FINAL DRAINAGE REPORT

W.O. #68927

ELLSWORTH ROAD -PHASE I-
GERMANN ROAD TO RAY ROAD

Prepared for:

MARICOPA COUNTY DEPARTMENT

OF TRANSPORTATION

Prepared by:

amec

May 23, 2005

amec

Memo

To	**Sami Ayoub, P.E., MCDOT** **Bobbie Ohler, P.E., FCDMC** **Tom Kmetz, P.E., City of Mesa**
From	**Alex Coronel, P.E., AMEC**
Date	**July 19, 2005**

Registered Professional Engineer (Civil)
CERTIFICATE NO.
40209
ALEX F.
CORONEL
Date Signed 7-19-2005
ARIZONA, U.S.A.

Subject **Field Change Memorandum for Minor Revisions to Final Improvement Plans for W.O. #68927 (Ellsworth Road Phase I)**

Project Stakeholders and Construction Contractor,

The purpose of this technical memorandum is to provide a supplement to the Final Improvement Plans, dated April 15, 2005, for W.O. #68927 (Ellsworth Road – Phase I, Germann road to Ray Road) to reflect minor field revisions that should be made to said plans during project construction.

This memorandum addresses the following six (6) items:

ITEM 1: – SEE APPENDIX N
The revised *Design Memorandum for Ellsworth Road Overtopping* and supporting attachments dated May 19, 2005; included in the Final Drainage Report for Ellsworth Road Phase I dated May 23, 2005 show that the proposed berm at channel station 500+00 to 502+00 is no longer necessary. Therefore the berm should NOT be built. Further clarification is provided in the *Design Memorandum for Ellsworth Channel Overtopping,* dated July 19, 2005.

ITEM 2:
On sheet S09, the plan view note should read; " 4 CELLS, 10x6x24' ", NOT 6 CELLS. (See Attached S09)

ITEM 3:
On sheet S02, the station and invert elevation at the downstream end of the culvert apron should be changed to; Sta. = 467+02.86 and El. = 1380.44. The slope of the apron should be changed to; S = -0.0855%. (See Attached S02)

ITEM 4:
On sheet S01, the invert elevation at the upstream and downstream ends of the culvert apron should be changed to; El. (Upstream) = 1383.47, El. (Downstream) = 1383.42. (See Attached S01)

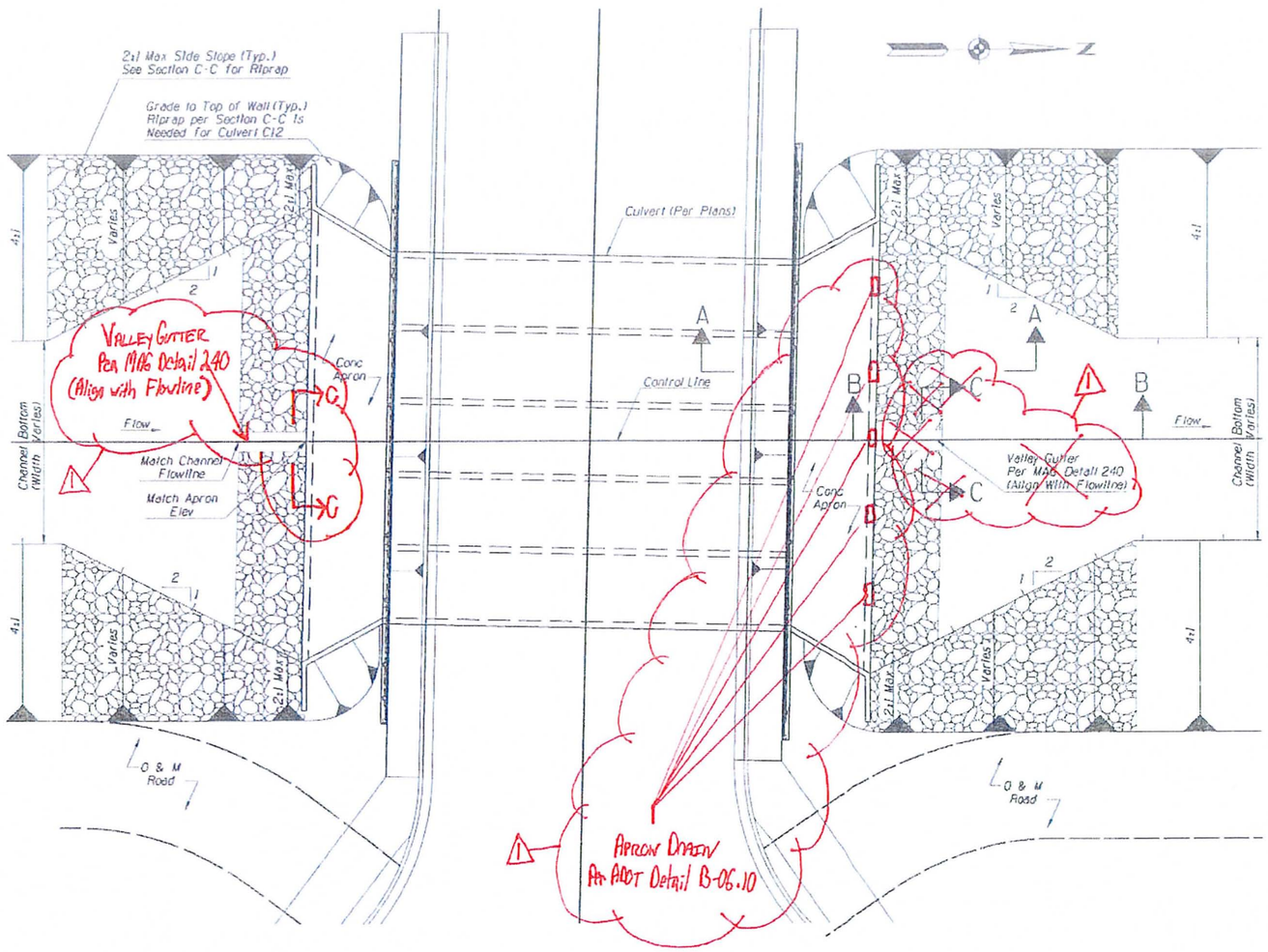
AMEC Infrastructure, Inc.
4435 East Holmes Avenue
Mesa, Arizona 85206-3372
Tel (480) 830-3700
Fax (480) 830-3903
www.amec.com

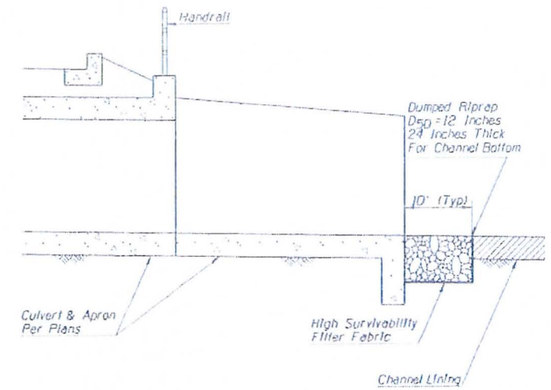
ITEM 5:
At each concrete box culvert outlet apron, drain slots shall be added at each barrel centerline per ADOT Std. Det. B-06.10. Also the downstream Valley Gutter shown on Detail Sheet CHD4 shall NOT be constructed but rather the dumped riprap shall be warped to create a smooth transition between the apron elevation and the channel flow line elevation. (See Attached CHD4)

ITEM 6:
Per Section 215 of the Project Final Special Provisions; "In addition to grading per finished grade tolerances, the channel shall be graded to drain". This is especially critical from channel stations 446+98.90 to 552+52.28 where the proposed channel is of shallow slope and runs parallel to Ellsworth Road. The finished channel should be free of any areas that would result in the accumulation of standing water. To further promote positive drainage it is recommended that the channel be built from downstream to upstream.

If there are any questions, comments or concerns regarding this memorandum please feel free to contact AMEC.

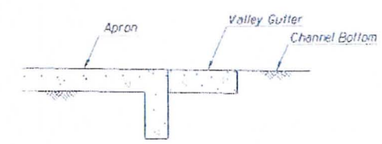
FEDERAL REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927	97	130	





SECTION A-A

(Typical Upstream and Downstream)



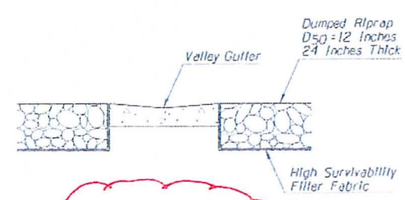
SECTION B-B

(Typical Upstream and Downstream)

• Typical for Culverts C3, C7, C9, C11, & C12.

For culvert C12, Riprap is not needed on side slopes with no 2:1 side slope transitions.

For culvert C4, see Sheet CH05 for channel bottom and side slope transitions, and valley gutter length.



SECTION C-C

(Typical Upstream and ~~Downstream~~)

NO.	REVISION	BY	DATE
1		APC	7-12-06
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	J.CHRISTOPH, R.DAVIES	04/15/05
DRAWN	S.CARLOCK	04/15/05
CHECKED	R.DAVIES	04/15/05

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2496

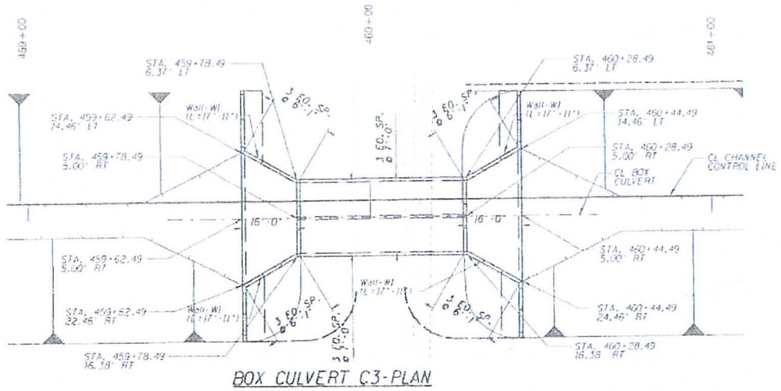
BOX CULVERT AND CHANNEL BOTTOM TRANSITION RIPRAP DETAILS

SHEET CH04 OF CH09

TRACS NO.

English

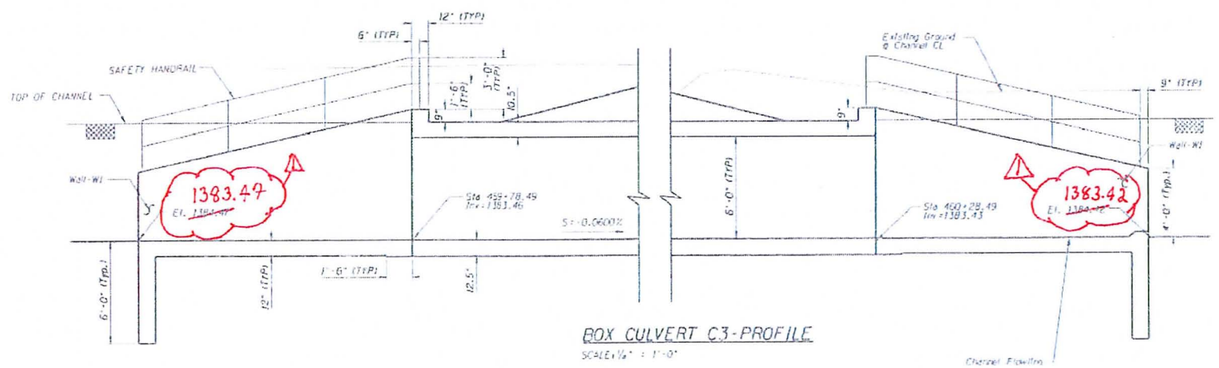
FEDERAL AID REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927	118	125	



BOX CULVERT C3-PLAN

SCALE: 1" = 20'

2 CELLS, 10'x6'x50', H=6'
FOR REINFORCING DETAILS OF BOX CULVERT SEE ADOT STANDARD DWG B-02.20 TABLE 1



BOX CULVERT C3-PROFILE

SCALE: 1/16" = 1'-0"

NOTES:

1. FOR CONCRETE AND REINFORCING DETAILS OF WALL-W1 AND WALL-W2 SEE DWG. 508.
2. NEAR SIDE RAILING NOT SHOWN FOR CLARITY. FOR DETAILS OF HANDRAILS SEE DWG. 505.
3. L=APPROXIMATE LENGTH OF WALLS.
4. SEE CHANNEL DWGS. CH01-CH05 AND CHANNEL PLAN AND PROFILE DWGS. CH01-CH23 AND CH01P-CH23P FOR LOCATION OF UTILITIES.
5. SEE DWGS CH01-CH03 FOR BANK PROTECTION, RIPRAP AND CHANNEL BOTTOM TRANSITION DETAILS.
6. ALL STRUCTURES SHALL HAVE FORMED CONSTR. JOINTS IN TOP SLAB AND WALLS (OPTIONAL IN FLOOR SLAB) SPACED NOT MORE THAN 38'-0" APART OR AS SHOWN. REINFORCING STEEL SHALL PROJECT 1'-6" THRU THE JOINT. THE JOINT SHALL BE MADE WITH 1/2" PLYWOOD BULKHEAD WHICH SHALL BE LEFT IN PLACE. JOINTS SHALL BE PERPENDICULAR TO THE CENTERLINE OF THE BOX.
7. THE DETAILS FOR EXPANSION AND CONSTRUCTION JOINTS SHALL CONFORM TO ADOT STANDARD DETAIL B-10.10 FOR RETAINING WALLS.
8. EXPANSION JOINTS IN WALLS & TOP SLAB SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 90'-0".

NO.	REVISION	BY	DATE
4			
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	S. RAMAIAH	10/15/04
DRAWN	B. HELM	10/15/04
CHECKED	S. RAMAIAH	10/19/04

17809 SATYA V. RAMAIAH

SVR INC.
S.R CONSULTING ENGINEERS
2219 S. 16th St.
Suite 1
Tempe, AZ 85282
Ph: (602) 414 4460
Fax: (602) 414 4074

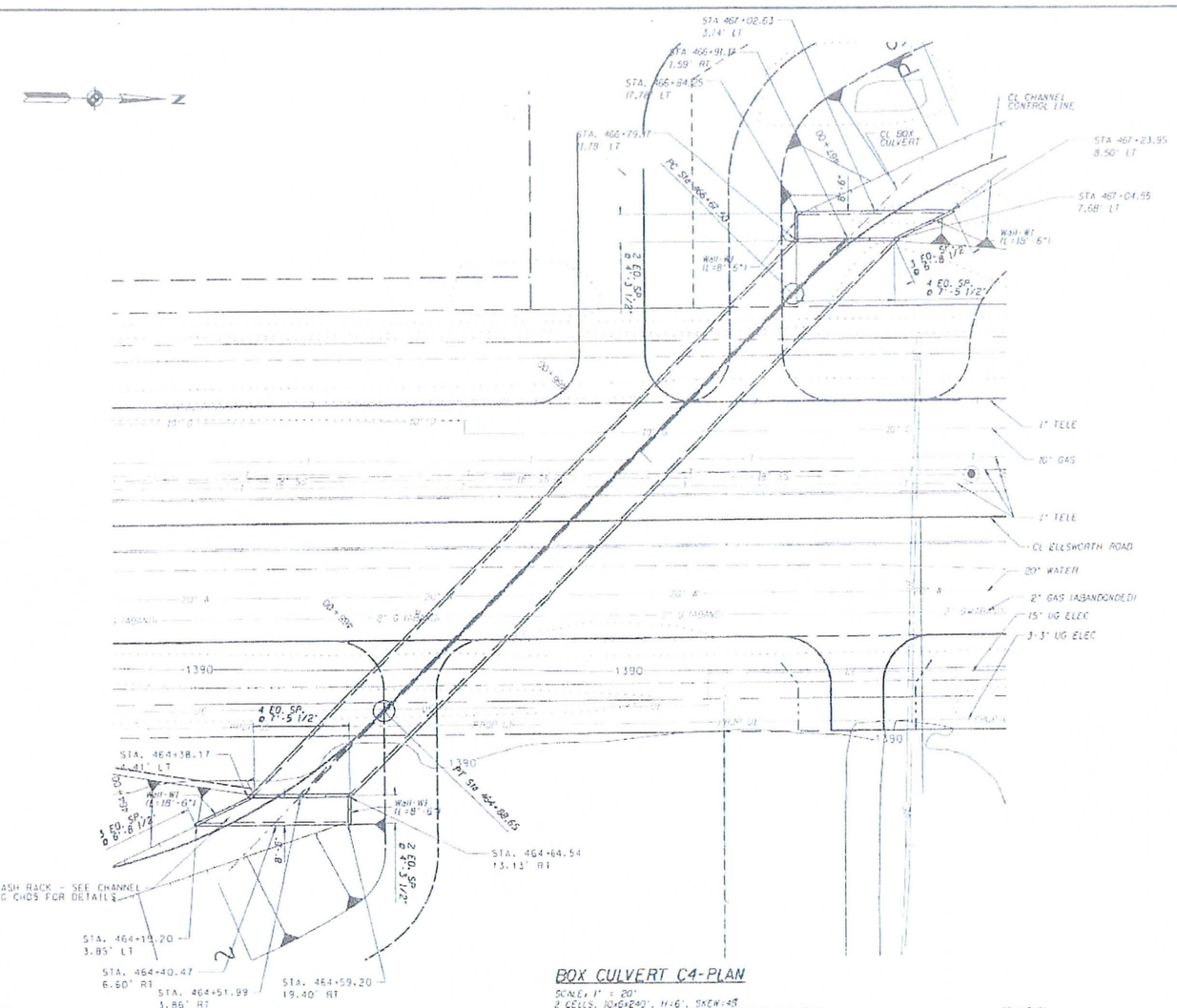
BOX CULVERT C3
PLAN AND ELEVATION

SHEET S01 OF S12

TRACS NO.

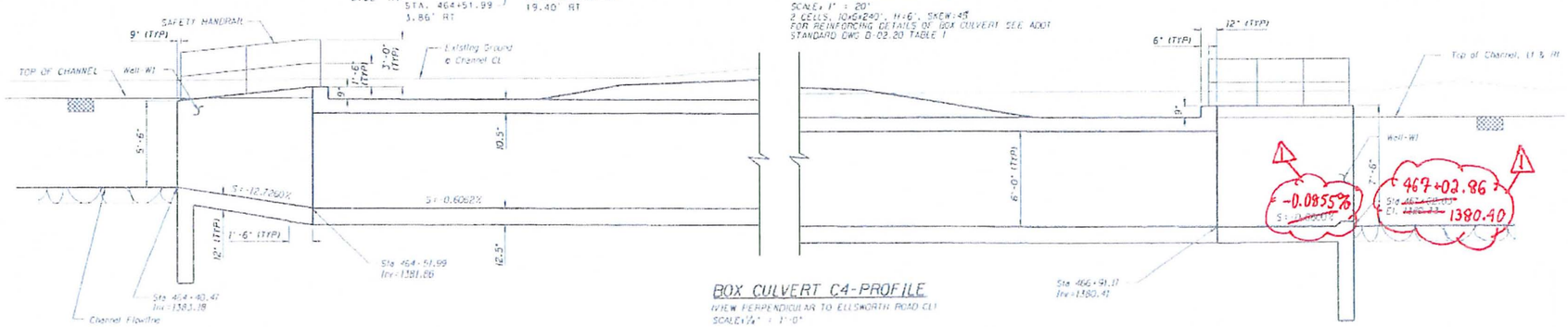
English

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927	119	129	



BOX CULVERT C4-PLAN

SCALE: 1" = 20'
2 CELLS, 10'Wx8'H, L=6', SKEW=45
FOR REINFORCING DETAILS OF BOX CULVERT SEE ADOT STANDARD DWG B-03.20 TABLE 1



BOX CULVERT C4-PROFILE

(VIEW PERPENDICULAR TO ELLSWORTH ROAD CL)
SCALE: 1/4" = 1'-0"

NOTES:

1. FOR CONCRETE AND REINFORCING DETAILS OF WALL W1 AND WALL-W2 SEE DWG. S08.
2. NEAR SIDE RAILING NOT SHOWN FOR CLARITY. FOR DETAILS OF HANDRAILS SEE DWG. S03.
3. L=APPROXIMATE LENGTH OF WALLS.
4. SEE CHANNEL DWGS. CH01-CH05 AND CHANNEL PLAN AND PROFILE DWGS. CH01-CH23 AND CH01P-CH23P FOR LOCATION OF UTILITIES.
5. SEE DWGS CH01-CH04 FOR BANK PROTECTION, RIPRAP AND CHANNEL DOTTED TRANSITION DETAILS.
6. ALL STRUCTURES SHALL HAVE FORMED CONSTR. JOINTS IN TOP SLAB AND WALLS (OPTIONAL IN FLOOR SLAB) SPACED NOT MORE THAN 36'-6" APART OR AS SHOWN. REINFORCING STEEL SHALL PROJECT 1'-6" THRU THE JOINT. THE JOINT SHALL BE MADE WITH 3/4" PLYWOOD BULKHEAD WHICH SHALL BE LEFT IN PLACE. JOINTS SHALL BE PERPENDICULAR TO THE CENTERLINE OF THE BOX.
7. THE DETAILS FOR EXPANSION AND CONSTRUCTION JOINTS SHALL CONFORM TO ADOT STANDARD DETAIL B-16.30 FOR RETAINING WALLS.
8. EXPANSION JOINTS IN WALLS & TOP SLAB SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 30'-0".

NO.	REVISION	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	S. RAMAIAH	10/15/04
DRAWN	B. HELM	10/15/04
CHECKED	S. RAMAIAH	10/15/04

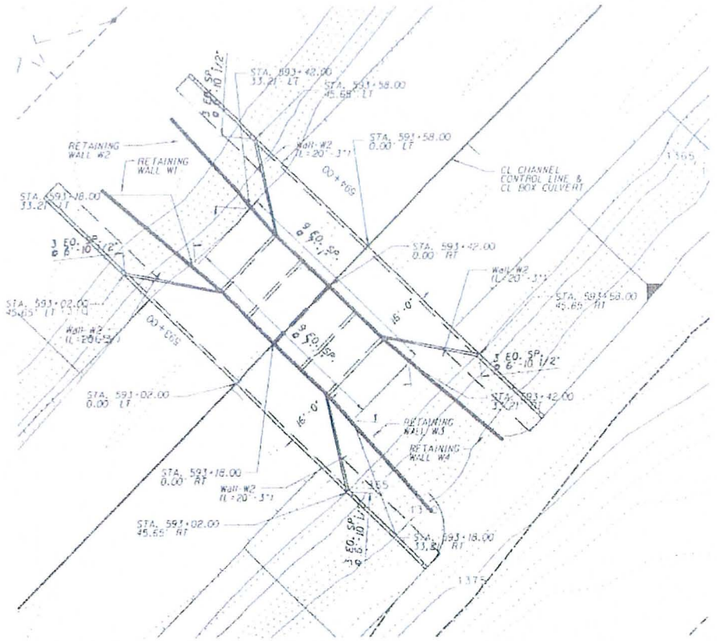
SVR INC.
S R CONSULTING ENGINEERS

BOX CULVERT C4
PLAN AND ELEVATION

SHEET S02 OF S12

TRACS NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TO AL. SHEETS	RECORD DRAWING
9	AZ	68927	126	129	



BOX CULVERT C12-PLAN

SCALE: 1" = 20'

4 3 CELLS, 10'x6'x24'
FOR REINFORCING DETAILS OF BOX CULVERT SEE ADOT STANDARD DWG B 02.03 TABLE 1

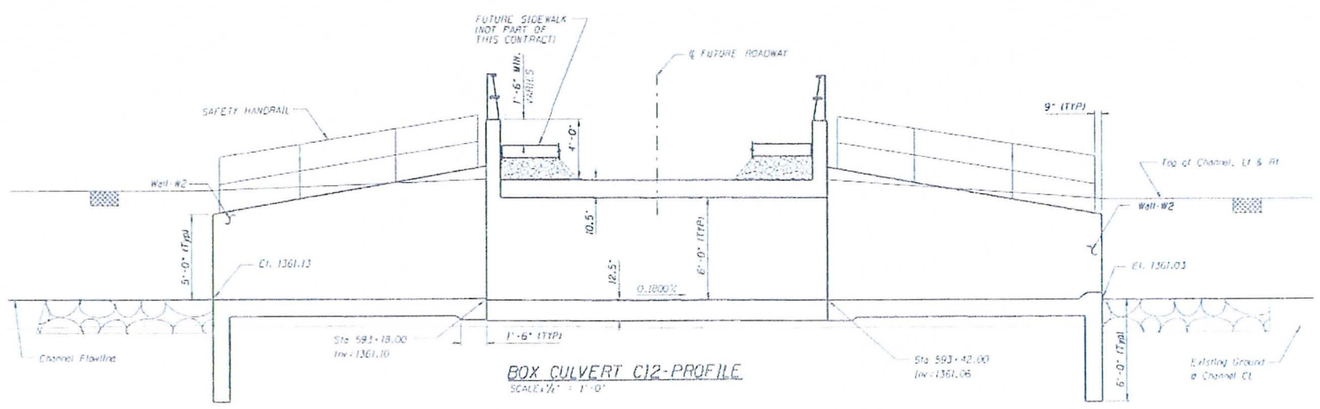
RETAINING WALLS

NUMBER	LENGTH
W1	34'-9"
W2	34'-9"
W3	34'-9"
W4	34'-9"

SEE ADOT STD. DWGS. B 18.10 & 18.20 CASE 2, HEIGHT 6' FOR DETAILS

NOTES:

1. FOR CONCRETE AND REINFORCING DETAILS OF WALL-W1 AND WALL-W2 SEE DWG. 508.
2. NEAR SIDE RAILING NOT SHOWN FOR CLARITY. FOR DETAILS OF HANDRAILS SEE DWG. 508.
3. L=APPROXIMATE LENGTH OF WALLS.
4. SEE CHANNEL DWGS. CH01-CH05 AND CHANNEL PLAN AND PROFILE DWGS. CH01-CH23 AND CH01P-CH23P FOR LOCATION OF UTILITIES.
5. SEE DWGS. CH01-CH04 FOR BANK PROTECTION, RIPRAP AND CHANNEL BOTTOM TRANSITION DETAILS.
6. ALL STRUCTURES SHALL HAVE FORMED CONSTR. JOINTS IN TOP SLAB AND WALLS (OPTIONAL IN FLOOR SLAB) SPACED NOT MORE THAN 18'-8" APART OR AS SHOWN. REINFORCING STEEL SHALL PROJECT 1'-6" THRU THE JOINT. THE JOINT SHALL BE MADE WITH ¾" PLYWOOD BULKHEAD WITCH SHALL BE LEFT IN PLACE. JOINTS SHALL BE PERPENDICULAR TO THE CENTERLINE OF THE BOX.
7. THE DETAILS FOR EXPANSION AND CONSTRUCTION JOINTS SHALL CONFORM TO ADOT STANDARD DETAIL B 18.10 FOR RETAINING WALLS.
8. EXPANSION JOINTS IN WALLS & TOP SLAB SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 90'-0".



BOX CULVERT C12-PROFILE

SCALE: 1/4" = 1'-0"

NO.	REVISION	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	S. RAMAIAH	10/15/04
DRAWN	B. HELM	10/15/04
CHECKED	S. RAMAIAH	10/19/04

SVR INC.

BOX CULVERT C12
PLAN AND ELEVATION

SHEET 509 OF 512

TRACS NO.

amec

Memo

To	Sami Ayoub, P.E., MCDOT Bobbie Ohler, P.E., FCDMC Tom Kmetz, P.E., City of Mesa
From	Alex Coronel, P.E., AMEC
Date	November 28, 2004 Revised: May 19, 2005 Revised: July 19, 2005

Registered Professional Engineer (Civil) CERTIFICATE NO. 40209 ALEX F. CORONEL Date Signed 7-19-05 ARIZONA, U.S.A.

Subject **Design Memorandum for Ellsworth Channel Overtopping W.O. #68927 (Ellsworth Road Phase I)**

SEE APPENDIX N

PURPOSE: The purpose of this memorandum is to document the results of the evaluation of the proposed Ellsworth Channel hydraulic design. The results of the hydraulic design and analysis demonstrate that the new channel, which is designed for developed watershed conditions runoff, will not make flooding conditions worse during a 100-year storm event under existing watershed conditions. The evaluation focused on the channel reach from the existing Pecos Road alignment extending 3200 feet north (See attached exhibits). **This revision dated July 19, 2005 does not differ from the May 19, 2005 memorandum in terms of calculated results, but rather serves to further clarify the implications of said results. (Additions are shown in bold.)**

HYDROLOGY: The developed watershed peak discharges are significantly lower than the peak discharges under existing watershed conditions due to on-site retention requirements imposed on new development. Of greater impact in this area is the impact of the proposed Pecos detention basins planned at the Maricopa / Pinal County boundary as outlined in the East Mesa Area Drainage Master Plan (ADMP) (See attached ADMP Area 1 Preliminary Plan, by Dibble and Associates). The developed conditions channel design discharge at existing Pecos Road is 600 cfs. The existing conditions peak discharge at the same location is 2858 cfs.

The ADMP existing conditions hydrology model shows runoff generated south and east of existing Pecos Road, draining west to Ellsworth Road, crossing Ellsworth Road and continuing west along the Pecos Road alignment. Runoff generated north and east of the existing Pecos Road as well as runoff generated in Pinal County, is diverted along the north side of the existing Pecos Road to Ellsworth Road. At Ellsworth Road this runoff flows north along Ellsworth Road and crosses Ellsworth Road into the Williams Gateway Airport North Perimeter Channel.

HYDRAULIC EVALUATION: This evaluation considers the impact of the proposed channel construction on overtopping flows leaving the channel and continuing west along the historic flow path. Two HEC-RAS models were developed to estimate overtopping flows.

HEC-RAS model *EllsworthChannel.prj (Plan: Final Unplugged Int CIP Q Weir No Berm.p03)* was developed based on proposed channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow leaving the channel and continuing west onto WGA property. The

AMEC Infrastructure, Inc.
4435 East Holmes Avenue
Mesa, Arizona 85206-3372
Tel (480) 830-3700
Fax (480) 830-3903
www.amec.com

lateral weir location is shown on the attached Figure: *Weir Exhibit – Proposed Condition.* The highest ground elevation adjacent to the channel was used as the weir elevation for the proposed condition; this coincided with the top of the WGA access road throughout much of the reach.

HEC-RAS model *EllsworthExistingOT.prj* was developed based on existing channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow overtopping the Ellsworth Road and existing channel. Again, the highest ground elevation adjacent to the existing channel was used as the weir elevation for the existing conditions. This consists of the GM access road at the upstream end of the model and the WGA access road at the downstream end. This is shown on the attached Figure: *Weir Exhibit – Existing Condition.*

RESULTS:

- The existing watershed flow escapes the proposed Ellsworth Channel and continues west onto WGA property from channel station 14451 to channel station 12800 see Figure: *Weir Exhibit – Proposed Condition.* Approximately 1160 cfs escapes to the west. The amount of existing watershed flow crossing existing Ellsworth Road and channel from the same reach, from Pecos road to channel station 12800, is approximately 1780 cfs see Figure: *Weir Exhibit – Existing Condition.* Note that the proposed HEC-RAS Channel Stationing = Existing Channel Stationing – 100, upstream of station 11400, this is accounted for on the attached figures and the attached *Channel Depth Check.xls* Table. The amount of existing watershed flow leaving the proposed channel and continuing west (1160 cfs) is less the existing watershed flow crossing the existing road and channel and continuing west (1780 cfs). Therefore the channel construction does not have a negative impact on overtopping flow to the west as the total amount of flow that escapes is decreased and the extent of the escaping reach is not altered.

- As shown on the attached *Channel Depth Check.xls* Table, although the proposed channel will retain and convey higher flows the computed water surface elevation is decreased throughout the breakout reach (station 14451 to 12800).

- **As shown on the attached *Channel Depth Check.xls* Table, from Channel Station 500+00 to 502+00 the computed water surface elevation for the proposed geometry is less than the computed water surface elevation for the existing geometry. Therefore the proposed berm shown on the Final Improvement Plans is <u>NOT NECESSARY and should NOT be constructed</u>.**

- **As shown on the attached Figures: *Weir Exhibit – Existing Condition* and *Weir Exhibit – Proposed Condition*, the interim condition flow that overtops the control weir and travels westward will follow well defined flow paths parallel to or in-between the existing elevated WGA runways. The channel construction will not change the ultimate path of the overtopping flow when compared to the existing condition.**

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Comparison of Magnitude and Location of Flow that will overtop Ellsworth Channel and adjacent high ground and continue towards the west, in both the Existing and Proposed Conditions. Analysis for the proposed conditions assumes that the berm from channel stations 500+00 to 502+00 fails.**

Sheet
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

Conclusion: **The analysis shows that the location of breakout to the west occurs at approximately the same location for both the existing and proposed conditions. Also the total amount of flow that escapes will be reduce from approximately 1800 cfs to 1200 cfs.**
Finally the computed water surface elevation for the proposed condition is consistently lower throughout the overtopping reach (from station 505+00 downstream the flow is contained within the channel for both the existing and proposed conditions).
Note: River Stationing is offset by approximately 100 ft. upstream of RS 11400, this is accounted for in the following tables.

Prepared By: AFC

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

PROPOSED GEOMETRY (See Exhibit for Weir Location)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Freeboard at Left Channel Bank	Weir Flow
		(cfs)	(ft)	(ft)	(ft)	(ft)	(cfs)
14490	47409.16	Lat Struct					
14451	47448.16	342.01	1379.81	1387.3	7.5	0.4	33
14400	47499.16	309.37	1379.77	1387.3	7.5	0.5	64
14300	47599.16	245.87	1379.69	1387.3	7.6	0.3	56
14200	47699.16	190	1379.61	1387.3	7.7	0.2	49
14100	47799.16	140.56	1379.53	1387.3	7.8	0.1	120
14000	47899.16	20.58	1379.45	1387.3	7.8	-0.4	197
13900	47999.16	2330.39	1379.37	1386.8	7.4	0.1	182
13800	48099.16	2148.67	1379.29	1386.7	7.4	0.6	163
13700	48199.16	1985.61	1379.21	1386.6	7.4	0.3	109
13600	48299.16	1876.27	1379.13	1386.53	7.4	0.3	50
13500	48399.16	1825.82	1379.05	1386.43	7.4	0.6	25
13400	48499.16	1800.59	1378.97	1386.33	7.4	0.3	11
13300	48599.16	1789.83	1378.89	1386.24	7.3	0.8	9
13200	48699.16	1780.5	1378.81	1386.15	7.3	-0.4	3
13100	48799.16	1777.05	1378.73	1386.06	7.3	-0.4	0
13000	48899.16	1777.05	1378.65	1385.99	7.3	-0.4	15
12900	48999.16	1761.71	1378.57	1385.9	7.3	-0.4	50
12800	49099.16	1711.4	1378.49	1385.84	7.3	-0.4	20
12700	49199.16	1691.75	1378.41	1385.78	7.4	-0.5	2
12600	49299.16	1690.12	1378.33	1385.75	7.4	-0.5	2
12500	49399.16	1688.5	1378.25	1385.67	7.4	-0.5	0
12400	49499.16	1688.4	1378.17	1385.59	7.4	-0.5	0
12300	49599.16	1688.4	1378.09	1385.52	7.4	-0.5	0
12200	49699.16	1688.4	1378.01	1385.45	7.4	-0.5	0
12100	49799.16	1688.4	1377.93	1385.37	7.4	-0.5	0
12000	49899.16	1688.4	1377.85	1385.3	7.5	-0.6	0
11900	49999.16	1688.4	1377.77	1385.22	7.5	-0.6	0
11800	50099.16	1688.4	1377.69	1385.13	7.4	-0.5	0
11700	50199.16	1688.4	1377.61	1385.06	7.5	-0.5	0
11400	50499.16	1688.4	1377.37	1384.87	7.5	0.12	0
11300	50599.16	1688.4	1377.29	1384.74	7.5	0.51	0
						Total Weir Flow =	1161

HEC-RAS Project: Ellsworth Existing Channel Overtopping.prj
HEC-RAS Plan: Ellsworth Existing Channel Overtopping.p01

EXISTING GEOMETRY (See Exhibit for Weir Location)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Freeboard at Left Channel Bank	Weir Flow	Prop. Conditions CWSEL - Exist. Conditions CWSEL
		(cfs)	(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)
14200	47699.16	2856	1386.67	1389.63	3.0	0.37	300	-2.3
14100	47799.16	2555.97	1386.59	1389.41	2.8	-0.77	468	-2.1
14000	47899.16	2087.76	1386.04	1389.14	2.8	-0.69	412	-2.3
13900	47999.16	1675.36	1385.46	1388.94	3.1	-1.11	139	-2.2
13800	48099.16	1536.69	1385.56	1388.76	3.5	-0.58	84	-2.2
13700	48199.16	1452.35	1385.4	1388.49	3.2	-0.58	26	-2.0
13600	48299.16	1426.65	1385.38	1388.26	3.1	-0.67	17	-1.8
13500	48399.16	1410.1	1385.13	1387.98	2.9	-0.59	34	-1.7
13400	48499.16	1376.17	1384.9	1387.42	2.8	-0.16	56	-1.2
13300	48599.16	1320.64	1385.24	1387.25	2.5	-0.25	67	-1.1
13200	48699.16	1253.85	1385.08	1387.07	2.0	-0.07	29	-1.0
13100	48799.16	1225.34	1384.85	1386.92	2.0	-0.25	0	-0.9
13000	48899.16	1225.33	1384.52	1386.76	2.1	-0.22	35	-0.9
12900	48999.16	1190.01	1384.43	1386.57	2.2	-0.03	88	-0.7
12800	49099.16	1101.7	1384.28	1386.43	2.1	0.05	23	-0.7
12700	49199.16	1078.86	1383.98	1386.3	2.2	0.1	0	-0.5
12600	49299.16	1078.86	1383.84	1386.19	2.3	0.07	0	-0.5
12500	49399.16	1078.86	1383.86	1386.05	2.4	-0.11	0	-0.5
12400	49499.16	1078.86	1383.77	1385.92	2.2	-0.04	0	-0.4
12300	49599.16	1078.86	1383.65	1385.8	2.2	-0.2	0	-0.3
12200	49699.16	1078.86	1383.48	1385.67	2.1	-0.49	0	-0.3
12100	49799.16	1078.86	1383.31	1385.54	2.2	-0.3	0	-0.2
12000	49899.16	1078.86	1383.37	1385.42	2.2	-0.36	0	-0.2
11900	49999.16	1078.86	1383.28	1385.29	2.1	-0.29	0	-0.2
11800	50099.16	1078.86	1383.45	1385.18	2.0	-0.1	0	-0.1
11400	50499.16	1078.86	1380.34	1384.32	4.0	0.68	0	0.5
11300	50599.16	1078.86	1380.16	1383.81	3.6	1.09	0	0.9
						Total Weir Flow =	1777	

FINAL DRAINAGE REPORT

W.O. #68927

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

ELLSWORTH ROAD -PHASE I-
GERMANN ROAD TO RAY ROAD

Prepared for:

MARICOPA COUNTY DEPARTMENT
OF TRANSPORTATION

Prepared by:

Registered Professional Engineer (Civil)
CERTIFICATE NO.
40209
ALEX F.
CORONEL
Date Signed 5-23-05
ARIZONA, U.S.A.

amec

Registered Professional Engineer (Civil)
CERTIFICATE NO.
21674
ROBERT L.
DAVIES
Date Signed 5-23-05
ARIZONA, U.S.A.

May 23, 2005

DRAINAGE REPORT

W.O. #68927

ELLSWORTH ROAD – GERMANN ROAD TO RAY ROAD

TABLE OF CONTENTS

I. INTRODUCTION 1
- A. General 1
- B. Study Area 1
- C. Existing Data and Reports 3

II. DESIGN CRITERIA 4
- A. Applicable Standards 4
- B. Definitions 4
  - 1. Watershed Condition 4
  - 2. CIP Condition 5
  - 3. Ultimate Design Criteria 6
  - 4. Check Design Criteria 6
- C. Rainfall 6
- D. Roadway Inundation 6
- E. Catch Basins 7
- F. Storm Drains 7
- G. Open Channels 8
  - 1. Channel Design Criteria 8
- H. Culverts 9
  - 1. Introduction 9
  - 2. Culverts within the Ellsworth Channel 9
  - 3. Cross-road culverts under Ellsworth Road 10

III. HYDROLOGY 11
- A. Introduction 11
- B. East Mesa ADMP 11
- C. Drainage Area Characteristics 11
- D. Methodology 12
  - 1. HEC-1 Hydrology 12
  - 2. Rational Method Hydrology 13
- E. Modifications to Base Hydrology Model (By Previous Consultant) 13
- F. Design Assumptions 15

IV. HYDRAULICS 15
- A. Roadway Drainage 15
  - 1. Methodology 15
  - 2. Assumptions 16
- B. Flood Control Channels 16
  - 1. Methodology 16
  - 2. Stable Channel Design 16
  - 3. Channel Lining 17
  - 4. Scour Along Proposed Channel 18

Registered Professional Engineer (Civil) CERTIFICATE NO. 21874 ROBERT L. DAVIES Date Signed 5-23-05 ARIZONA, U.S.A.

Registered Professional Engineer (Civil) CERTIFICATE NO. 40203 ALEX F. CORONEL Date Signed 5-23-05 ARIZONA, U.S.A.

5. Manning's Roughness Coefficient 20
6. Channel Cross Section 21
7. Bends and Superelevation 22
8. Inflow locations 22
9. Down Drains 23
10. HEC-RAS Modeling 23
11. Special Considerations 24
C. Culverts 25
1. Methodology 25
2. Culvert Overtopping 25
V. RESULTS & RECOMMENDATIONS 27
A. Hydrology 27
B. Roadway Drainage Design 27
1. Design Exceptions 30
2. Powerline Floodway Outfall System Phase I, Station 178+50.26 (Sheet CHC3 & SD25) 31
3. North Ellsworth Channel Outfall System, Roadway Station 156+23 (Sheet SD20 to SD24) 32
4. Ellsworth Channel Outfall Connector Pipe System (Sheet SD04 to SD20) 32
5. South Ellsworth Channel Outfall System, Roadway Station 46+99 (Sheet SD02 to SD03) 32
6. South of Germann Road 33
C. Channel Design 33
1. Design Exception 34
2. Starting Water Surface Elevation 36
3. Station 616+95 to 52+ 523+95 (Powerline Floodway to GM Manifold) 37
4. Station 520+50 to 473+29.5 (GM Manifold to Pecos Rd.) 38
5. Station 473+29.5 to 446+45.7 (Pecos Rd. to Future Pecos Rd.) 38
6. Station 446+45.7 to 420+00 (Future Pecos Rd. to Germann Rd.) 39
7. Potential Land Subsidence 39
D. Culvert Design 39
1. Germann Drain 41
2. Pecos South Drain (Sta 69+21, Sta 72+17) 41
3. Pecos North Drain (Sta 76+86) 41
4. GM Manifold (Sta 120+72, Sta 129+29) 41
5. GM Drainage (South of the Powerline Floodway) (Sta 129+59) 42
6. Powerline Floodway Culvert Extension (Sta 178+41) 42
7. GM Drainage (North of the Powerline Floodway) 42
8. WGA Former Armory Culvert (Sta 608+78.59) 43
VI. REFERENCES 43

Registered Professional Engineer (Civil) CERTIFICATE NO. 40209 ALEX F. CORONEL Date Signed 5-23-05 ARIZONA, U.S.A.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21074 ROBERT L. DAVIES Date Signed 5-23-05 ARIZONA, U.S.A.

LIST OF FIGURES

Figure-1 Project Location 2
Figure-2 HEC-1 Sub-area Map 14
Figure-3 Storm Drain Schematic 29

LIST OF TABLES

Table-1 Precipitation Depths 6
Table-2 Culvert Criteria Summary 10
Table-3 Gravel Mulch Gradation 18
Table-4 Design Flow Summary 27
Table-5 100-Year Runoff Concentration Points 31
Table-6 Channel Design Summary 33
Table-7 Culvert Summary 40

LIST OF APPENDICES

Meeting Summary ..... Appendix A
Design Rainfall Data ..... Appendix B
Soil Data ..... Appendix C
HEC-1 Output ..... Appendix D
Stable Channel Design Calculations ..... Appendix E
Scour Calculations ..... Appendix F
Pavement Drainage, Storm Drain and Riprap Sizing Calculations ..... Appendix G
HEC-RAS for PLF ..... Appendix H
Ellsworth Channel Design Conditions HEC-RAS Output ..... Appendix I
Culvert Calculations ..... Appendix J
Drop Structure Design Calculations ..... Appendix K
Downdrain Location Determination ..... Appendix L
Channel Freeboard Tables ..... Appendix M
AMEC Design Memorandums ..... Appendix N
WGA North Perimeter Channel and Armory Culvert Drain Time Calculations ..... Appendix O
Storm Drain Tie-in Check at Powerline Floodway ..... Appendix P
Electronic Hydraulic and Hydrologic Models ..... Appendix Q

Registered Professional Engineer (Civil) CERTIFICATE NO. 40209 ALEX F. CORONEL Date Signed 5-23-05 ARIZONA, U.S.A.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21674 ROBERT L. DAVIES Date Signed 5-23-05 ARIZONA, U.S.A.

DRAINAGE REPORT
W.O. #68927
ELLSWORTH ROAD PHASE I – GERMANN ROAD TO RAY ROAD

I. INTRODUCTION

A. *General*

This drainage report is prepared for the Maricopa County Department of Transportation (MCDOT), the Flood Control District of Maricopa County (FCDMC), and the City of Mesa as part of the design of Ellsworth Road widening from Germann Road to Ray Road in Mesa, Arizona. This report supersedes the previous report dated January 31, 2005 and the addendum issued on March 7, 2005. The project includes on-site roadway drainage design as well as the design of the Ellsworth Channel, a regional flood control channel identified in the *East Mesa Area Drainage Master Plan.* The FCDMC and City of Mesa are participating with MCDOT in project implementation. This report presents the drainage analysis and results for the project. The project location is shown on **Figure 1**.

Ellsworth Road will be constructed in phases. An ultimate 7-lane roadway section has been identified, however, an interim 5-lane section will be constructed in undeveloped sections of the corridor. The roadway drainage design is based on the ultimate section with temporary catch basins located along the interim roadway sections.

B. *Study Area*

The study area is characterized predominantly by open desert land. However, residential development is replacing the open desert environment north of Elliot Road and this trend is expected to continue across the watershed. The drainage area is bounded by the CAP canal on the east and the East Maricopa Floodway on the west. The General Motors Desert Proving Grounds (GMDPG) is located immediately east of Ellsworth Road and serves as a 4-mile barrier to flow from the east. It is intended that regional flows cross Ellsworth Road at five main locations; 1) Elliot Wash - 1/4 mile north of Elliot Road, 2) Elliot Drain – ¼ mile south of Elliot Road, 3) Powerline Floodway (PLF) - midway between Elliot Road and Pecos Road (Ray Road alignment), 4) GM Manifold – at approximately the Williams Field Road alignment, and 5) Pecos Channel – at or near Pecos Road. The latter three crossings are located within the Phase I study area and are the main focus of this report.

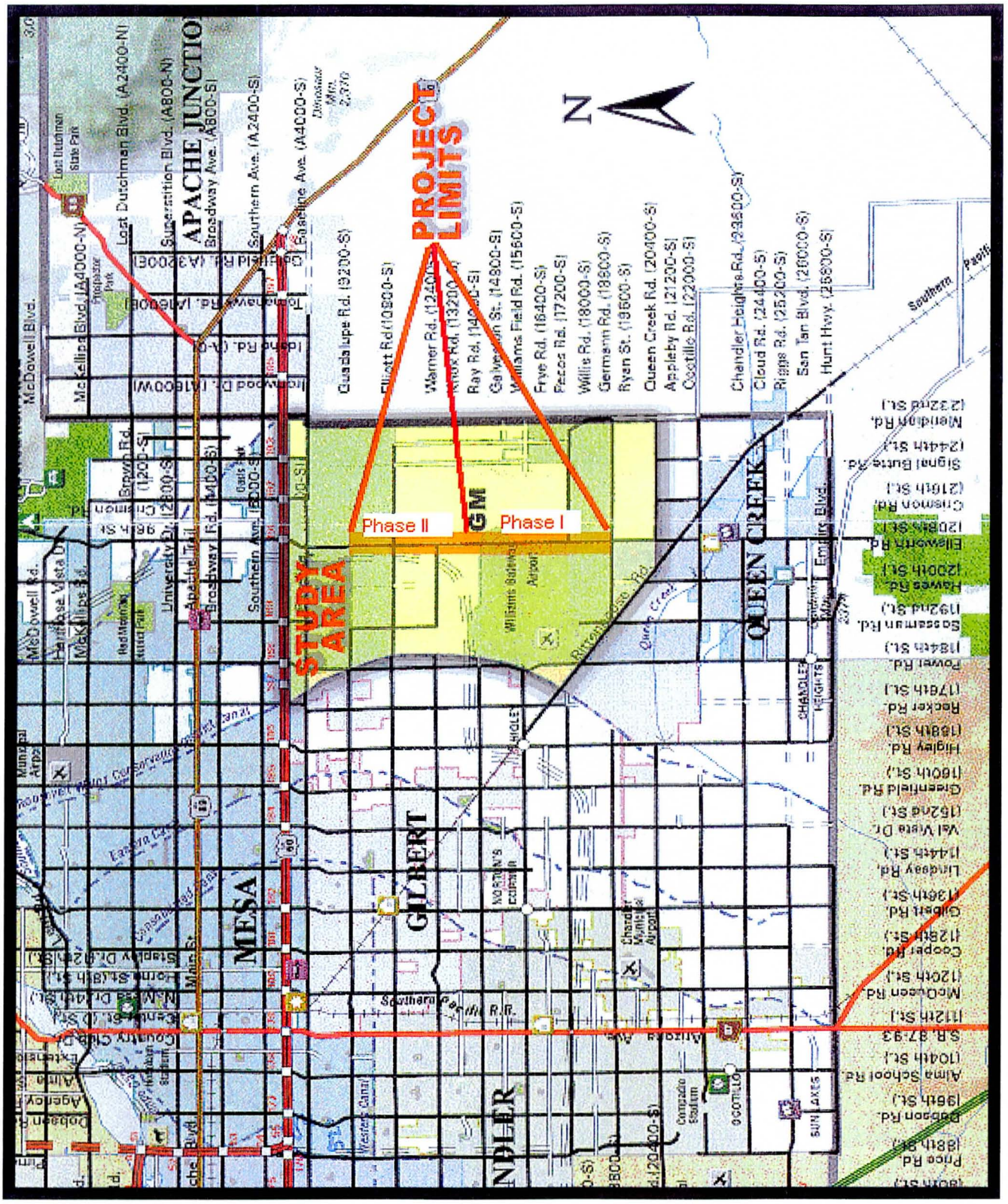


Figure 1 – Project Location

C. *Existing Data and Reports*

The Ellsworth Channel design is based on a preliminary channel design concept presented in *East Mesa Area Drainage Master Plan, Recommended Design Report*, FCD #95-32, July 1998 (ADMP) prepared by Dibble & Associates for the FCDMC. The ADMP channel concept is part of a larger system of channels and detention basins. This system will collect runoff at the Pinal County line adjacent to Meridian Road at Pecos Road and convey the runoff westerly along Pecos Road to Ellsworth Road. Once at the intersection of Ellsworth and Pecos Roads, runoff will be routed north along Ellsworth Road for 1.5 miles before heading northwesterly through the Williams Gateway Airport and to the Powerline Floodway.

The preliminary design was subsequently refined as part of the *Design Concept Report, Ellsworth Road to Baseline Road*, October 1999 (DCR), prepared by Dibble & Associates as a sub-consultant to CH2MHill for MCDOT. The DCR combined the roadway design for Ellsworth Road with the Ellsworth Channel to formulate a combined channel & roadway concept. The preliminary roadway drainage concept was also developed as part of the DCR. The roadway drainage concept utilizes the planned flood control improvements as outfalls for the roadway drainage.

Alternative alignments and cross-sections were then re-evaluated for the Ellsworth Channel in the *Preliminary Channel Evaluation*, completed as a pre-design phase of the current design contract. Channel alternatives were re-evaluated to incorporate changes that have occurred since the ADMP as well as to refine the channel and landscape concepts based on input from the project stakeholders. The selected channel concept and alignment was developed to a pre-design level in *Technical Memorandum #2, Preliminary Channel Evaluation Hydraulics & Hydrology*, June 8, 2001 (TM2), prepared by Dibble & Associates as a sub-consultant to CH2Mhill for MCDOT. The selected channel concept is further developed for final design as documented in this drainage report.

Soil properties are described in four separate geotechnical documents. *Report on Geotechnical Investigation*, August 6, 2001, Speedie and Associates, presents the site investigations,

laboratory results, and design recommendations for the roadway project. *Supplemental Drainage Channel, Ellsworth Road – Germann to ½ Mile N. of Elliot*, draft dated August 3, 2001, Speedie and Associates, presents the results of investigations along the Ellsworth Channel alignment for use in channel lining design. *Geotechnical Design for Ellsworth Road Drainage Channel*, January 28, 2002, Memorandum by CH2Mhill presents recommendations for structure foundations within the channel. *Geotechnical Services Drainage Channel Improvements, Ellsworth Road to Guadalupe Roads,* December 17, 2004 by AMEC Earth and Environmental, Inc. (AMEC E&E) presents the results of test drilling and laboratory analysis and recommends criteria for embankment protection. The AMEC E&E report and the Speedie and Associates draft memorandum dated August 3, 2001 are contained in **Appendix C**.

II. DESIGN CRITERIA

A. *Applicable Standards*

The *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology*, January 1, 1995, (Hydrology Manual), and *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics*, January 28, 1996, (Hydraulics Manual), as well as the City of Mesa's drainage requirements as stated in the *City of Mesa Procedure Manual, Engineering and Design Standards* (Procedure Manual) are used as the basis for drainage design. Additionally, design criteria are adopted based on information presented in the ADMP. The specific criteria used in this analysis are contained in the following sections. Design exceptions where the following criteria are not met are identified in Section V. Results & Recommendations with an explanation of why the criteria were relaxed.

B. *Definitions*

The following definitions are used in describing the various design conditions and criteria used in the drainage design:

1. Watershed Condition

Watershed condition describes the level of development within the watershed. For purposes of this project, two (2) watershed conditions are considered:

a) Existing Conditions

Existing watershed conditions is defined as the development conditions at the time of design, which differentiates between natural, undeveloped or agricultural areas and areas that have been developed with single-family residential, commercial, industrial, or some other land use that exists at the time of the hydrologic modeling.

b) Developed Conditions

Developed watershed conditions is defined as the development conditions at build-out, which is based on the improvement of natural, undeveloped or agricultural areas into the ultimate development conditions as described by the appropriate land use plan.

2. CIP Condition

CIP condition describes the level of implementation of the East Mesa ADMP within the watershed. For purposes of this project, three (3) CIP conditions are considered:

a) Pre-CIP

The Pre-CIP condition is defined as the runoff patterns and routing before implementation of any of the recommended projects from the East Mesa ADMP and before construction of the Ellsworth Road project. This would be prior to construction of the Elliot Basin outlet pipes and includes the existing Ellsworth Road profile.

b) Interim CIP

The Interim CIP condition is defined as the runoff patterns and routing immediately upon completion of the Ellsworth Road construction. This would include the Crismon lateral to the Elliot Basin, the Elliot Basin, the Elliot Basin outlet pipes, and the new Ellsworth Road profile and drainage system.

c) Full-CIP

The full CIP condition is defined as the runoff patterns and routing upon full implementation of the recommended projects from the East Mesa ADMP. This would include construction of the Siphon Draw, Pecos North, and Pecos South Basins and the associated channels.

3. Ultimate Design Criteria

The ultimate design criteria are the actual criteria established as the basis for design. The published County drainage design criteria apply under this condition.

4. Check Design Criteria

The check design criteria are criteria that must be met under certain interim conditions or under a secondary storm event, such as the 100-year event.

C. *Rainfall*

Design rainfall depths are developed from rainfall isopluvial maps contained in the Hydrology Manual. Design rainfall depths are as shown in **Table 1**.

Table 1 – Precipitation Depths

	Precipitation Depth (in)	
Return Period (yrs)	6 hr.	24 hr.
2	1.1	1.3
100	3.00	3.6

A site-specific rainfall intensity-duration-frequency (IDF) curve is developed for use in the pavement drainage analysis and design. Rainfall depth-duration-frequency data used to develop the IDF curve is developed using FCDMC's DDMSW software and the rainfall depths presented above. The rainfall depth-duration-frequency worksheet and the IDF curve data are contained in **Appendix B**.

D. *Roadway Inundation*

An interim and ultimate construction is planned for Ellsworth Road. The ultimate planned roadway is an Urban Road of Regional Significance (URRS) consisting of a 7-lane section with a median and full curb and gutter. The interim roadway design consists of a 5-lane section without curb and gutter. The southbound lanes adjacent to Williams Gateway Airport will be constructed to the full ultimate section while the northbound lanes for this segment will consist of the interim section. Runoff is allowed to collect in the right-most driving lane and bicycle

lane for the ultimate section, or in a roadside ditch and shoulder for the interim section, for a maximum allowable spread of 17 feet. Pavement drainage is collected with catch basins and conveyed to a suitable outfall via storm drains or roadside ditches. The following criteria from the Procedure Manual apply to the on-site drainage:

- Streets shall be designed to carry runoff from a 10-year peak storm. Arterial streets and major collectors shall be designed to concentrate the runoff spread to one (1) lane. The peak flows from a 100-year storm shall be carried within the cross-section between the right-of-way lines.
- In cases where the peak flows from the design storm exceed the street capacity; underground pipes of sufficient size to carry the excess shall be installed.

In addition to the above City of Mesa requirements, the following criteria from the Hydraulics Manual have also been adopted for roadway drainage.

- Roadside ditches are to be sized to prevent the 10-year storm runoff from saturating the pavement sub-grade.
- Roadside ditch side slopes are to be no steeper than 4 to 1 (H: V) within the roadway clear zone.

E. *Catch Basins*

Catch basins are placed as necessary to meet the roadway inundation criteria and at intersections to prevent cross street flow. City of Mesa M-64 double grated catch basins are used for the ultimate roadway section and ADOT C-15.81 grated catch basins are used for the interim section. The interim catch basins will need to be replaced when the ultimate roadway improvements are constructed. The interception capacity of catch basins is reduced to account for plugging by debris. Grated catch basin interception capacity is reduced by 75% for continuous grade conditions.

F. *Storm Drains*

- Storm drains are sized for the 10-year inlet flows to limit the hydraulic grade line to a minimum of 1.0 foot below the inlet structures using a Manning's n value of 0.013.
- The minimum pipe size is 24 inch for mainline storm drains and 18 inch for catch basin connector pipes
- Pipes shall be deep enough to not project into the pavement sub-grade.
- Maximum spacing of manholes is 300 feet for pipes up to 30 inch diameter, 400 feet for pipes larger than 30 inch and smaller than 48 inch, and 500 feet for pipes 48 inch and larger.

- Minimum flowing full velocities of 5 ft/s are maintained where possible. A minimum flowing half-full velocity of 2 ft/s was maintained where possible.
- Storm drain profiles are generally designed with pipe crowns matching.

G. *Open Channels*

The channel design employed in this project is based on the "stable channel" design approach, which means that the channel bed and banks are designed to remain fixed without eroding from the design flow event. This design approach is in contrast to a "movable bed" approach, which is typically used in larger natural channel systems to mimic the natural channel processes that occur in nature. The specific criteria used in this analysis are contained in the following sections.

1. Channel Design Criteria

- New channels are designed for the 100-year rainfall event under *Full-CIP* conditions per the East Mesa ADMP. Additionally, channels are checked to ensure that they convey the 100-year *Interim-CIP* conditions peak discharge within the channel banks. There are exceptions to this. ie. Channel adjacent to WGA.

Channel stability was evaluated based on maximum permissible velocity per Tables 6.1 and 6.3 of the DDMVII. Further verification is provided using stable channel calculations based on the tractive force method using the shields diagram to identify the initiation of motion.

- The design channel depth is the normal flow depth plus freeboard. Required freeboard is 0.25 times the sum of flow depth plus velocity head with a minimum of 1 foot. The freeboard requirement shall be met for the *Full-CIP* condition but is not mandatory under the *Interim-CIP* condition.

- Froude numbers for channel design are to be less than or equal to 0.86 for sub-critical flow. Super-critical flow is not allowed, except at designed channel drop structures.

- The minimum channel bend radius shall be 3-times the channel top width at the depth of flow.

- Longitudinal channel slopes are set as steeply as possible within the limitations of the channel material design maximum permissible velocity and the limitation on Froude number.

- In cut situations surface runoff will generally flow over the maintenance road and enter over the sides of the channel. The proposed gravel mulch lining will limit rill erosion of the channel banks. Where the top of channel projects above the adjacent existing ground (fill situations), a parallel channel or swale was used to convey runoff to a planned

channel inflow point. The parallel auxiliary drainage channel will consist of a v-shaped swale.

- The channel cross-section allows for a minimum 16-foot wide maintenance road on one side of the channel. The new maintenance roads have a 2% cross slope, towards the main channel. A 4-inch thick decomposed granite surface is provided on the maintenance road.

H. *Culverts*

1. Introduction

The culvert design must consider a range of conditions, which may be encountered during the service life of the project. The culvert performance must, at a minimum, not make conditions worse than before the project was constructed. Conversely, the ultimate culvert performance must provide the level of protection established by the County drainage design criteria. Levels of protection between these two extremes may be realized between the period of initial construction and the ultimate build-out of the watershed. The conditions to be analyzed for culvert design are described in terms of the level of development within the contributing watershed (watershed condition). This impacts the amount of runoff generated by a storm event. The level of implementation of the recommended plan from the East Mesa ADMP (CIP condition) impacts the routing and attenuation of the runoff prior to reaching Ellsworth Road. Culvert design criteria are summarized in **Table 2**.

2. Culverts within the Ellsworth Channel

Culverts within the Ellsworth channel are ultimately to be sized for the same design discharge as the channel itself. Under Interim-CIP conditions the culverts were sized to convey the full 100-year peak discharge (Q100), with no freeboard in the proposed Ellsworth Channel and with no plugging factor applied. An exception to this is from Stations 479+00 to 513+00 where flow will escape the channel under Interim-CIP conditions (See Section V-C-1). Under Full-CIP conditions the culverts were sized for the Q100 with a culvert-plugging factor applied and with the condition of maintaining the required freeboard within the proposed Ellsworth Channel. Culvert plugging was modeled by blocking-out a 1-foot layer of debris along the bottom of the culvert in HEC-RAS. The condition requiring the largest culvert size governed.

3. Cross-road culverts under Ellsworth Road

Under Interim-CIP conditions the culverts were to be sized to match the Pre-CIP water surface elevation at the road crossing considering the combined culvert and overtopping flow for the 100-year discharge with no plugging factor applied. AMEC was directed to use the design criteria as listed in **Table 2** below. The culverts at the GM Manifold were designed to carry the 100-year discharge under Interim-CIP conditions. (See Section V.D.4)

Table 2 - Culvert Criteria Summary

CIP Condition	Pre-CIP	Interim-CIP	Full-CIP
Watershed Condition	Existing	Existing	Developed
HEC-1 Model		MIDCURD.DAT	SEBT-N2.DAT
Design Criteria	N/A	Check	Ultimate
Culverts in channel			
Culvert size:	N/A	Q100 or Chann. cap. w/no FB	Q100
Overtopping:	N/A	N/A	N/A
Plugging factor:	N/A	No	Yes
Cross-road culverts			
At Pecos North:			
Culvert size:	N/A	N/A	Q100
Overtopping:	Calc. Ex. W.S.El.	Not to exceed exist. W.S.El.	N/A
Plugging factor:	N/A	No	Yes (50%)
At GM:			
Culvert size:	N/A	Q100	
Overtopping:	Calc. Ex W.S.El.	No	
Plugging factor:	N/A	Yes (50%)	

- Box Culverts were designed with a minimum height of 4 feet for maintenance purposes. A minimum of 1 foot of cover was provided for a full roadway structural section.

- Handrails were provided around culvert headwalls with a vertical drop of 2.5 feet or greater from the top of headwall to the culvert flowline.

- Trash rack/access barriers were provided at storm drain outlets greater than or equal to 30-inches in diameter and for culverts where security is required at WGA and GM Proving Grounds.

- HEC-RAS was used to model a 1-foot layer of debris accumulation along the bottom of culverts within the Ellsworth Channel to account for weeds and other debris that may inhibit flow during a storm event. The debris plugging criteria is applied to the developed conditions (Full-CIP) design discharge, but is relaxed for the capacity check of the higher existing conditions (Interim-CIP) discharge.

III. HYDROLOGY

A. *Introduction*

The hydrology for the study area was originally prepared in 1996 by the FCDMC for use in the East Mesa ADMP. As part of the development of the ADMP, Dibble and Associates modified the hydrologic model storage and routing parameters to incorporate modeling of the proposed ADMP drainage features. Others subsequently modified the East Mesa ADMP hydrology as part of the Elliot Basin design and as part of the *East Maricopa Floodway Capacity Mitigation and Multi-Use Corridor Study* (EMF Capacity Study). The resulting model established the hydrologic discharges for this project. Modifications made as part of the Final Design project are described in Section E.

B. *East Mesa ADMP*

Implementation of the design features proposed as part of the East Mesa ADMP will have a significant effect on the hydrology within the project area. The most significant effect will be the reduction of flow entering the Ellsworth channel just north of existing Pecos Road. The flow at this location will be greatly attenuated by the proposed Pecos North and Pecos South Detention Basins that will be located at the northeast and southeast corners of Pecos Road and Meridian Road respectively.

C. *Drainage Area Characteristics*

The drainage area contributing runoff to the study area encompasses 90 square miles, extending east into Pinal County. The Superstition Freeway and the CAP canal form major drainage boundaries. Runoff is concentrated upstream of the CAP canal and discharged over the canal in over-chutes. The Superstition Freeway has a system of collector channels and detention basins that collects runoff and discharges the detained flows under the freeway. Some of this flow makes its way to the project through a combination of overland and roadside ditch flows.

The area south of the Superstition Freeway is characterized by agricultural and industrial land uses with large portions of undeveloped desert. However, residential development is replacing the open desert environment north of Elliot Road and this trend is expected to continue across the watershed. The drainage area is bounded by the CAP canal on the east and the East Maricopa Floodway on the west. The General Motors Desert Proving Grounds (GMDPG) is located

immediately east of the Ellsworth Road and serves as a 4-mile barrier to flow from the east. The GM Proving Grounds and Williams Gateway Airport (WGA) occupy approximately 25 percent of the study area south of the freeway, and have a major impact on the hydrology. Almost all of the runoff entering the study area from Pinal County encounters the GM Proving Grounds at some point along its boundary. GM has made substantial changes to the natural drainage patterns as part of construction of their test track facilities. Much of the runoff reaching the GM Proving Grounds is diverted around the north and south property boundaries and through the site in the Powerline Floodway. Flows internal to GM, south of the Powerline Floodway, are collected and discharged at the "GM Manifold" located approximately 1-mile south of the Powerline Floodway. A schematic diagram detailing the existing flow conditions at the GM property has been included in **Appendix J**. Williams Gateway Airport has taken a similar approach to handling off-site flows. Perimeter channels divert flows around the north and south boundaries to the East Maricopa Floodway.

D. *Methodology*

1. HEC-1 Hydrology

Project hydrology was developed using the U.S. Army Corps of Engineers, *HEC-1 Flood Hydrograph Package* (HEC-1) computer program. Guidance is given in the *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology* (Hydrology Manual) for application of the HEC-1 program within Maricopa County. The computer program *Drainage Design Management System for Windows* (DDMSW), developed by the FCDMC, was used to aid in the application of the methods described in the Hydrology Manual.

Runoff was evaluated under existing Pre-CIP, Interim-CIP, and developed Full-CIP conditions for the 100-year, 24-hour storm using the SCS Type II rainfall distribution. Rainfall losses were estimated using the Green-Ampt method. DDMSW uses the S-graph method, with the Phoenix Valley S-graph, to represent runoff characteristics for the watershed and to develop a Unit hydrograph for input into the HEC-1 model.

Flow rates for channel design were based on 100-year peak discharges under fully developed watershed conditions. However, due to the FCDMC and the City of Mesa's retention

requirement, the developed conditions peak discharges will be less than existing conditions. As a result, project elements were checked against existing conditions flow rates to ensure that capacity is maintained within the cut section of the channel.

2. *Rational Method Hydrology*

The rational method is used for runoff calculations for storm drain design using a site specific Rainfall Intensity-Duration-Frequency (I-D-F) Relation developed using the DDMSW. This I-D-F relation is shown in **Appendix B**.

The Rational Method was also used in small areas for sizing area inlets, swales, or culverts where the contributing drainage area is smaller than a HEC-1 sub-basin. The Rational Method methodology presented in the Hydrology Manual is used for the small area runoff computations.

E. *Modifications to Base Hydrology Model (By Previous Consultant)*

The following modifications were made to the HEC-1 hydrology model as part of this project:

- Adding aerial reduction factors for the 1-, and 5-square mile storms,
- Adding channel routing steps which more accurately depict the Ellsworth Channel,
- Removal of the Ray Basin which was proposed in the EMF Capacity Study,
- Updating the General Motors site to account for future on-site retention, and
- Sub-dividing basin 82A into 4-subbasins.

During design development for the current project, General Motors announced that they would sell the GM Proving Ground and move their operation to a new location. As a result, it is anticipated that the GM Proving Ground will eventually be redeveloped under City of Mesa design requirements, which include providing on-site retention. The effect of on-site retention within GM Proving Ground was incorporated into the developed conditions design hydrology. The HEC-1 drainage sub-area map is shown on **Figure 2**.

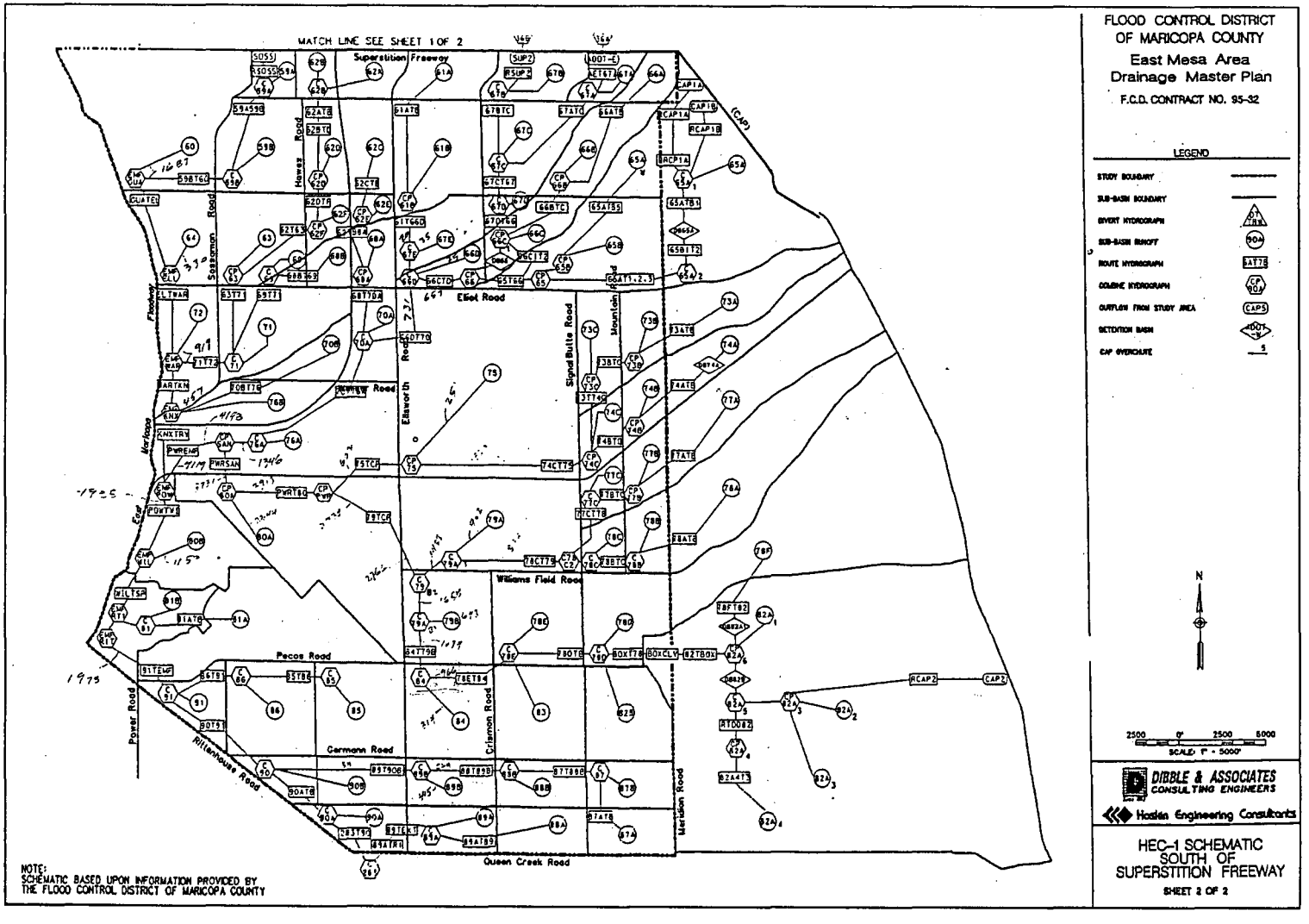


Figure 2 HEC-1 Subarea Map

F. *Design Assumptions*

The hydrology for this project models the 100-year storm event for the following three conditions as described in the Definitions:

- Pre-CIP,
- Interim-CIP, and
- Full-CIP

The results of the three modeling scenarios are used to establish the design for the "ultimate" and "check" design criteria.

IV. HYDRAULICS

A. *Roadway Drainage*

1. Methodology

Pavement and inlet hydraulic calculations are based on procedures contained in the Federal Highway Administration Hydraulic Engineering Circular No. 12 *Drainage of Highway Pavements*, 1996. Storm drain hydraulic grade line calculations are performed using StormCAD. As stated previously, the current improvements to Ellsworth Road represent an *interim* design, delaying the *ultimate* roadway design section for construction at a later date. In most locations along Ellsworth Road, the pavement design extends to only two lanes with no curb and gutter. The additional driving lane and bicycle lane with curb and gutter will be added in the ultimate design construction. The catch basin and storm drain system design is based on the criteria required for the *ultimate* proposed roadway section. Drainage areas and runoff characteristics are based on the ultimate roadway section. However, in order to ensure adequate capture of runoff in the interim condition, ADOT C-15.81, grated catch basins are utilized in place of the ultimate City of Mesa M-64 combination catch basins. Interim basins will be constructed at the *ultimate* design location at the toe of a roadside swale as part of the roadway typical section. Roadside swales are placed only in roadside cut conditions. In roadside fill conditions, runoff is allowed to flow away from the roadway into natural runoff paths where possible. In fill conditions where positive drainage away from the roadway does not exist, such as on the upstream side of the roadway, shallow ponding occurs within the roadway right-of-way; depths do not exceed 8 in. and water surface elevations are below the roadway subgrade.

Given the increased slope away from the pavement of the unpaved shoulder of the interim roadway/ROW section, the elevation of the interim grated inlets is lower than that of the ultimate M-64 inlets. Therefore, it was necessary to design these catch basins at the lower elevation to ensure proper system performance in the interim condition. In the future, when construction of the ultimate roadway section is completed, the storm drain design considered construction of the M-64 inlets to require only a minimal reconstruction of the interim catch basins and the connector pipe would not need replacement. Where inlets were left out in the interim roadside fill condition, the connector pipe will be installed at the appropriate slope to accommodate the future curb and gutter and catch basin and then plugged.

2. *Assumptions*

The following assumptions are made in performing the pavement drainage analysis:

- A minimum time of concentration of five minutes is used,
- The 10-year design discharge used for inlet sizing is based on the runoff generated within the road right-of-way for the ultimate section,
- The C factor for runoff for the roadway right-of-way is 0.75; at locations where additional offsite runoff is generated from GM proving ground berms the C factor is 0.70.

B. *Flood Control Channels*

1. *Methodology*

Channels were initially sized using Manning's equation for developed conditions 100-year peak discharges with freeboard using maximum permissible velocity as the primary design parameter. To minimize the overall channel width, the channel cross-section and slope in each channel reach is set to meet the design permissible velocity. The design channel section is then evaluated using the River Analysis System, developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC-RAS).

2. *Stable Channel Design*

The channel concept adopted in *Technical Memorandum #2, Preliminary Channel Evaluation* was a landscaped earth channel. Per section 6.3 of the Drainage Design Manual Volume II, Hydraulics (DDMVII), AMEC determined the maximum allowable velocity for the earthen channel from Table 6.1. The geotechnical data prepared for the design indicates that soils along the channel alignment are silts and sands with little clay content. As a result, the maximum permissible velocities for the channel would range from 2.5 to 3.5 fps. Following the natural

ground slope would cause excessive velocities throughout much of the channel. Design velocities in the shallower upstream reaches will range from 2 to 4 fps, while velocities in the steeper downstream reaches will approach 6 fps. Limited by natural slope and recognizing that taking additional right-of-way in order to decrease the design velocities was not an economical alternative, AMEC proceeded to investigate channel-lining options.

AMEC's first action was to coordinate with District design staff to explore lining alternatives that have proven effective in similar applications. One such application is along the Rittenhouse Channel, located approximately 1 mile southwest of the proposed Ellsworth Channel. Faced with similar challenges the District chose to use "gravel mulch" lining along this channel. Gravel mulch is a graded material consisting of a combination of crushed and rounded stones that is hand placed along the channel banks to protect them from erosion. Table 6.3 of the DDMVII indicates that a lining of coarse gravel can withstand a permissible velocity of 6 fps; therefore this option would appear to be applicable to the proposed Ellsworth Channel. However, since the median size of the coarse gravel in Table 6.3 is not given, AMEC opted to supplement the information in the table with stable channel calculations based on the tractive force method using the shields diagram to identify the initiation of motion.

AMEC used the stable channel design functions included within the Hydrologic Engineering Center's River Analysis System (HECRAS) to perform the stable channel calculations. The input parameters are discharge, specific gravity of the lining material, angle of repose of the lining material, side slope, Manning's "n" value and bottom width, the program then solves for depth of flow and the d_{50} stone size that will result in a stable channel (See calculations in **Appendix E**) The results show that a d_{50} stone size of 1.25 inches is required for Channel Reach 7. For Channel Reaches 1-6, d_{50} varied from 0.3 inches to 0.85 inches. Therefore AMEC proposes that a gravel mulch channel lining with a d_{50} stone size of 0.3 to 1.25 inches be used on the side slopes of the entire channel.

3. Channel Lining

According to the geotechnical analysis contained in **Appendix C**, the native soils in the design reach will offer little resistance to scour. The channel will have little resistance to erosion and would require a very wide section with very flat slopes. This would result in an uneconomical

design. As a result, a "gravel mulch" channel-lining concept was developed using rock with a d_{50} size of 1.25". A permissible velocity of 6 fps is adopted for this lining.

The gravel mulch size is based on the stable channel design considerations. These include considering the velocity of flowing water on the gravel mulch at the point of incipient motion. Based on tractive shear theory, any particle smaller than the critical size at incipient motion will be moved by the flowing water.

Table 3 – Gravel Mulch Gradation

Sieve Size		Percent Passing by Weight
	2.25"	90-100
	1.25"	40-60
	0.75'	0-15
	#4	0-5

Per the DDMVII the selected gravel mulch lining thickness is 2.0 inches, or approximately 1.5 times the d_{50}. As stated earlier in the report, the channel was designed for the developed, full-CIP watershed conditions and then checked for the existing, interim-CIP conditions. The higher existing conditions flow rates generate higher velocities that exceed the design permissible maximum velocities. This occurs in the steepest channel section, downstream of culvert C12 from Channel Station 593+50 downstream to the channel outlet. Rather than decreasing the channel slope to reduce the flow velocity or increasing the channel lining thickness a lower level of protection will be accepted until watershed build-out occurs. The watershed build-out assumption includes future construction of the Pecos Basins as recommended in the East Mesa ADMP.

4. *Scour Along Proposed Channel Bottom*

Early in the design process the decision was made to not include the channel lining on the bottom of the channel. This decision was based on the observation of similar flood control channels in the project vicinity and was discussed with staff from the District's Engineering Division. Advantages to this design include greater accessibility and maneuverability of maintenance vehicles as well as significant cost savings. However the design is not without risks, particularly due to the native soils tendency to scour. With this in mind AMEC conducted

a detailed analysis to determine the maximum anticipated scour throughout the channel. The channel was subdivided into ten segments for the purpose of this analysis. The segments were established based on the presence of upstream and downstream grade controls such as culverts or drop structures. The analysis considered long term and general scour to be applicable components to the proposed design condition. The equilibrium or "stable slope" used in the calculation of long-term degradation was taken as the average of the value determined using Schoklitsch, Meyer-Peter, Muller and Lane's Tractive Force methods. General scour was determined using the Regime Equations that take factors such as particle size and flow distribution into consideration. Local scour and bend scour were not considered due to the absence of any abrupt changes in flow direction or any significant bends in the channel alignment.

The results of the analysis are included in **Appendix F.** The analysis shows that the maximum anticipated long term degradation of the channel would occur in reaches 8 (3.2 feet) and 10 (4.8 feet) with the other reaches experiencing a negligible amount of degradation. The increased flow depth and relative length of these segments contributes to the long-term degradation. Maximum anticipated general scour ranges from 0.1 to 1.9 feet throughout the channel. The maximum anticipated total scour in the channel would occur in reaches 8 (4.8 feet) and 10 (6.7 feet) respectively. State Standard 5-96 (SS5-96) was used to assess the results of the above analysis. According to SS5-96 the maximum anticipated total scour would occur in reaches 7 – 10 (4.87 feet). Note: SS5-96 is generally considered a conservative estimate of scour potential.

Long-term degradation as determined above will be at it's maximum at the point furthest from the downstream grade control. All points between these values will be reduced linearly. The exact time at which the maximum scour will occur is unknown and can take several years to develop. The general scour computed above uses the 100-year event to determine scour depth and regular maintenance of flood control facilities is generally accepted following such events. None of the above equations consider sediment transport; therefore, the total scour could be reduced by aggradation of sediment transported from upstream. With this in mind it is AMEC's recommendation that the channel bottom remain unlined, however careful monitoring of the channels performance is recommended. Should the channel exhibit less than adequate

performance in reaches 6 - 10 the channel could be retrofitted with intermittent grade control structures or alternatively the channel could be fully lined in the future.

5. Manning's Roughness Coefficient

The Manning's roughness coefficient, n, is a measure of the flow resistance or relative roughness of a channel. The flow resistance is affected by many factors including bed material, cross section irregularities, depth of flow, vegetation, channel alignment, channel shape, obstructions, suspended material and bed-load. A Manning's roughness coefficient was established for each modeled channel cover including, bare earth, gravel mulch and riprap / gabions.

Where the channel cover is bare earth, the roughness coefficient was established using the publication, *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona.* From this publication, it is found that the primary factors affecting the n-value are surface irregularities, obstructions and vegetation with consideration also given for depth and meander. Based on these factors, the n-value is estimated from the equation;

$$n = (n_b + n_1 + n_2 + n_3) f_m$$

Where;

n_b = base Manning's value for a straight uniform channel
n_1 = value for surface irregularities
n_2 = value for obstructions
n_3 = value for vegetation
f_m = factor for meander

The base n-value for bare earth was taken as 0.026 from the second table on page 8 of the above referenced publication for a median grain size of 1 millimeter. Since the channel is intended to be as smooth as possible, for the given bed material, the value for n_1 is zero. The channel will also be free of large rocks however a certain degree of wild grasses will grow with time. Therefore, the values for n_2 and n_3 are 0.0 and 0.002 respectively. While the channel will have some degree of meander built into the design, the effect of this will be negligible due to the low velocities. The factor for meander, f_m, is 1.0. The resulting design n-value of 0.028 was used for the bare earth portions of the channel.

The Arizona Department of Water Resources *Manual for Engineering Analysis of Fluvial Systems* provides an equation for calculating an n-value based on the size of bed material. The base Manning's n-value for the 1.25" gravel mulch lining material is calculated from the following equation;

$$n_b = 0.0395 \times D_{50}^{(1/6)}$$

Where d_{50} = Diameter, in feet, in which 50% of the particles (by weight) are smaller.

This equation yields a base Manning's n-value of 0.028 for the 1.25" gravel mulch. As stated above, the actual n-value is affected by many factors, so the n-value is further refined below.

The base n-value for the 1.25" gravel mulch channel-lining material is 0.028. Since the channel is intended to be as smooth as possible, for the given bed material, the value for n_1 is zero. The channel banks will also be free of large rocks however the landscaping theme calls for the bottom two-thirds of the channel banks to be approximately 10% covered with trees and bushes, while the top one-third of the channel banks will be approximately 40% covered. Therefore, the values for n_2 and n_3 are 0.0 / 0.003 and 0.0 / .009 for the bottom two-thirds and top one-third respectively. A weighted average of these values results in values for n_2 and n_3 of 0.0 and 0.004 respectively. While the channel will have some degree of meander built into the design, the effect of this will be negligible due to the low velocities. Therefore, the factor for meander, f_m, is 1.0. These adjustments resulted in a design n-value of 0.032 for the gravel mulch lined portions of the channel.

From Table 1 of, *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona,* for an average rock size of 6.0", an n-value of 0.040 will be used for the rip-rap, gabion and grouted riprap channel linings.

6. Channel Cross Section

The channel cross-section is a trapezoidal section with 4:1 side slopes. A cross-slope is provided in the channel bottom to convey nuisance flows without spreading across the entire channel bottom. The bottom cross-slope is to the channel centerline where the channel bottom half-width was greater than 16 feet to allow room for maintenance vehicles to turn around. The bottom

cross-slope was sloped to one side where the channel bottom half-width is less than 16 feet for ease of construction and to facilitate maintenance.

A 16-foot minimum width maintenance road will be provided along the east side of the channel. The maintenance road will have a 2% cross slope towards the channel. Where the channel was in cut, off-site flow was allowed to cross the maintenance road and sheet flow into the channel. The gravel mulch lining and the decomposed granite lining of the maintenance road itself will mitigate the potential for rill erosion of the channel banks. In fill situations, where the top of the maintenance road and/or the top of channel projects above adjacent grade, a parallel channel or swale was used to convey runoff to a planned channel inflow point. The parallel auxiliary channel consists of a v-shaped swale. On the west side of the channel the channel side slope was designed to intersect existing grade and no provision is made for off-site flow since the natural ground slopes from east to west (away from the channel).

7. *Bends and Superelevation*

Although there are several curves in the channel alignment, there is only one with a short enough radius to warrant special attention. The curve between stations 584+50.19 and 588+61.78 was located where the channel alignment rejoins the existing North Perimeter Channel near the Powerline Floodway. The curve has a radius of 310 feet, which is near the minimum allowable radius for the channel section. Tractive shear increases around the outside of bends with ratios of curve radius to channel bottom width less than about 10. Riprap was provided around the outside of the bend to resist the increased tractive shear.

The design channel velocities are low and the bend radii are long so that superelevation of flow around bends was small enough to be neglected. The 310-foot radius curve just described has a computed superelevation of 0.21 feet. Calculations are included in **Appendix O**.

8. *Inflow locations*

Other than the main inflow locations such as the Pecos North Culvert, GM manifold and the WGA Culverts, there are two additional channel inflow locations. These locations are just south of Existing Pecos Road at roadway stations 69+21 and 72+17 where the sheet-flow from the

fields was collected at existing low points. Inflow to the channel was estimated using the Rational Method. The inflow structures consist of ADOT drop inlets. These inlets were placed to coincide with existing low-points with only minor grading required to make them effective. The relocated tail-water ditches will be placed up-stream from the inlets so that irrigation tail-water is kept from entering the system. During large events, the tail-water ditches will overtop and flow will enter the inlet structure. This system closely replicates the existing drainage pattern of the area.

9. Down Drains

Down drains are provided at key locations to collect runoff from landscaped areas or fill sections and discharge it in a controlled manner into the channel. The main objective of the down drains design was to collect runoff that is cut-off from flowing into the channel by either the maintenance road or the channel bank. Where possible, the down drains are placed to coincide with the storm drain laterals and the landscape area is graded to make use of these inlets. However, in some cases, additional down drains are required where a lateral does not exist. The maximum down drain spacing is also a factor in determining the down drain locations. This spacing was estimated based on the capacity of the swale on the east side of the channel and by using the rational method to determine the amount of runoff for a given reach. The down drain location determination calculations are included in **Appendix L**. Down drains and collector swales are not used along the west side of the channel as existing ground naturally slopes away from the channel (east to west).

10. HEC-RAS Modeling

Detailed hydraulic analysis of the channel is performed for the 100-year storm discharges for the following three conditions as described in the Definitions: (A Detailed HEC-RAS Cross Section Location Map is included in **Appendix I**).

- Pre-CIP, HEC-RAS Project = *EllsworthExistingOT.prj,* Plan = *EllsworthExistingOT.p01*
- Interim-CIP, and, HEC-RAS Project = *EllsworthChannel.prj,* Plan = *Final Unplugged Int CIP Q.p01*
- Full-CIP, HEC-RAS Project = *EllsworthChannel.prj,* Plan = *Final Plugged Full CIP Q.p07*

The Pre-CIP analysis utilizes the existing unimproved channel cross-sections in the vicinity of Pecos Road as part of an evaluation to compare water surfaces with and without the project to

ensure that the proposed channel improvements do not make flooding conditions worse than before construction of the project. (See Section V.C.1a. *Channel Overtopping Analysis*).

The Interim-CIP analysis utilizes the proposed channel and roadway design cross-sections for comparison with the Pre-CIP analysis and to evaluate the flooding potential immediately following construction.

The Full-CIP analysis was the ultimate design model used as the basis for the culvert, gravel mulch lining, and freeboard analysis.

The Channel geometry is represented by cross sections, which are extracted from the Inroads surface model and show both the channel and roadway in one section.

A separate model of the Powerline Floodway is utilized to establish the starting 100-year water surface elevation for the Ellsworth channel. The starting water surface elevation for the Ellsworth Channel is 1358.73 and 1358.27 for the Interim-CIP and Full CIP respectively.

Box culverts within the main channel were modeled using the Bridge and Culvert modeling routines within HEC-RAS. To account for possible clogging of the culverts due to debris, culverts are modeled with an additional 1 foot depth of debris.

11. Special Considerations

One of the constraints for the channel design is the glide slope of WGA's runway 30R. This runway will be extended in the future and will be converted from a 34:1 non-precision approach to a 50:1 precision approach. Federal Aviation Administration (FAA) requirements dictate that the roadway must be at least 15 feet below this future glide slope. The existing road profile does not meet this criterion. The new roadway design is based on maintaining the existing road elevation at the critical glide slope location and obtaining a variance from FAA when the runway is extended. The channel flowline elevation was set based on this roadway profile, keeping the channel below the roadway gutter elevation. The critical location for the glide slope is at channel station 49+323.69.

C. *Culverts*

1. Methodology

New culverts were sized using standard culvert design methodology considering inlet or outlet control as presented in Federal Highway Administration, Hydraulic Design Series No. 5, *Hydraulic Design of Highway Culverts*, September 1985. The calculations check for inlet control and pipe barrel (friction) or tail water control. The condition resulting in the highest computed headwater elevation governs. Culverts within the main channel are analyzed as part of the channel hydraulics. Connector pipes with drop inlets were typically analyzed using Haestad Methods StormCad. Several culverts conveying offsite flow into the Ellsworth Channel were analyzed using HY-8.

2. Culvert Overtopping

Under the ultimate (Full-CIP) conditions, the Pecos Road culvert will pass the full 100-year discharge without roadway overtopping. The Pecos Road culvert will overtop under the Interim-CIP condition when constructed. The overtopping flows will drain over Ellsworth Road and then overland to the proposed Ellsworth Channel, where it will flow down over the bank into the channel. If overtopping occurs in this interim period, significant bank erosion could occur as the runoff cascades over the bank in a manner similar to a spillway. If the duration of overtopping is long enough, the erosion (assuming no bank protection) could conceivably migrate toward Ellsworth Road, causing damage to the roadway. Roadway overtopping at the Pecos Road culvert will begin at about 1,103 cfs, which is slightly higher than a 10-year frequency discharge. The overtopping discharge during a 100-year event would then be 1717 cfs. See **Appendix N** for a complete analysis of this and a schematic representation of the same.

The project stakeholders decided that the east bank of the Ellsworth Channel should be protected against the possible damage described above. The following materials were considered to provide bank protection along the proposed channels east bank within the overtopping limits:

- Gabion mattresses,
- Loose riprap,
- Grouted rock, and
- Gravel mulch

a) Gabion Mattresses

Gabion mattresses can be neatly placed upon the prepared slope and can be filled with a smaller size stone than would be required with other rock systems. They are stable and hold together well, even with uneven settlement or high velocities. The mattresses will be covered with a one-foot layer of soil and the channel lining material so they will normally not be visible. As a result, the wire baskets would not be subject to vandalism or abrasion failures and would not be an "eyesore". If a culvert-overtopping event occurred, the channel lining material and soil layer would simply be washed away leaving the mattresses harmlessly exposed. Maintenance crews following the event could then replace the soil and channel lining material.

b) Loose riprap

Loose riprap is not recommended for steep slopes. Quality placement is difficult to control during construction, the required rock sizes are large, and FCDMC maintenance staff has indicated that it is difficult to keep weeds and trash cleared from within the riprap protection. Loose riprap does not have a good record of performance in these applications and was not considered a viable alternative.

c) Grouted rock

Grouted rock, when designed and placed properly overcomes many of the weaknesses of loose riprap installations. The recommended design approach is to provide a uniform rock size of adequate size to resist the tractive shear forces exerted by the flow cascading over the channel bank. The voids within the rock structure would be filled with grout. The grout is placed by injection methods by pumping under low pressure through a 2-inch nozzle to ensure complete penetration of the grout into the rock layer. It is important to fill all voids from the subgrade level through the rock layer, leaving a portion of the rock exposed and cleaned for appearance and added roughness.

Although this would be a technically acceptable alternative, it is more expensive and was not considered to be a better selection than the gabion mattresses.

d) Gravel mulch

For a "gravel mulch" concept to work, the gravel would have to be sized by the same methodology as the loose riprap, resulting in the same design. As described above, loose riprap was not considered a viable alternative.

e) Bank Overtopping Protection

Based on the foregoing discussion, the project stakeholders agreed that the gabion mattress protection be recommended for this application.

V. RESULTS & RECOMMENDATIONS

A. *Hydrology*

The HEC-1 output for the full CIP condition model is contained in **Appendix D**. The remainder of the hydraulic models are included in electronic form in **Appendix Q**. The peak discharge rates applicable for each reach of the Ellsworth Channel are summarized in **Table 4**.

Table 4 – Design Flow Summary

HEC-1 ID	Location	Discharge (Check) Existing Conditions (Interim-CIP)	Discharge (Design) Ultimate Conditions (Full-CIP)
R84	S. of Pecos Rd.	349 cfs	590 cfs
C78E	Pecos Rd. discharge	2912 cfs	647 cfs
C84	NW Corner Pecos & Ellsworth	2856 cfs	599 cfs
C79A2	GM manifold discharge	2028 cfs	1452 cfs
C79B3	Combined flow at GM manifold	3550 cfs	1744 cfs

B. *Roadway Drainage Design*

The hydraulic analysis is performed using StormCAD software. Calculations are presented in **Appendix G.**

The storm drain system consists of four independent systems with the following outfalls:

- Powerline Floodway (Roadway Sta 1178+50.26, Sheet CHC3 & SD23), and
- Ellsworth Channel North (Roadway Sta 156+23.19, Sheet SD18)
- Ellsworth Channel (Channel Sta 52+50 to Sta 153+10.24, Sheets SD02 to SD18)
- Ellsworth Channel South (Channel Sta 446+98.90, Sheet CH03)

Figure 3 is a schematic of the storm drain network. The schematic presented depicts one of the two closed systems in Phase I. There are a number of connector pipes, which convey pavement drainage to the Ellsworth Channel. For locations of these connector pipes, see the AMEC 100% plans, Volume 2 – Channel and Storm Drain Plans.

There are also several drop inlets and down drains, which convey offsite flows to Ellsworth Channel. At the north end of the Phase I project there is a storm sewer system which outlets to the Powerline Floodway. The analysis for this storm sewer system was performed by the Phase II consultant, Stantec, and has been included in **Appendix G**.

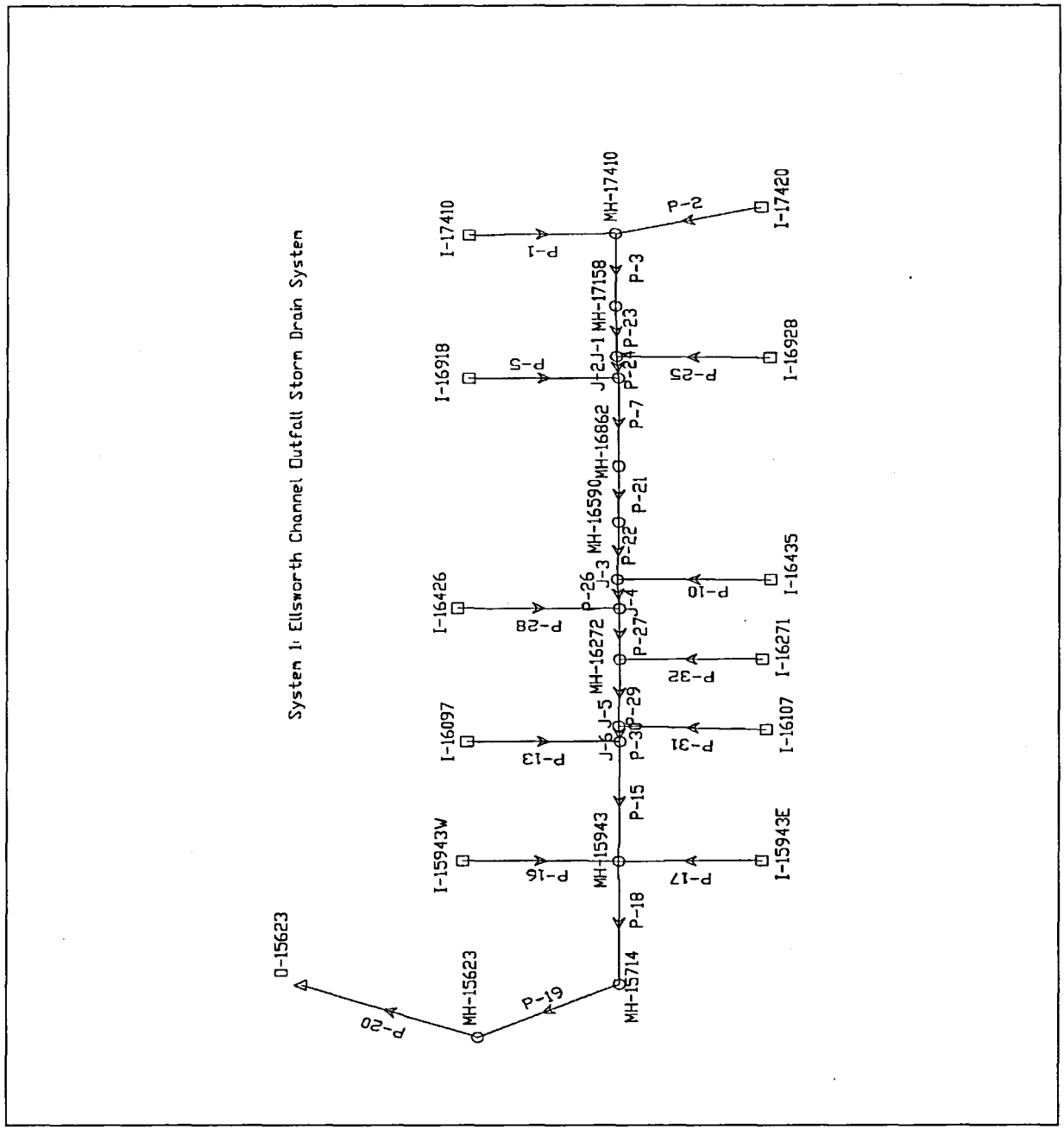


Figure 3 – Storm Drain Schematic

The main line storm drain, pipe sizes range from (24 inches to 48 inches in diameter. The majority of the connector pipe sizes are 18 inches in diameter, some 24 inch and 42 inch pipes were also used. The contributing watershed area produces runoff from the *ultimate* roadway section, including sidewalk and landscape where applicable. Grading of the ROW outside of the paved section minimizes offsite flows from entering the system except in isolated areas. The

GM Proving Ground adjacent to Ellsworth Road contains large berms running parallel to the roadway. In some areas, these berms contribute runoff to the roadway and these additional flows are incorporated into the storm drain design. In the interim condition, there is an increased percentage of the contributing unpaved section within the ROW. This results in a reduction in C-factor, and a subsequent reduction in runoff as compared to the ultimate roadway design section. This reduction provides an additional factor of safety in the interim condition. Other offsite flows generated on the GM property are addressed in Section V.D.7. *GM Drainage (North of the Powerline Floodway).* Roadway runoff area and time of concentration calculations are presented in tabular form in **Appendix G**.

City of Mesa standard M-64, double grated catch basins were specified for use in on-grade and in sump capture locations for the ultimate roadway build-out with curb and gutter. A maximum spread of 17 feet is maintained throughout the network, with most spreads extending 10 feet to 15 feet.

To ensure adequate capture of runoff flows in the interim condition, once the ultimate condition was modeled and catch basin spacing determined, ADOT C15.81 catch basins were specified for the interim condition catch basins. In the interim construction a transverse dike, creating a localized sump, will bound each ADOT C-15.81 catch basin. Since runoff is delivered to interim inlets via unlined roadside ditches, additional maintenance of the catch basins and connector pipes will be required to mitigate the accumulation of fine sediments entering the system for the interim condition.

1. Design Exceptions

Spread resulting from the 100-year storm must be contained within the right-of-way of the proposed roadway section. In the interim condition, where curb and gutter is not constructed, 100-year runoff will be allowed to leave the roadway section, as it does now, and will not be contained within the roadway right-of-way limits. To ensure that existing development is not negatively impacted at locations where runoff leaves the roadway section, areas of runoff concentration have been investigated. Runoff leaves the roadway section without negative

effects (ponds and discharges to channel or farm fields). **Table 5** contains a list of areas where runoff leaves the roadway in a concentrated manner.

TABLE 5 - 100 Year Runoff Concentration Points

Roadway Station	Lt/Rt	Description
161+00	Rt	Concentration at Roadway Sump. Runoff ponds against GM Berm, then continues South to at Sta 156+25 and enters Ellsworth Channel via an RGRCP Storm Drain.
137+00	Rt	Concentration at Roadway Sump. Runoff ponds against GM Berm, then it crosses Ellsworth Road in a culvert and enters Ellsworth Channel.
118+50	Rt	Concentration at Roadway Sump. Runoff crosses Ellsworth Road in a culvert and enters Ellsworth Channel.
92+00	Rt	Concentration at Roadway Sump. Runoff ponds against existing grade, crosses Ellsworth Road in a culvert and enters Ellsworth Channel.
79+00	Rt	Concentration at Roadway Sump. Runoff ponds against existing grade, crosses Ellsworth Road in a culvert and enters Ellsworth Channel.
53+00	Rt	Concentration at Roadway Sump. Runoff enters Ellsworth Channel.
161+00	Lt	Concentration at Roadway Sump. Runoff enters Williams Gateway property and continues Southwest, eventually be intercepted by Ellsworth Channel.
137+00	Lt	Concentration at Roadway Sump. Runoff ponds against curb, then enters Ellsworth Channel.
118+50	Lt	Concentration at Roadway Sump. Runoff ponds against curb, then enters Ellsworth Channel.
92+00	Lt	Concentration at Roadway Sump. Runoff enters Ellsworth Channel.
79+00	Lt	Concentration at Roadway Sump. Runoff enters Ellsworth Channel.
53+00	Lt	Concentration at Roadway Sump. Runoff enters adjacent farm field and continues west.

Once Ellsworth Road is built to its ultimate section, with completed curb and gutter, the effects of the 100-year storm will once again need to be investigated, by the ultimate conditions design engineer and future land developers. Sumps in the roadway profile will create concentration points for runoff, ponding against the curb. Once the curb is overtopped, runoff will spill onto adjacent properties. It will be necessary for those developing these properties to provide adequate drainage features to accommodate runoff leaving the roadway during a 100-year event.

2. *Powerline Floodway Outfall System Phase I, Station 178+50.26 (Sheet CHC3 & SD25)*

The Powerline Floodway outfall system collects runoff from Phase II to the Powerline Floodway at Ellsworth Road, Station 178+50. The Phase II consultant, Stantec, performed the analysis and design for this system north of Station 181+00. That analysis is included in **Appendix G**. Flows exit the system at the Powerline Floodway, tying into the 10-year hydraulic grade line elevation

of this channel. District Staff voiced concerns that the approach angle of the 60 inch storm drain could cause flow to overtop the Powerline Floodways southern bank in the event that the storm drain was flowing full while the Powerline Floodway was carrying little to no flow. Given the fact that the storm drains contributing drainage area is much smaller than that of the Powerline Floodway, this is a likely scenario. AMEC presented the Exhibit included in **Appendix P** to District Staff members at the February 18, 2005 Comment Resolution meeting and a decision was made to change the approach angle should be changed from approximately 45 degrees to 60 degrees. The resulting flow pattern is oriented closer to the direction of flow of the Powerline Floodway thereby significantly reducing the possibility of overtopping.

3. North Ellsworth Channel Outfall System, Roadway Station 156+23 (Sheet SD20 to SD24)

The North Ellsworth Channel outfall system collects runoff from south of the Powerline Floodway to a location at which the Ellsworth Channel alignment becomes adjacent to Ellsworth Road, a distance of approximately 1800 feet. The system empties into the Ellsworth Channel at its toe of slope, tying into the hydraulic grade line of the channel during the 10-year event.

4. Ellsworth Channel Outfall Connector Pipe System (Sheet SD04 to SD20)

The Ellsworth Channel outfall connector pipe system collects runoff from a location at which the Ellsworth Channel alignment becomes adjacent to Ellsworth Road, Station 153+50.00 to Station 52+50.00. This system does not convey flow along its length. Flows are intercepted at inlets and discharged immediately to Ellsworth Channel via connector pipes. Outfall connector pipe inverts are set at the toe of the Ellsworth Channel side slope.

5. South Ellsworth Channel Outfall System, Roadway Station 46+99 (Sheet SD02 to SD03)

Pavement drainage from German Road to Future Pecos Road is collected and conveyed along the west and east side of Ellsworth Road to Roadway Station 38+50.00 via roadway grader ditches. Here the flow is collected by catch basins and conveyed in connector pipes and discharged into a 24 inch storm drain that begins here and terminates approximately 890 feet later at Ellsworth Channel Station 446+99. At the direction of the project stakeholders a storm drain below the pavement was used at this location due to the fact that not enough right-of-way could be acquired

to allow for a connection to the proposed Ellsworth Channel via a continuation of the grader ditch.

6. South of Germann Road

Drainage south of Germann Road is addressed in Section V.D.1 of this report (Germann Drain) and in **Appendix N** (Design Memorandums). Roadway drainage calculations were not performed for this reach.

C. *Channel Design*

The Ellsworth Channel proposed conditions hydraulic model output and cross-section location exhibit is included in **Appendix I**. There are 9 typical channel reaches for this project as summarized in **Table 6**. The channels are stationed from upstream to downstream with station 616+95 being located at the confluence with the Powerline Floodway.

Table 6 – Channel Design Summary

Channel Reach	From Station	To Station	Design Discharge (Full CIP) (Dev. Water-shed)	Check Discharge (Pre & Int CIP) (Exist Water-shed)	Channel Bottom Width	Channel Slope
			(cfs)	(cfs)	(ft)	(ft/ft)
Reach 1	44699	46442	600	349	10.17	0.0006
Reach 2	46691	47895	600	349	10.17	0.0008
Reach 3	47895	52395	600	2856	30.18	0.0008
Reach 4	52395	53195	1172	3203	70.21	0.0008
Reach 5	53195	55313	1744	3550	70.21	0.0008
Reach 6	55313	58413	1744	3550	70.21	0.0014
Reach 7	58450	58898	1744	3550	70.21	.00234
Reach 8	58898	59318	1744	3550	70.21	.00228
Reach 9	59375	61695	1744	3550	70.21	.00253

The following section describes the design exceptions requested for the construction of the proposed Ellsworth Channel project. The section discusses the starting water surface elevation determination and provides a brief description of each of the channel reaches listed above including any special considerations unique to each reach:

1. Design Exception

a) Channel overtopping at Pecos Road

The Full-CIP design condition for the Ellsworth Channel includes construction of the Pecos Basins at the Meridian Road alignment. The Pecos Basins, when constructed, will significantly reduce the 100-year peak discharge reaching the Ellsworth Channel at Pecos Road. The future Full-CIP channel design discharge downstream from the Pecos confluence is 600 cfs. The existing conditions peak discharge at the same location is 2856 cfs. Downstream from the GM Manifold (approximate channel station 526+00), the channel cross-section is generally in cut and can contain the existing condition peak discharges within the cut section with little or no freeboard. The channel reach from the Pecos confluence to the GM Manifold is in the vicinity of the critical glide slope location. Therefore the design tops of channel bank elevations are at or near the natural ground elevation. The project stakeholders determined that it was not cost-effective to increase the channel capacity in this reach for the interim condition, considering that the channel would be unnecessarily oversized when the Pecos Basins are built.

It was determined that channel overtopping would be allowed for the interim condition between the location from Pecos Road for a distance of approximately 3,400 feet as long as it can be demonstrated that conditions are not made worse than under existing conditions by the channel and roadway construction. The Channel Overtopping Analysis demonstrating that conditions are not made worse is described below. The existing conditions hydrology from the East Mesa ADMP was reviewed to determine flow routing for existing conditions in the vicinity of Pecos Road and Ellsworth Road. The East Mesa ADMP existing conditions hydrology model shows that runoff generated south of Pecos Road, draining west to Ellsworth Road, crossing Ellsworth Road and continuing west along the Pecos Road alignment. Runoff generated north of Pecos Road as well as runoff generated east of the project in Pinal County, is diverted along the north side of Pecos Road to Ellsworth Road. At Ellsworth Road this runoff flows north along Ellsworth Road and crosses Ellsworth Road into the Williams Gateway Airport North Perimeter Channel in a broad, sheet flow fashion extending for nearly 6500 feet along Ellsworth Road.

The Channel Overtopping Analysis considers:

- Changes in peak discharge resulting from capturing and diverting flow to the north with the new channel, and

- The impact of the channel construction on overtopping flows leaving the channel and continuing west along the historic flow path.

The main concern was to ensure that by capturing and diverting flow generated south of Pecos Road to the north along Williams Gateway Airport, that additional runoff not be released onto the airport in excess of the amount that would flow across the airport under existing conditions.

b) Changes in Peak Discharge

Per the East Mesa ADMP existing conditions routing, 443 cfs crosses Ellsworth Road south of Pecos Road and 2,863 cfs reaches Ellsworth Road north of Pecos Road. The design hydrology model (Interim-CIP model) for existing watershed conditions combines these hydrographs to establish the peak discharge of 2856 cfs flowing north of Pecos Road. This indicates that collecting and diverting the 443 cfs from south of Pecos Road does not increase the peak discharge north of Pecos Road. This is due to differences in timing of the peak discharges reaching the channel. The local runoff south of Pecos Road reaches the channel approximately 1.5 hours earlier than the peak discharge north of Pecos Road. As a result, the peak discharge intercepted south of Pecos Road will already have drained through the system in advance of the higher peak north of Pecos Road. Runoff spilling out of the Ellsworth Channel south of Pecos Road is due to backwater from the channel system north of Pecos Road.

c) Hydraulic Modeling

Two HEC-RAS models were developed to estimate overtopping flows.

HEC-RAS model *EllsworthChannel.prj (Plan: Final Unplugged Int CIP Q Weir No Berm.p03)* was developed based on proposed channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow leaving the channel and continuing west onto WGA property. The lateral weir location is shown on Figure: *Weir Exhibit – Proposed Condition"* and is included in **Appendix N**. The highest ground elevation adjacent to the channel was used as the weir elevation, for the proposed condition this coincided with the top of the WGA access road throughout much of the reach.

HEC-RAS model E*llsworthExistingOT.prj* was developed based on existing channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow overtopping the

Ellsworth Road and existing channel. Again the highest ground elevation adjacent to the existing channel was used as the weir elevation, for the existing conditions this consists of the GM access road at the upstream end of the model and the WGA access road at the downstream end. This is shown on Figure: *Weir Exhibit – Existing Condition* and is included in **Appendix N.**

d) Results

The existing watershed flow escapes the proposed Ellsworth Channel and continues west onto WGA property from channel station 14451 to channel station 12800. Approximately 1160 cfs escapes to the west.

The amount of existing watershed flow crossing existing Ellsworth Road and channel from the same reach, from Pecos road to channel station 12800, is approximately 1780 cfs (Note that proposed HEC-RAS Channel Stationing = Existing Channel Stationing – 100, upstream of station 11400). The amount of existing watershed flow leaving the proposed channel and continuing west (1160 cfs) is less the existing watershed flow crossing the existing road and channel to west (1780 cfs). Therefore the channel construction does not have a negative impact on overtopping flow to the west as the total amount of flow that escapes is decreased and the extent of the escaping reach is not altered.

At the request of the District the computed water surface elevations through the escaping reach were also compared. The table included in **Appendix N** clearly shows that although the proposed channel will retain and convey higher flows the computed water surface elevation is decreased throughout the breakout reach (station 14451 to 12800). The electronic HEC-RAS models listed above are included in **Appendix Q**.

2. *Starting Water Surface Elevation*

The starting water surface elevation for the Ellsworth Channel hydraulic analysis is dictated by the flow conditions in the Powerline Floodway. A HEC-RAS model was developed for the Powerline Floodway from the as-built plans. The model was run with the Interim-CIP and Full-CIP discharges to establish the starting water surface elevations for both conditions at the Ellsworth Channel confluence. The water surface elevations are 1358.73 feet and 1358.27 feet

for the Interim and Full CIP conditions, respectively. The Powerline Floodway HEC-RAS output summary tables are included in **Appendix H**.

3. Station 616+95 to 52+ 523+95 (Powerline Floodway to GM Manifold)

This is the downstream reach of the channel project with an outfall into the PLF. The reach includes three box culvert crossings and one sloping faced baffled chute drop structure. Off-site flows enter this reach at the GM Manifold, a storm drain outfall, one WGA pipe and at the confluence with the WGA North Perimeter Channel. Flow from the GM manifold passes under Ellsworth Road via two sets of concrete box culverts and combines with the main channel flow from the south.

The existing channel along the west side of Ellsworth Road at WGA leaves the Ellsworth Road alignment at approximately 4,000 feet south of the PLF and drains northwesterly through the WGA property to the outfall at the PLF. This reach of channel is sometimes referred to as the North Perimeter Channel (NPC). The new Ellsworth Channel will redirect the NPC so that it will continue to the north remaining adjacent to Ellsworth Road for another 1310 feet and then follow the arcing north property line to a point where it will rejoin the NPC. This will result in a segment of the NPC that will be cutoff at both ends. Meetings with WGA staff led to the decision to allow the NPC to drain unimpeded, into the proposed Ellsworth Channel at the location of the confluence (approximate Ellsworth Channel Station 506+98). This concept was discussed with representatives of both the Flood Control District and the City of Mesa.

In order to match the NPC's invert elevation at the confluence, a 6-foot sloping baffled chute drop structure was employed at station 584+13.52. The baffled chute design was used so as to eliminate the need for a downstream stilling basin (that is used with drop structures that primarily dissipate the energy at the bottom of the drop) that would be difficult to drain. The chosen design employs a 2-foot sill at the upstream end of the drop that is used to control the entrance velocity at the crest of the slope. Three 1-foot wide openings are used to drain any water that remains trapped upstream of the sill following the design event. The structure was designed using the procedures outlined in the publication, *Hydraulic Design of Stilling Basins and Energy Dissipaters,* USBR 1984. Design calculations are included in **Appendix K**.

The NPC will connect to the Ellsworth Channel via 1, 48" RGRCP that is designed to drain the NPC in approximately 5 hours following a design event. A 50% clogging factor was applied to model the effects of the security racks located on the upstream side. The outlet of the 48" RGRCP will be fitted with a flap-gate mounted on a setting collar. The purpose of the flap-gate is to assure that backwater within the Ellsworth Channel will not back up through the pipe and cause flooding on the WGA property. Following a design event the water surface elevation within the Ellsworth Channel will subside and the flap-gate will open allowing the channel to drain. The calculations package for the NPC tie-in is included in **Appendix O** as well as a map entitled *Maximum Available Retention Volume in the Abandoned North Perimeter Channel.* The exhibit clearly shows that the abandoned NPC will have sufficient volume to detain the 100-year, 2-hour runoff volume from its contributing drainage area and therefore no flooding within the WGA property outside of the limits of the existing NPC is expected.

4. *Station 520+50 to 473+29.5 (GM Manifold to Pecos Rd.)*

This reach collects flow from the planned Pecos Channel at the northeast corner of Pecos Road and Ellsworth Road and conveys it to the GM Manifold. The reach includes one box culvert crossing. Pavement drainage is collected via a series of small inlets and conveyed to the Ellsworth Road connector pipe storm drain system.

The box culvert for the planned Pecos Channel will be constructed with this project to its ultimate configuration. The Ellsworth Channel design includes gabion baskets along the east channel bank to protect the channel from potential erosion from overtopping flows that may occur prior to construction of the Pecos Channel and basins (see Section IV.C.2. *Culvert Overtopping*).

5. *Station 473+29.5 to 446+45.7 (Pecos Rd. to Future Pecos Rd.)*

This reach extends from the future Pecos Road, on-half mile south of the existing Pecos Road, to the confluence with the future Pecos Channel. The reach includes two box culvert crossings, one of which passes under Ellsworth Road as the channel shifts from the east side of the road to the west side. Off-site flows enter this reach from an agricultural tailwater ditch at the future Pecos

Road alignment that drains a large area of irrigated fields and from a series of small inlets from the Ellsworth Road storm drain system.

6. Station 446+45.7 to 420+00 (Future Pecos Rd. to Germann Rd.)

Provisions to convey offsite flows are not provided for in this reach. This was the result of a detailed alternative evaluation and final recommendation from the project stakeholders. Street drainage in this reach will be collected and conveyed in roadside ditches to a location approximately 800 feet south of New Pecos Road. The street drainage will then drop into a proposed storm drain system that will outlet to the proposed Ellsworth Channel at approximately channel station 446+99. The roadside ditches and storm drain described above will be located completely within the 65-foot right-of-way of Ellsworth Road.

7. Potential Land Subsidence

The channel design has not included provision for subsidence. It is recommended that a monitoring program be implemented to identify land subsidence, if it occurs. Specific measures for channel modifications due to subsidence could then be made based on actual measured differential subsidence.

D. *Culvert Design*

Culverts, which are "in-line" with proposed channels are modeled in HEC-RAS as part of the channel system and are intended to be "free-flowing" so that the backwater effect is minimal. An exception to this is culvert C12 that is deliberately undersized and allowed to flow under pressure during the design runoff event. This was done in order to take advantage of the excess channel depth upstream of the culvert that resulted from lowering the channel invert to allow for positive drainage from the NPC.

Those culverts, which are tributary to the channel system, are modeled using HY8 and are shown in **Appendix J**. Other culverts are "cross culverts" and convey runoff from one side of Ellsworth Road to the other side.

The following is a brief description of specific, unique culverts and/or culvert systems within the study area: Culverts are summarized in **Table 7**

Table 7 - Culvert Summary

CROSS-ROAD CULVERTS

Culvert Location and Size	No.	Approx Sta	Pre-CIP				Interim -CIP				Full-CIP			
			Q100 (cfs)	Rd EL (ft)	WSEL (ft)	Overtopping Depth (ft)	Q100 (cfs)	Rd EL (ft)	WSEL (ft)	Overtopping Depth (ft)	Q100 (cfs)	Rd EL (ft)	WSEL (ft)	Overtopping Depth (ft)
Pecos North 3-10' x 5' C.B.C	C-6	Roadway: 76+20 Channel: 477+00 RAS: 14100	2856	1387.5	1389.39	1.89	2856	1388.1	1388.67	0.57	600	1388.1	1386.63	0
GM Manifield South 5-10' x 5' C.B.C	C-8	Roadway: 120+20 Channel: 521+00 RAS: 9800	1014	1382.5	1383.45	0.95	934	1384.6	1384.73	0*	590	1384.6	1382.4	0
GM Manifield North 5-10' x 5' C.B.C	C-10	Roadway: 128+70 Channel: 529+60 RAS:8900	1014	1382.1	1383.05	0.95	1095	1386.5	1384.73	0	863	1386.5	1382.4	0
PLF Culvert 1-16.5' x 6' C.B.C	C-14	Roadway: 178+41 Channel: N/A RAS: N/A	This is an extension of an existing culvert in the Powerline Floodway.											

* The overtopping depth at GM south is estmated based on the berm elevation at the culvert inlet (1385.0 ft)

OTHER CULVERTS

Culvert Location and Size	No.	Approx Sta	Comment
WGA Former Armory Culvert 1 - 42" RGRCP		Roadway: N/A Channel: 609+16 RAS: 1000	Replace Existing Culvert in kind.
Confluence with NPC 1 - 48" RGRCP		Roadway: N/A Channel: 587+58 RAS: 3200	Culvert drains the existing North Perimeter Channel (NPC) that is cut-off by the construction of the proposed Ellsworth Channel. The culvert was sized to drain the NPC within 36 hours. The calculations apply a 50% clogging factor to account the the access barrier on the upstream side. The pipe is fitted with a concrete collar and Waterman flap gate to keep backwater within the proposed channel from adversly effecting the WGA property. (See calculations in Appendix O)
Pecos South Drain 2 - 42" RGRCP		Roadway: 69+21 and 72+17 Channel: 470+00 and473+00	Culverts carry agricultural runoff across Ellsworth Road and into Ellsworth Channel.
Germann Drain 1 - 24" CMP		Roadway: 19+50 Channel: N/A RAS: N/A	Culvert carries flow from southeast corner of Germann and Ellsworth to southwest corner. See Appendix N for a detailed description of the flow conditions at this intersection.

1. Germann Drain

A proposed 24" CMP will be installed from the southeast corner to the southwest corner of Germann and Ellsworth Roads. **Appendix N** contains a detailed description and analysis of the flow conditions at this location.

2. Pecos South Drain (Sta 69+21, Sta 72+17)

An agricultural field drains to the southeast corner of the Pecos Road and Ellsworth Road intersection. The flow is constrained by these roads, especially since Ellsworth Road will be raised about 1.64 feet above existing grade. Two cross culverts, each 42 inch in size, under Ellsworth Road are proposed, at the locations of catch basins necessary for roadway drainage. The culverts are designed for the 100-year storm in order to mitigate the 100-year ponding on private property. The Ellsworth Channel is the outfall, and the channel's 100-year design depth is the tailwater condition.

3. Pecos North Drain (Sta 76+86)

This culvert is part of the ADMP system and serves to drain flow from the east, which is currently routed between the GM berms and Pecos Road. This culvert is designed to convey a 100-yr flow of 600 cfs in the developed, full-CIP condition. Additionally, the culvert will convey the existing conditions, interim-CIP flow of 2856 cfs by allowing 0.57 feet of overtopping of Ellsworth Road. The culvert is a 3-barrel 10-foot x 5 foot CBC. Since this location is designed to overtop the road under existing conditions, the east bank of the channel is armored against erosion with gabion bank protection (see Section IV.C.2. *Culvert Overtopping*). This culvert also requires a trash rack/access barrier due to its penetration onto GM property.

4. GM Manifold (Sta 120+72, Sta 129+29)

This culvert system serves as a major drainage for the GM Proving Grounds. Flow passes through the manifold structure at three locations and is combined in an equalizing swale between the road and the security berms. A portion of the berms that are perpendicular to the road will need to be removed to allow for construction of this collection system. This culvert system actually consists of two individual 5-barrel culvert systems, which act together, sharing a common water surface. The design flow for this system is 1452 cfs. Additionally, the culvert

system will convey the existing conditions, interim-CIP flow of 2028 cfs with no overtopping of Ellsworth Road with a 50% clogging factor applied. This design criterion was chosen with direction from the stakeholders in order to avoid the need to reinforce the pavement structural section or line the channel east bank at this location. Since there is no definite timetable for the construction of future improvements, such as on-site flow retention that would reduce the amount of flow that exits the G.M. property, it was deemed prudent from a public safety perspective to design the crossing so as to not overtop and/or inundate Ellsworth Road in the interim flow condition. These two sets of culverts require trash rack/access barriers due to their penetration onto GM property.

5. *GM Drainage (South of the Powerline Floodway) (Sta 129+59)*

Currently, there are 2-48 inch CMP's that penetrate the GM security berm north of the GM Manifold. Based on field observations, flow still reaches these culverts, however the calculations provided in **Appendix J** shows that the flow is negligible compared to the amount flowing through the GM Manifold. Therefore, these culverts will be abandoned.

6. *Powerline Floodway Culvert Extension (Sta 178+41)*

Because of the widening of Ellsworth Road, the existing box culvert will need to be extended a total of 22.8 feet to the east and 80.8 feet to the west. This will allow for a 32-foot warping transition zone from the culvert outlet to the existing channel, similar to the existing condition. There is also a 20-foot long "open-box" section that will be constructed to provide a location to tie-in the proposed 60 inch storm-drain. An "open-box" configuration was chosen in order to provide easy access to the storm drain for maintenance purposes. The existing General Motors access gate and related telemetry will be moved approximately 15-feet east into a new open-box section.

7. *GM Drainage (North of the Powerline Floodway)*

Within the developed area of General Motors is a sub basin that drains directly to Ellsworth Road. In its current condition, the runoff collects along Ellsworth Road and is either conveyed in an existing 24 inch pipe under the road or continues to the south in a roadside swale to the Powerline Floodway. An existing General Motors detention pond at the northeast corner of Ellsworth Road and the Powerline Floodway currently drains into the Powerline Floodway via a

drainage scupper. Due to the roadway widening and in-line box culvert extension, this drainage scupper must be removed and replaced in kind.

8. *WGA Former Armory Culvert (Sta 608+78.59)*

The former armory area drains to the existing Ellsworth Channel via an existing 48 inch pipe. Because of channel improvements, this culvert will need to be removed. It will be replaced with a new 42 inch RCP placed at a 45-degree angle relative to the channel. See **Appendix O** for ponding area drain time calculations.

VI. REFERENCES

AMEC Earth and Environmental, Inc., *Geotechnical Services Drainage Channel Improvements MCDOT Project No. 68927 Ellsworth Road Germann to Guadalupe Roads,* December, 2004.

Arizona Department of Water Resources, *Manual for Engineering Analysis of Fluvial Systems, 1985.*

Collins/Pina, *East Maricopa Floodway Capacity Mitigation & Multi-Use Corridor Study, Conceptual Design Alternatives Report*, August 2000.

Dibble & Associates, *Technical Memorandum #1, Preliminary Channel Evaluation Hydraulics & Hydrology*, May 16, 2001.

Dibble & Associates, *Technical Memorandum #2, Preliminary Channel Evaluation Hydraulics & Hydrology*, June 8, 2001.

Dibble & Associates, *Design Concept Report, Ellsworth Road to Baseline Road*, October 1999.

Dibble & Associates, *East Mesa Area Drainage Master Plan, Recommended Design Report*, July, 1998.

Federal Highway Administration, Hydraulic Design Series No. 5, *Hydraulic Design of Highway Culverts*, FHWA-IP-85-15, September 1985.

Federal Highway Administration, Hydraulic Engineering Circular No. 12, *Drainage of Highway Pavements*, FHWA-TS-84-202, March 1984.

Federal Highway Administration, Hydraulic Engineering Circular No. 15, *Design of Roadside Channels with Flexible Linings*, FHWA-IP-87-7, April 1988.

Flood Control District of Maricopa County, Engineering Division, *Drainage Design Manual for Maricopa County, Arizona Volume I, Hydrology*, January 1, 1995.

Flood Control District of Maricopa County, Engineering Division, *Drainage Design Manual for Maricopa County, Arizona Volume II, Hydraulics*, January 28, 1996.

Wood, Patel & Associates, Inc. Elliot Road Detention Basins & Outfall Channel Phases 1 & 2 Design Documentation Summary, May 2000.

U.S. Army Corps of Engineers, *HEC-1, Flood Hydrograph Package, Users Manual*, September 1990.

U.S. Bureau of Reclamation, *Hydraulic Design of Stilling Basins and Energy Dissipators*, May 1984

U.S. Geological Survey, *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona*, April, 1991.

APPENDIX A

Meeting Summary

amec

Minutes of Meeting

Project	68927	**AMEC File No**	04-2004-045
Date/Time	January 6, 2005	**MCDOT Contract No**	2004-094
Location	MCDOT Conference Room Navajo	**Written by**	Gregory Holverson
Subject	Phase Transition During Construction		

Present Gregory Holverson (AMEC), Bobbie Ohler (FCDMC), Gary Sharpio(FCDMC) Bill Sloan (AMEC), Pete Laannein (MCDOT), Darryl Bradley (Stantec), John Ball (Stanley Consultants), Sami Ayoub (MCDOT), Lisa Ruane MCDOT), Ron Parker (MCDOT), Tom Kmetz (COM)

cc Chris Mexas (AMEC), Bill Hiatt (AMEC), Larry Barela (AMEC), Mark Venti (COM), Herb Miller (MCDOT), Olin S. Sutton (MCDOT), John Thayer (MCDOT), Alex Coronel (AMEC)

Main Issues

Sami initiated the meeting by asking who would like to present their plan.

Greg presented a potential traffic control plan that AMEC team had prepared for the groups consideration.

Lisa stated that she had initially visualized something similar but had concerns with it.

Tom Stated that the City of Mesa's thoughts on the traffic transition area are similar to those presented by AMEC with a few differences. One would be to have Phase I contractor be responsible for maintenance of temporary transition pavement and Phase I contractor to complete all improvements in Phase I Project area. Tom also mentioned that if the vertical transition started south of the driveway it would minimize driveway disruption. Greg stated that a ll% grade was used for transition and adjustment to that can be made.

Lisa mentioned that special review should be given to the grade break no matter where it ends up to make sure there are no bottoming out problems. In general, the group emphasized to not dictate construction means and methods but to provide some basic indication of what will be required of the contractor so they can adequately bid it and still have some flexibility in proceeding with their work. Gary mentioned that if the proposed roadway were lowered by 3 feet, it would closely match the existing and make traffic transition easier. Greg indicated he would check into it. (Subsequently after the meeting, Greg confirmed that new road height was based on clearance needed over the existing box culvert structure and the new extension for new pavement section.)

Main Issues

Several alternative bidding options were reviewed for Traffic Control bid item for providing transition from proposed to existing for both Phase I & II. Additional conversation developed regarding a Lump Sum bid item that specifically requires contractors to work together.

General discussion concluded that 2-II' lanes should be open at all items and any detour over 5 days in duration would be to be paved. At conclusion of meeting, it was determined that AMEC should revise Transition Plan and resubmit for review. Additionally, it was noted that traffic control would be easier if existing box were left in place. It was mentioned that the box culvert should be extended unless some sort of deficiency can be documented with culvert structure. Greg mentioned that the age of original structure is the primary reason for recommendation for replacement and no structural deficiency is known. Greg will arrange for a closer visually inspection and plans will be revised to extend existing unless a deficiency is noted.

For Phase II, the east 23' ultimate improvements will mostly likely be constructed first.

Sami suggested that perhaps moving bid date for Phase II back would be beneficial in reducing potential conflicts between the Phase I and II construction efforts. A suggestion was made to for bid opening of Phase II to early June.

amec

Minutes of Meeting

Project	68927	**AMEC Project no.**	04-2004-045
Date/Time	December 21, 2004 – 10:00am	**MCDOT Contract No.**	2004-094
Location	MCDOT – Apache	**Written by**	Greg Holverson
Subject	Ellsworth Road Stakeholder Meeting		

Present Greg Holverson (AMEC), Bob Davies (AMEC), Peter Laaninen (MCDOT), Jim Martin (AMEC), Chris Mexas (AMEC), Tom Kmetz (COM), Cathy Regester (FCDMC), Sami Ayoub (MCDOT), Bobbie Ohler (FCDMC), Lisa Ruane (MCDOT) Coral Sheehan (MCDOT), Alex Coronel (AMEC),

cc Herb Miller (MCDOT), Bill Hiatt (AMEC), John Thayer (MCDOT), Larry Barela, (AMEC), Olin S. Sutton Jr. (MCDOT), Joe Pinto (MCDOT), Gary Shapiro (FCDMC), Bob Herz (MCDOT), Robert Alcala (RA Alcala& Assoc.), Bill Hansing, (COM), Bill Donahue (COM), Mark Venti (COM), Dennis Ericson (COM), Dan Sundstrom (COM), Steve Lohide (Logan Simpson Design), Adrienne Sears-Lake (COM)

Main Issues

1. Right-of-Way Comments Include:
   a) For the SE corner of Germann and Ellsworth Road R/W, Coral will send title company new documents as they have lost their copy
   b) For the GM parcel on the NE corner of Pecos and Ellsworth Road that has not been acquired yet, AMEC will send Coral a plan detailing what is needed that will be less than that shown on the 70% plans.
   c) For the WGA easement that has not been acquired yet, AMEC will send Coral, Bobbie, Tom and Sami a map showing what is needed, that will be less than that shown on the 70% plans.

2. FCDMC Comments:
   a) Marble samples from a Marble Company have been submitted to Bob Davies and Tom also wishes to receive a sample. The company submitting the samples would hope that perhaps their product could be used in channel construction.
   b) Splitting of Cost Estimate was reviewed with several recommendations. AMEC will make adjustment and send to Bobbie, Tom and Sami.
   c) Structures Cost Estimate was given to Bobbie and a similar copy will be sent to Sami. It was decided that sharing 50/50 the cost of structures under the roadway between roadway and channel was appropriate.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

ITEMS	ACTION

d) Fencing and gates that would be impacted with just building the road, should be shared 50/50 between roadway and channel portions of project.
e) RGRCP should be further investigated as to cost sharing between roadway and channel portions of project.
f) Channel construction needs to substantially completed by June of 2006, so that FCDMC can pay MCDOT per the current budgeting plan. Bobbie asked if words could be added to specifications to make this happen. It appears that channel construction would be one of the first construction activities and that there is enough time to meet this need. AMEC will further investigate correct wording to be used and make adjustment to specifications if there would be no additional construction cost impact.
g) Construction period is to be 16 months.
h) Cost breakdown for the first 6 items of Engineer's Estimate need to be based on ratio of total overall construction cost.
i) Revised cost estimate will be sent to stakeholders.

3. City of Mesa Comments:
   a) Tom asked if Photometric and Voltage Drop calculations have been given to City staff. Greg will check into this matter.
   b) Turning radius for design vehicle for O&M road will be 45 feet.
   c) Survey monuments will be standard MAG monuments for City of Mesa.
   d) AMEC will investigate how the concrete box culvert at Station 65+00 can be constructed while maintaining one lane of traffic in both directions.

4. MCDOT Comments:
   a) 100 % comments are due on January 4, 2005, and maybe hard to achieve given the holidays. Sámi offered a one week extension and requested that comments be sent to him in portions so that AMEC can start comment resolution process on schedule.
   b) Comment resolution meeting is scheduled for January 11, 2005, and the same day comments are due. Comment resolution meeting will be scheduled in Mesa on January 12, 2005.

amec

Minutes of Meeting

Project	68927	**AMEC Project no.**	04-2004-045
Date/Time	November 23, 2004 – 10:00am	**MCDOT Contract No.**	2004-094
Location	MCDOT – Apache	**Written by**	Greg Holverson
Subject	Ellsworth Road 90 % Comment Submission Meetings		

Present Greg Holverson (AMEC), Robert Johnston (AMEC), Bob Davies (AMEC), Peter Laaninen (MCDOT), Jim Martin (AMEC), Chris Mexas (AMEC), Tom Kmetz (COM), Cathy Regester FCDMC), Olin S. Sutton Jr. (MCDOT), Joe Pinto (MCDOT), Sami Ayoub (MCDOT), Bobbie Ohler (FCDMC), Gary Shapiro (FCDMC)

cc Herb Miller (MCDOT), Coral Sheehan (MCDOT), Alex Coronel (AMEC), Bill Hiatt (AMEC), John Thayer (MCDOT), Larry Barela, (AMEC), Bob Herz (MCDOT), Robert Alcala (RA Alcala& Assoc.), Bill Hansing, (COM), Bill Donahue (COM), Mark Venti (COM), Dennis Ericson (COM), Dan Sundstrom (COM), Steve Lohide (Logan Simpson Design), Adrienne Sears-Lake (COM)

Main Issues

1. Right-of-Way Comments Include:
   a) R/W on Northeast corner of Ellsworth and Pecos intersections as shown on the 70% plans is not reflected on MCDOT R/W exhibits. Coral will proceed with right of entry and acquisition of this piece. Currently, GM right-of-needs are with the attorney.

   b) Several of the existing TCE's look small, CM representatives from AMEC and MCDOT will double check that they are sufficient as currently shown.

2. Utilities Comments Include:
   a) Olin suggested adding a line item in the bid list for water and sanitary sewer relocations.
   b) Olin will send SW gas a red line plan set confirming abandonment of 2-inch gas line.
   c) SRP will most likely need to lower future line more than currently designed to stay 48 inches below grader ditch south of Pecos.
   d) Pole line E-W on Germann and east side of Ellsworth will have to be relocated once in coordination with underground facilities. Olin will give SRP crossections so they can proceed with design.
   e) Greg will provide Olin with a revised set of latest storm drain plans.
   d) QW will run new line on west side.
   f) Olin will visit with Queen Creek after the Holiday regarding the lowering their irrigation structure at Germann Road.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

g) Private irrigation letters gave permission and easements to relocate a portion of the existing facilities. The remaining facilities will be removed and not replaced. Plans will show the details

h) Olin may request additional potholes for those areas that have changed from 70% design plans.

i) Landscaping power sources will be coordinated with street light service points.

j) Landscaping power sources for areas away from roadway will come from batteries.

k) GM frontage, existing fence should be by left in place even though it is and will be in R/W. Design will be adjusted accordingly and a special use permit will be issued by Mesa

l) Show Ray Road and Pecos Road turn out as future, no need to build them now.

m) E-Street coordination is needed between phase 1 and 2 design and construction.

n) Fire access to WGA and west side turnout at existing Pecos Road is to be moved southerly to avoid cost of channel crossing. Fire and O&M access road from this point will be extended southerly along channel, connecting into Ellsworth Road at station 6700. R/W and fencing will be adjusted. Ellsworth median at this point should have mountable curb and be constructed so that fire and maintenance vehicles can cross at this point.

o) No median opening is needed at 7660.

n) Storm drain manhole spacing needs to be checked as it appears they may be too close together at certain points

p) Low points along Germann and Ellsworth intersection approaches need to be checked for positive drainage.

q) Transverse drainage of pavement at left turn lanes needs to be check for drainage. Cross slopes ranging from 1.7 to 2.2% can be utilized.

r) Irrigation supply will come off of COM water supply.

s) Powerline channel turnouts need to have gates moved back to allow a truck to stop in Driveway off of Ellsworth Road.

t) For those channel or paving plans showing fencing, please add a note referencing fencing plans for details on relocation and installation.

u) Adjustments to tailwater ditches near Germann and Ellsworth intersection need to be coordinated with Olin.

Drainage inlets for the O&M road need to align with laterals from Ellsworth inlets as much as possible.

3. <u>City of Mesa Comments Include:</u>

a) Street light team meeting was held yesterday and another meeting will be held next week.

b) RALCALA will be meeting with SRP to determine points of delivery, which will be revised to show less points than currently shown.

c) RALCALA and Mesa staff will be meeting about E-Street requirements.

e) Tom will let Greg know of turn around radius or width required for typical maintence equipment that will be using O & M road.

f) Landscaping north of station 15700 should be removed.

ITEMS	ACTION

4. Flood Control District Comments Include:
   1) Channel easement along WGA will be reviewed and reduced in width with the design goal of minimizing impact on existing WGA fence and O&M road.
   2) Channel drop structure at the connection to Powerline Floodway will be moved up stream to replace the concrete grade control structure and allowing for matching the invert elevation of existing channel connection point eliminating the need for low-flow channel, percolation basin, or outlet pipe system.
   3) The connection to Powerline Floodway will be redesigned with a substantially less structure to save construction cost.

5 Specifications Comments Include:
   1) Coordination between Phase 1 construction and Phase 2 construction needs to be articulated in the special provisions to save cost associated with extensive vertical and horizontal pavement tapers that will be necessary if construction of each phase proceeds independent of the other at this point. Additionally, connection of the outfall for storm drain system needs to be coordinated between phases.

6 Schedule Comments Include:
   1) Sami distributed a schedule portraying the dates of important project milestones and the linkages necessary between milestones to start construction in June of 2005.

amec

Minutes of Meeting

Project	68927	**AMEC File No**	04-2004-048
Date/Time	November 16, 2004	**MCDOT Contract No**	2004-94
Location	Flood Control District Maricopa County	**Written by**	Bob Davies
Subject	Ellsworth Road		Chris Mexas

Present: Bobbie Ohler (FCDMC), Gary Shapiro (FCDMC), Peter Laaninen (MCDOT), Herb Miller (MCDOT), Coral Sheehan (MCDOT), Bob Davies (AMEC), Chris Mexas (AMEC).

cc: Robert Johnston (AMEC), Alex Coronel (AMEC), Bill Hiatt (AMEC), Jim Martin (AMEC), Greg Holverson (AMEC), Sami Ayoub (MCDOT), Mark Venti (COM), Bob Herz (MCDOT), John Thayer (MCDOT), Olin S. Sutton, Jr. (MCDOT), Joe Pinto (MCDOT), Cathy Regester (FCD), Tom Kmetz (COM).

Main Issues

Main topic of the meeting was to discuss channel easement width and need for TCE for channel construction, and discuss if temporary fencing is needed.

1. WGA Fencing: Bobbie commented that she understood that the WGA right-of-way has not been acquired yet. She inquired why the temporary fence is not inside the right-of way in some areas. She requested that AMEC confirm the location of the temporary fencing.

2. WGA R/W: Bobbie went through the channel plans, sheet by sheet, to identify areas where we might be able to trim down the identified right-of-way or drainage easement required. AMEC needs to identify how much TCE is required on the west side of the channel. For some reason the fencing footprints did not always appear in the same location in the channel plans as in the WGA fencing sheets. AMEC is to investigate and get to agree.

3. Downdrain Profiles: Gary pointed out that profiles should be shown for all the downdrains. This is important so that we can ascertain whether we have a backflow problem into the channel.

4. Temporary Fencing: The need for temporary fencing was then discussed at length. The possibility to write into the special provisions or construction notes that the contractor must maintain fencing at all times was discussed. AMEC could consider providing wording in the specifications that allows the contractor to reuse the fencing provided the revised fencing is acceptable to the inspector and WGA after it is reinstalled. One problem with this concept is that presently there are two types of fence being called out here. A MAG 6-foot high temporary fence and a WGA 7-foot high permanent fence.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

ITEMS	ACTION

5. WGA TCE: As proposed right-of-way and drainage easement takes are minimized AMEC is to consider landscape requirements, slopes, and turnarounds. On the WGA side of the channel AMEC should only allow for some landscaping and a 15-20-foot dirt road. For the determination of how much TCE is required, AMEC will consider how the contractor will likely construct the project. AMEC will consider the likely construction operation required to build the project. This operation will require a certain width. Once this likely width is anticipated, the revised minimum right-of way can be subtracted from it, leaving the required TCE needed. AMEC will have their construction management staff review the plans to anticipate the construction operation width likely required.

6. WGA Perimeter Road: Bobbie inquired whether portions of the new perimeter road can be deleted once we reduce the right-of way. She recommended AMEC contact Art Allen and get his reaction as to whether we need a new perimeter road at all or if he has a preference of whether we require a drainage easement of a certain width and a TCE beyond that.

7. Ellsworth Channel: Gary requested AMEC assess how far back AMEC water ponds onto the WGA property and what the resulting freeboard is. AMEC should assess, demonstrate, and document that allowing the channel to break through the bank of Ellsworth Channel does not make matters worse upstream onto WGA property.

8. Cross-Sections: AMEC discussed some of the comments from the District received regarding the 90% submittal. Herb said that the cross-sections need to reflect the top of ground required to build the channel/gabion/structure of what the contractor has to build. Chris and Gary agreed.

amec

Minutes of Meeting

Project	68927	**AMEC Project no.**	04-2004-048
Date/Time	November 15, 2004 – 9:00am	**MCDOT Contract No.**	2004-94
Location	MCDOT – Division Training Room	**Written by**	Greg Holverson
Subject	Ellsworth Road 90 % Comment Submission Meetings		

Present Greg Holverson (AMEC), Dave Bruggeman (Lee Eng.), Robert Johnston (AMEC), Bob Davies (AMEC), Peter Laaninen (MCDOT), Bob Herz (MCDOT), Jim Martin (AMEC), Chris Mexas (AMEC), Robert Alcala (RA Alcala& Assoc.), Bill Hansing, (COM), Bill Donahue (COM), Mark Venti (COM), Dennis Ericson (COM), Dan Sendstrom (COM), Tom Kmetz (COM), Steve Lohide (Logan Simpson Design), Adrienne Sears-Lake (COM)

cc Bobbie Ohler (FCDMC), Gary Shapiro (FCDMC), Herb Miller (MCDOT), Coral Sheehan (MCDOT), Alex Coronel (AMEC), Bill Hiatt (AMEC), Sami Ayoub (MCDOT), John Thayer (MCDOT), Olin S. Sutton Jr. (MCDOT), Joe Pinto (MCDOT), Cathy Regester FCDMC)

Main Issues

1. Traffic Signals Comments:
   1) Bill Hansing indicated that Ellsworth was an E street north of New Pecos and needs to be connected to E street stubouts that exist along New Pecos. A standard quad-duct is ok south of New Pecos.
   2) The mast arms on Germann Should be shorten from 45-feet to 40-feet.

2. Street Lights Comments Include:
   1) Bill Donahue indicated that Nate Morrison is the contact for SRP drop and meter application.
   2) Traffic signals and street lights need to be coordinated for shared pole arrangements.
   3) Eliminate elbows with general swipes, as it is hard to pull wire.
   4) Street Lights - Can have 2 circuits per cabinet.
   5) 2-inch conduit is maximum.
   6) LED light for obstruction needs to be review, do not believe it is necessary.
   7) Coordinate with landscaping the point of service
   8) Use a Traffic Signal Service Pedestal at all lighted intersections
   9) Pull boxes spacing needs to be less than 210-feet.
   10) Comment spreadsheet was passed out from the City of Mesa Streetlight Division.
   11) No 18-inch elbows.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

ITEMS	ACTION

3. General Civil Comments Include:
   1) Meandering sidewalks are not normally accepted by the City of Mesa but will be allowed for this specific project, as agreed to years ago.
   2) No raised median on Germann Road or on Ellsworth Road south of Germann. Pavement markings should be used instead.
   3) Use City of Mesa standard pavement section of 15 ½ inches.
   4) During construction one lane per direction is to remain open at all times is ok as a while maintaining left turns at Pecos and Germann.
   5) Separate meetings regarding lighting, traffic signals, and landscaping would be the quickest to resolve issues.
   6) Putting conduits at intersections is a good idea just in case it is needed in the future.
   7) Coordinate with Bolduc Smiley for Phase II improvements.
   8) Eliminate the traffic control pages in plan sets, but add what is needed in specs.

4. Landscaping:
   1) Irrigation has several changes that where identified.
   2) No landscaping needed in old channel section south of New Pecos.
   3) Overhanging tree cover where ramps go down in channel may be a problem.
   4) Need sight distances checked at intersections.
   5) Pavers are needed where median is less than 5-feet wide.
   6) Plans call for 15-gallon trees, should be 24-gallon as smallest.

amec

Minutes of Meeting

Date/Time	November 8, 2004	**Project No.**	68927
Location	MCDOT	**Written by**	Greg Holverson
Subject	Ellsworth Phase I Comment Resolution Mtg		

Present Alex Coronel (AMEC), Sami Ayoub (MCDOT), Bill Hiatt (AMEC), Mark Venti (COM), Gary Shapiro (FCDMC), Jim Martin (AMEC), Chris Mexas (AMEC), Bobbie Ohler (FCD), Bob Herz (MCDOT), Peter Laaninen (MCDOT), Coral Sheehan (MCDOT), Bob Davies (AMEC), Greg Holverson (AMEC), John Thayer (MCDOT), Olin S. Sutton, Jr. (MCDOT).

Not Present Robert Johnston (AMEC), Joe Pinto (MCDOT), Cathy Regester (FCD), Tom Kmetz (COM)

Main Issues

Time For Comments has been extended to the end of this week.

Flood Control District:

1. Excess Freeboard: Bobbie commented that freeboard had been reduced, but still looked somewhat excessive. Bob stated that considerable effort has been put forward to raise channel 1.2 feet to reduce freeboard as much as possible and is limited by a number of culvert crossings and connector pipes along Ellsworth. Bobbie stated to keep in mind hydrology shows 1,000 cfs plus and from the very beginning it was known that there is no way to contain this flow in channel. The project is to be designed for future conditions and show the current conditions will not be worsened.

2. Channel Lining: Lining of channel has been coordinated with Michael Lopez to be similar to what has been used on successful FCD projects. Velocities are within design manual requirements.

3. HEC-RAS Stationing: Bob Davies will provide a station conversion overlay for HEC RAS as stationing has been revised to coordinate better between Channel and Road in stationing in plan sets.

4. Gabions: Bobbie asked if gabions could be covered to look nicer, maybe with dirt and then gravel mulch. Coordination of this issue needs to happen with Mesa. Bobbie will forward to Bob a company contact that has been contacting her regarding marble rock that they have access to.

5. Water Quality: First flush water quality issues will be coordinated by Bob with Todd Williams (FCDMC) and City of Mesa.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

ITEMS	ACTION

6. Germann Road: Profile has been lowered to match existing. Future development will be responsible for on-site retention. This project will improve the drainage flow to the west but will not fix the regional drainage concerns and will require a Design Exception.

7. GM Drainage: Coordinated needs to happen between Phase I and II. GM needs to handle their on site water. The existing GM manifold crossing locations have been raised but will still experience over topping and require a design variance. Design exception reports need to be submitted on drainage issues. Hydrology shows 1,000 plus cfs which would not be possible to contain in channel.

8. Channel R/W: R/W seems to be excessive and should be checked. Bob will give Bobbie sketch of what is needed to accommodate channel and then define what may be considered excessive. Bobbie will then coordinate with Coral Sheehan and John Palmeri, who is finalizing R/W documents for Williams Gateway Airport.

9. Wet Weather Work: Work in the Powerline floodway in wet weather will be under control of the contractor similar to other district projects. Bobbie will give example specifications on this situation to Bob to use as a guide.

10. Channel Merging: Connecting old channel to new channel will need to be looked at so water does not back up, break out or cause problems. Art Allen has agreed to the concept of merging two channels. Excess dirt may be stockpile at Williams Gateway Airport (WGA) to be available for future use by WGA to fill in old channel.

11. Powerline Floodway: Tie to existing drop structure may need special review.

12. Storm Drain: Stationing references may be easier to understand if they are part of the road plans and not part of the channel plans.

13. Special Provisions: The intent of the special provisions will coordinated between Bob Herz and FCD. MCDOT typically does not repeat standard specifications from MAG in the special provisions.

14. Agency Cost Breakdown: Costs will be broken out for Channel work and Road work, but the intent is to build both the channel and road as part of one project.

15. R/W Comments: Comments were passed out and will be looked at after the meeting.

City of Mesa Comments

16. Comment Resolution Meeting: City of Mesa would like to have a comment resolution meeting in Mesa perhaps Wednesday. Mark will call Greg with arrangements.

17. Sidewalks: City of Mesa does not allow meandering sidewalks and the reason why sidewalks are meandering on this project needs to be researched.

18. Intersections: Arterial to arterial intersections such as Existing Pecos, Ray, and Williams Field need to be per COM std detail M46.2.

ITEMS	ACTION

19. PUE: Will be needed for future bus pullouts and should be outlined on the plans per M 46.2

20. R/W At Intersections: Approach half widths need to be 75 feet to allow for ultimate right turn lane. Extra R/W to accommodate this needs to be outlined on plans.

MCDOT comments

21. GM Fence: Should be out of R/W.

22. Plan Quantity Sheet: Summary of existing quantities needs to be revised.

23. Construction Management: MCDOT will be doing all construction management and inspection.

24. Bid Method: Project should be bid in normal manner, perhaps offering an incentive for early completion.

25. Profile: Median curb and gutter profile is needed but edges of pavement grade lines are not necessary.

26. Intersections: Should be tied down with stationing and return radius.

27. Communication Protocol During Construction: Specs need to be written so that construction drawings are to be submitted to MCDOT who in turn will provide them to COM for review and comment.

28. Utility Identification: Plans should show which company owns which waterline if there are more than one.

29. Utility Clearances: Underground utility crossings need at least 12 inch vertical clearance, this may require a bid item for adjustments.

30. Temporary Utility Connections: Specifications shall be revised for temporary utilities to be per MCDOT requirements, MCDOT will in turn relay what City of Mesa requires.

31. Specifications: Description should be revised to say road and channel.

amec

Minutes of Meeting

Date/Time	October 25, 2004	**Project No.**	68927
Location		**Written by**	Greg Holverson
Subject	Ellsworth Project		Robert Johnston

Present Alex Coronel (AMEC), Sami Ayoub (MCDOT), Robert Johnston (AMEC), Joe Pinto (MCDOT), Peter Laaninen (MCDOT), Coral Sheehan (MCDOT), Cathy Regester (FCD), Bob Davies (AMEC), Greg Holverson (AMEC), Olin S. Sutton, Jr. (MCDOT).

Main Issues

1. Construction cost estimate is much higher than expected, and needs to be reviewed.
2. MCDOT wants CAD files for all 90% drawings.
3. Comment resolution meeting is tentatively scheduled for Monday, November 8, 2004, from 8:30 am to 10:30 am at MCDOT. This meeting will determine who needs to be involved in smaller meetings off line to resolve specific issues. This meeting itself will not get into details but will overview all issues.
4. Right-of-Way and TCE will be confirmed with coral Sheehan.
5. Environmental data will be forwarded to Joe Pinto at MCDOT, to make sure their current permitting includes what we have received.
6. MCDOT is concerned that processing of the FAA permit if left to the contractor will delay start of construction. Coordination should take place with Stantec on submitting one permit to the FAA for construction activities for the whole project.
7. Design exception reports need to be submitted on drainage issues.
8. There will be a meeting with Utilities to visit about conflicts which may or may not be combined with November 8, 2004, meeting mentioned above in item 3.
9. Bob Davies and drainage team will continue to determine how to address sump condition south of Germann Road in a portion of our tapering project limits. A cost effective answer is requested in addressing the issue.
10. Excess dirt may be stockpile at Williams Gateway Airport or may be utilized in adjacent development. All options are currently open for further discussions.
11. Phase 1 & Phase 2 both will be constructed at the same time.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

amec

Minutes of Meeting

Date/Time September 28, 2004 - 10:00am

Location

Written by Greg Holverson
Robert Johnston

Subject Ellsworth Road Phase 1 Stakeholder's Meeting

Present Sami Ayoub (MCDOT), Joe Pinto (MCDOT Enviro), Bob Davies (AMEC), Cathy Regester (FCDMC), Peter Laaninen (MCDOT), Jim Martin (AMEC), Tom Kmetz (City of Mesa), Greg Holverson (AMEC), Gary Sharpiro (FCDMC), Bobbie Ohler (FCDMC), Olin S. Sutton Jr. (MCDOT), Robert Johnston (AMEC), Coral Sheehan (MCDOT R/W).

Main Issues

Utilities

1. SW Gas was relocated per 70% plans and needs to be checked to make sure design is okay.
2. SRP has relocated a portion.
3. Qwest runs along entire project and currently doing a design.
4. Queen Creek Irrigation District has facilities at Germann Road.
5. Private Irrigation lines in area.

Right-of-Way

1. 90% of TCE responses still not received.
2. Have entry agreements with WGA, but no right-of-way yet.
3. GM condemnation in process, requesting latest plans.
4. June construction period will not be a problem.
5. Channel within glide scope area is okay.

Drainage

1. Channel south of New Pecos to be replaced with grader ditches.
2. Connecting the old channel at the confluence with new channel has merit and may work well. Idea should be developed further.
3. Shoofly for powerline floodway is not required as contractor
4. Overtopping handled 3 ways as follows:
    a. Conditions with project should not be worse than before project.
    b. Interim (highwater could not increase).
    c. Future (must meet guidelines).
    d. Roadside drainage, ditches are desirable along Ellsworth north of Germann Road, a storm drain is not desirable.

Communication

1. Website should be used as a communication tool.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

Main Issues

O&M Road

1. Median openings are not required specifically for O&M roads.

Fencing

1. Herb Miller needs to be briefed prior to finalizing fence plans.

Traffic Control

1. No traffic control plans needed. Prefer to indicate operation expectations for traffic and access to adjacent property. This allows contractor flexibility in submitting their traffic control plan for approval.

WGA

1. Specifications need to tell contractor to apply for his own construction permit from FAA.
2. Fire Truck access to WGA is critical at main gate.

Action Items

1. Copy of Dibble CD to FCDMC.
2. All drawing sheets sorted and indexed (Robert J. & Chris M.).
3. Fencing in Special Provisions.
4. Coordinate Firetruck access gate at ex. at Pecos alignment with Art Allan, WGA.
5. Coordinate automobile gate for GMPG access with Scott Klinger of GM.

amec

Minutes of Meeting

Date/Time September 28, 2004 - 10:00am

Location

Written by Greg Holverson
Robert Johnston

Subject Ellsworth Road Phase 1 Stakeholder's Meeting

Present Sami Ayoub (MCDOT), Joe Pinto (MCDOT Enviro), Bob Davies (AMEC), Cathy Regester (FCDMC), Peter Laaninen (MCDOT), Jim Martin (AMEC), Tom Kmetz (City of Mesa), Greg Holverson (AMEC), Gary Sharpiro (FCDMC), Bobbie Ohler (FCDMC), Olin S. Sutton Jr. (MCDOT), Robert Johnston (AMEC), Coral Sheehan (MCDOT R/W).

Main Issues

Utilities

1. SW Gas was relocated per 70% plans and needs to be checked to make sure design is okay.
2. SRP has relocated a portion.
3. Qwest runs along entire project and currently doing a design.
4. Queen Creek Irrigation District has facilities at Germann Road.
5. Private Irrigation lines in area.

Right-of-Way

1. 90% of TCE responses still not received.
2. Have entry agreements with WGA, but no right-of-way yet.
3. GM condemnation in process, requesting latest plans.
4. June construction period will not be a problem.
5. Channel within glide scope area is okay.

Drainage

1. Channel south of New Pecos to be replaced with grader ditches.
2. Connecting the old channel at the confluence with new channel has merit and may work well. Idea should be developed further.
3. Shoofly for powerline floodway is not required as contractor
4. Overtopping handled 3 ways as follows:
    a. Conditions with project should not be worse than before project.
    b. Interim (highwater could not increase).
    c. Future (must meet guidelines).
    d. Roadside drainage, ditches are desirable along Ellsworth north of Germann Road, a storm drain is not desirable.

Communication

1. Website should be used as a communication tool.

AMEC Infrastructure, Inc.
2001 W. Camelback Rd., Suite 430
Phoenix, AZ 85015
USA
Tel (602) 343-2400
Fax (602) 343-2499

Main Issues

O&M Road

1. Median openings are not required specifically for O&M roads.

Fencing

1. Herb Miller needs to be briefed prior to finalizing fence plans.

Traffic Control

1. No traffic control plans needed. Prefer to indicate operation expectations for traffic and access to adjacent property. This allows contractor flexibility in submitting their traffic control plan for approval.

WGA

1. Specifications need to tell contractor to apply for his own construction permit from FAA.
2. Fire Truck access to WGA is critical at main gate.

Action Items

1. Copy of Dibble CD to FCDMC.
2. All drawing sheets sorted and indexed (Robert J. & Chris M.).
3. Fencing in Special Provisions.
4. Coordinate Firetruck access gate at ex. at Pecos alignment with Art Allan, WGA.
5. Coordinate automobile gate for GMPG access with Scott Klinger of GM.

Date of meeting: 8-16-04

Subject: Ellsworth Rd. Phase I Scoping
WO No. 68927, Contract No. 2004-94
Date of issue: 8-20-04
From: Jim Martin P.E. RLS

Attendees:

NAME	REPRESENTING	PHONE
Olin Sutton	MCDOT	602-506-5992
Sami Ayoub	MCDOT	602-506-4662
Bobbie Ohler	FCDMC	602-506-2943
Cathy Regester	FCDMC	602-506-4001
Gary Shapiro	FCDMC	623-506-3076
Tom Kmetz	City of Mesa	480-644-4292
Nick Bokaie	AMEC Infrastructure	480-830-3700
Farhad Moghimi	AMEC Infrastructure	480-830-3700
Jim Martin	AMEC Infrastructure	602-343-2400
Greg Holverson	AMEC Infrastructure	602-343-2400
Bob Davies	AMEC Infrastructure	480-648-5316
Chris Mexas	AMEC Infrastructure	602-343-2436

The purpose of this meeting was to present, discuss, and resolve stakeholder (MCDOT, FCDMC, and the City of Mesa) comments to AMEC's 8-11-04 revised Draft Scope and Fee Proposal.

New introductions were made. Sami Ayoub began the meeting by informing all present that the goal today is present all comments, discuss issues, and provide direction for resolution to AMEC. Sami led the key issue identification, concern involved with each issue, and direction for AMEC to finalize scope and fee proposal for Ellsworth Road Phase 1. He outlined a matrix (see attached) summarizing each key issue.

- Tom provided a detailed discussion of the City of Mesa's comments to AMEC's submittal. He and others had taken a fairly comprehensive look at the proposal from start to finish.
  - We went through the Scope of Work Comments and noted concerns about tasks:
    - 3.0 COM standards are to be used for intersection design
    - 3.1.1 From this task move formal VE to an allowance
    - 3.1.5 Add Traffic Signals
    - 8.2.2 Adjust drainage to Mesa standards
    - 8.3.3 Catch basins to be M64
    - 11.8.2 Driveways to be M42
    - 11.9.4 Intersection scale to be 1 to 10
    - 11.16.1 Duct bank drafting to be part of Street Light drawings
    - 11.19. Add Street Light Section
    - 12.5.8 Change metric reference to English
    - 12.6.5 Change metric reference to English

    - 15.1.1.6 Combine with 15.1.1.3 task items
  - There were several corrections to the meeting minutes from 8-04-04.
    - Add "temporarily" to issue regarding leaving out median in front of GM south entrance
    - Add "current" to 100 year storm overtopping Ellsworth issue
    - Add "When the ultimate improvements are in place, overtopping shall not exceed 6 inches."
    - Clarified utilization of grader ditches on both sides of Ellsworth to drain from Germann to New Pecos, and outlet into drainage facilities on east side of Ellsworth
    - Fiber Optic Duct Banks to be design per COM standards
  - We then went through the fee proposal. Item by item, comments on level of effort were discussed and noted. Key issues were noted and direction was provided to AMEC to evaluate and resolve.
- Olin provided an overview of the utility work, which has been done to date for Phase I, and gave his opinion as to what level of effort he expects is remaining. The discussion was very similar to that provided in the 8-04-04 meeting minutes. Pothole information was based on the 40% plans. Since then most of the profiles have changed. Some of the utilities such as the QCIDD lines and Southwest Gas have been relocated based on the 70% plans. As some utilities have already been relocated and some utilities have begun design efforts, it would be prudent to try and keep underground features at the same elevation shown on 70% plans. If changes are made to existing MCDOT's 70% plans they will likely affect already relocated utilities and present changes to current utility relocation plans. Olin handed out a utility Conflict Summary detailing conflicts identified to date.
- Bobbie Ohler and Gary will provide comments from their review within a couple days.

Sami directed AMEC to review, evaluate, and resolve all level of effort investigation areas as summarized in the matrix prepared.

Sami requested six bound copies of the final proposal delivered to him by this Friday 8-20-04.

Attachments:
Additional Notes From Meeting (Issue matrix)
Utility Conflict Summary
Revised minutes from 8-04-04 meeting
Comments from FCD and Response
    Fee breakdown for FCD portions
    List of Drawings

Upcoming milestones:

August 20 – Final scope and fee proposal
August 23 – MCDOT to submit to Contracts for contract preparation
September 22 – Board Approval target

ADDITIONAL MEETING NOTES

ITEM	PROPOSED	ALTERNATIVE	DELTA	RESOLVE	NOTES
AMEC	497	COM 289	208	Explore reducing hours	~ VE Define allowance 15K T & M by PM. ~ MCDOT will pay for AZ/AC 254 hours. ~ Utility conflicts - credit to COM 245 hours. ~ Consultant shall check for duplication of efforts. ~ Unit conversion by MCDOT/FCD MC. ~ Review Hours - Recheck. ~ Task 19.0 fee hours correction required.
LSD	67	COM 50	17	Will reduce to 50K	
LEE	51	COM 20	31	Reduce by 25 hours	
SVR	70	COM 40	30	Discuss with SVR	
					Procurement comments to be discussed with Barbara Hummel.

A) 13mm DB
B) 25mm DB
C) Abandon gas
D) (4) 89mm electric
E) 559x995 concrete electric
F) (3) 89mm electric

68927
Conflict Summary

(G) Unknown
(H) 400mmDIP water
(I) 250mm plastic sewer
(J)114mm plastic FO
(K)(3)63.5mm CATV FO
(L) New gas

	Station	L/R	ILS	Cable	Water	Sanitary Sewer	Gas	Telephone	Electric	Irr Sleeves
	1+130	3	Gas	R-7.52	423.487	57mm steel			1.275	
	1+130	4	Telephone	L-12.23	423.855	13mm DB			0.935	
1	1+150	L/R					1 ©	2 (A,B)		
2	1+200	L/R					1 ©	2 (A,B)	1 (D)	
3	1+350	L/R					1 ©	2 (A,B)	1 (D)	
	1+397	5	Telephone	L-10.493	424.13	25mm DB			1.085	
	1+385	6A	Gas	R-9.442	423.086	64mm steel			1.81	
	1+385	6	Electric	R-14.648	424.046	(4) 89mm conduit			1.3	
4	1+410	L								1
5	1+650	L/R					1 ©	2 (B,B)	1 (E)	
	1+769	7	Telephone	L-11.506	423.397	25mm DB			0.99	
	1+760	8	Electric	R-14.159	423.1	559x995 concrete			1.34/2.335	
6	1+770	L/R					1 ©	2 (B,B)	1 (E)	
7	2+000	L/R					1 ©	2 (B,B)	1 (E)	
	2+049	9	Gas	R-8.76	422.326	64mm steel			1.405	
	2+049	10	Telephone	L-11.393	423.038	25mm DB			0.825	
	2+049	11	Telephone	L-5.91	422.69	25mm DB			0.815	
	2+050	12	Electric	R-17.37	422.912	(3) 102mm conduit			1.32	
8	2+050	L/R					1 ©	2 (B,B)	1 (F)	
9	2+235	L								1
10	2+300	L/R					1 ©	4 (B,B,G,G)	1 (F)	
11	2+318	CBC			1 (H)	1 (I)	1 ©	4 (B,B,G,G)	1 (F)	
	2+370	13	Gas	R-8.97	421.801	64mm steel			1.28	
	2+391	14	Telephone	L-5.421	422.532	25mm DB			0.495	
	2+386	15	Telephone	L-6.159	422.156	25mm DB			1.07	
	2+362	18	Electric	R-17.30	422.328	(3) 102mm conduit			1.63	
	2+414	93	ILS	L-16.618	422.699	(2) 89mm steel			1.005	
	2+413	94	ILS	CL	422.242	(2) 89mm steel			0.86	
	2+413	95	ILS	R-14.064	422.615	(2) 89mm steel			1.075	
	2+413	96	ILS	R-14.064	421.892	610x360 encase			1.8	
12	2+500	L/R					1 ©	4 (B,B,G,G)		
	2+589	19	Telephone	L-11.453	422.128	25mm DB			0.655	
	2+589	20	Telephone	L-5.845	421.875	25mm DB			1.095	
	2+582	22	Electric	R-17.11	421.927	(3) 102mm conduit			1.895	
	2+584	22A	Gas	R-17.41	422.524	64mm steel			1.285	
	2+590	23	Water	R-7.415	421.52	406mm DIP			1.395	
13	2+590	L/R					1 ©	4 (B,B,G,G)		
	2+617	26	Telephone	R-19.9	421.911	25mm DB			0.925	
	2+723	28	Gas	R-8.83	421.354	64mm plastic			1.3	
	2+742	29	Telephone	L-7.432	421.698	25mm DB			0.98	
	2+742	30	Water	R-7.025	421.395	406mm DIP			1.385	
	2+719	31	Sewer	R-12.269	421.711	254mm plastic			0.79	
14	2+732	CBC								
15	2+750	L/R			1 (H)	1 (I)	1 ©	1 (B)		
16	2+800	L/R			1 (H)	1 (I)	1 ©	1 (B)		
	2+969	32	Sewer	R-12.176	421.377	254mm plastic			0.912	
17	3+015	L								1
	3+089	33	Telephone	L-13.387	421.47	25mm DB			0.83	
18	3+133	L/R			1 (H)	1 (I)	1 ©	1 (B)		

A) 13mm DB
B) 25mm DB
C) Abandon gas
D) (4) 89mm electric
E) 559x995 concrete electric
F) (3) 89mm electric

68927
Conflict Summary

(G) Unknown
(H) 400mmDIP water
(I) 250mm plastic sewer
(J)114mm plastic FO
(K)(3)63.5mm CATV FO
(L) New gas

	Station	L/R	ILS	Cable	Water	Sanitary Sewer	Gas	Telephone	Electric	Irr Sleeves
19	3+188	L/R			1 (H)	1 (I)	1 ©	1 (B)		
	3+249	34	Telephone	L-13.576	421.264	25mm DB			0.925	
	3+249	35	Sewer	R-13.878	420.918	254mm plastic			0.85	
20	3+300	L/R			1 (H)	1 (I)	1 ©	1 (B)		
21	3+450	L/R					1 ©	1 (B)		
22	3+620	L								1
	3+650	36	Gas	R-8.70	420.556	64mm steel			1.59	
	3+649	37	Telephone	L-9.471	420.775	25mm DB			0.895	
	3+650	38	Water	R-7.249	420.062	406mm DIP			2.095	
	3+650	39	Sewer	R-12.343	420.528	254mm plastic			1.494	
23	3+750	L/R					1 ©	1 (B)		
24	3+900	L/R				1 (I)	1 ©	1 (B)		
25	4+000	L/R				1 (I)	1 ©	1 (B)		
	4+000	40	Sewer	R-12.518	420.151	254mm plastic			1.4	
26	4+020	L				1 (I)				1
27	4+072	CBC								
28	4+120	L/R			1 (H)	1 (I)	1 ©	1 (B)		
	4+203	41	Gas	R-8.857	419.567	64mm steel			1.75	
	4+213	42	Telephone	L-3.147	420.932	381x848 slurry			0.213/1.061	
	4+205	43	Water	R-7.505	417.007	406mm DIP			4.305	
	4+201	44	Sewer	R-12.211	420.175	254mm plastic			1.26	
29	4+250	L/R					1 ©	1 (B)		
30	4+331	CBC								
31	4+400	L/R					1 ©	1 (B)		
32	4+550	L/R					1 ©	1 (B)		
	4+570	45	Telephone	L-13.231	420.698	25mm DB			1.025	
33	4+600	L/R					1 ©	1 (B)		
34	4+625	L								1
	4+640	46	Sewer	R-12.536	420.533	254mm plastic			1.49	
35	4+750	L/R				1 (I)	1 ©	1 (B)		
36	4+900	L/R				1 (I)	1 ©	1 (B)		
37	5+045	L/R				1 (I)	1 ©	1 (B)		
	5+047	47	Telephone	L-13.476	421.289	25mm DB			0.855	
38	5+247	L						1 (B)		
39	5+250	R			1 (H)	1 (I)	1 ©			
	5+289	48	Telephone	L-14.219	421.984	25mm DB			0.77	
40	5+397	L						1 (B)		
41	5+400	R			1 (H)	1 (I)	1 ©			
42	5+415	L								1
43	5+447	L						1 (B)		
44	5+450	R			1 (H)	1 (I)	1 ©			
45	5+545	L						1 (B)		
46	5+550	R			1 (H)	1 (I)	1 ©			
	5+679	49	Telephone	L-14.430	422.201	25mm DB			0.72	
	5+680	50	Sewer	R-13.432	421.739	254mm plastic			1.16	
47	5+697	L						1 (B)		
48	5+700	R					1 ©			
49	5+997	L						1 (B)		
50	6+001	R					1 ©			

A) 13mm DB
B) 25mm DB
C) Abandon gas
D) (4) 89mm electric
E) 559x995 concrete electric
F) (3) 89mm electric

68927
Conflict Summary

(G) Unknown
(H) 400mmDIP water
(I) 250mm plastic sewer
(J)114mm plastic FO
(K)(3)63.5mm CATV FO
(L) New gas

	Station	L/R	ILS	Cable	Water	Sanitary Sewer	Gas	Telephone	Electric	Irr Sleeves
	6+034	52	Telephone	L-11.55	422.19	25mm DB			0.68	
	6+034	53	Water	R-6.9	421.71	406mm DIP			1.235	
51	6+148	L						1 (B)		
52	6+151	R			1 (H)	1 (I)	1 ©			
	6+185	54	Gas	R-10.126	421.593	64mm steel			1.41	
53	6+193	L						1 (B)		
54	6+196	R			1 (H)	1 (I)	1 ©	1 (B)		
	6+260	1A	Water		421.16	432mm DIP			2.015	
	6+260	2A	Gas		421.686	63.5mm steel			1.49	
	6+260	3A	Sewer		421.7	279mm PVC			1.622	
	6+260	4A	Gas		421.176	254mm steel			2.12	
	6+260	5A	Telephone		422.397	25mm DB			0.86	
55	6+293	L					1 ©	1 (B)		
56	6+296	R			1 (H)	1 (I)				
57	6+443	L						1 (B)		
58	6+446	R					1 ©			
59	6+598	L					1 ©	3 (B,B,B)		
60	6+601	R					1 ©			
	6+633	56	Telephone	L-7.9435	423.026	25mm DB			0.83	
	6+636	57	Sewer	R-12.4452	422.419	254mm plastic			1.47	
	6+655	6A	Water		422.851	229mm Asbestos			1.175	
	6+655	7A	Water		421.624	432mm DIP			2.295	
	6+655	8A	Gas		422.545	63.5mm plastic			1.41	
	6+655	9A	Sewer		422.42	279mm PVC			1.635	
	6+655	10A	Gas		422.19	254mm steel			1.87	
	6+655	11A	Telephone		423.091	25mm DB			0.76	
	6+655	11B	Telephone		423.058	44.5mm DB			0.78	
	6+655	11C	Telephone		423.134	25mm DB			0.631	
	6+671	58	Electric	R-1.236	423.989	914x710 encased			0.19	
	6+667	59	Gas	R-8.568	422.589	64mm steel			1.29	
	6+665	60	Irrigation	R-1.261	423.719	610mm CMP			0.43	
61	6+748	L						3 (B,B,B)		
62	6+751	R								
	7+004	61	Telephone	L-6.938	423.481	25mm DB			0.81	
	7+003	62	Telephone	L-13.557	423.862	25mm DB			0.6	
	7+004	63	Sewer	R-12.052	423.109	254mm plastic			1.38	
63	7+053	L						3 (B,B,B)		
64	7+056	R								
65	7+103	L						3 (B,B,B)		
66	7+106	R								
67	7+153	L						3 (B,B,B)		
68	7+156	R								
	7+249	64	Telephone	L-10.294	423.541	25mm DB			0.72	
	7+249	65	Telephone	L-11.625	423.541	25mm DB			0.6	
	6+655	12A	Water		423.092	229mm Asbestos			1.255	
	6+655	13A	Water		422.745	432mm DIP			1.56	
	6+655	14A	Gas			63.5mm plastic				
	6+655	15A	Sewer		423.08	279mm PVC			1.385	
	6+655	16A	Gas		424.043	850mmW x1198mmH			0.232	

A) 13mm DB
B) 25mm DB
C) Abandon gas
D) (4) 89mm electric
E) 559x995 concrete electric
F) (3) 89mm electric

68927
Conflict Summary

(G) Unknown
(H) 400mmDIP water
(I) 250mm plastic sewer
(J)114mm plastic FO
(K)(3)63.5mm CATV FO
(L) New gas

	Station	L/R	ILS	Cable	Water	Sanitary Sewer	Gas	Telephone	Electric	Irr Sleeves
	6+655	17A	Telephone		423.657	25mm DB			0.655	
	6+655	17B	Telephone		423.391	38mm DB			0.915	
	6+655	17C	Telephone		423.542	25mm DB			0.715	
	7+719	69	Telephone	L-14.315	424.137	38mm DB			0.705	
73	7+753	L						2 (B,B)		
74	7+756	R								
75	7+803	L						2 (B,B)		
76	7+806	R				1 (I)				
77	7+853	L						2 (B,B)		
78	7+856	R				1 (I)				
	6+655	18A	Water		242.052	229mm Asbestos			1.235	
	6+655	19A	Water		423.481	432mm DIP			1.45	
	6+655	20A	Gas			63.5mm plastic				
	6+655	21A	Sewer		423.784	279mm PVC			1.175	
	6+655	22A	Gas		425.104	1700mmW x1255mmH			0.045	
	6+655	23A	Telephone		424.006	25mm DB			1.115	
	6+655	23B	Telephone		423.964	(2) 114mm plastic conduit			0.99	
82	8+151	R			1 (H)	1 (I)				
	8+160	74	Sewer	R-12.138	425.035	254mm plastic			1.26	
	+160	75	Water	R-9.023	424.134	406mm DIP			2.067	
	8+160	76	Gas	L-6.843	423.245	1219mm cap			2.635	
	8+159	77	Telephone	L-14.297	425.189	38mm DB			0.92	
	8+159	77A	Telephone	L-15.369	425.435	(2)114mm plastic			0.675	
83	8+298	L						2 (B,J)		
84	8+301	R								
	8+439	78	Sewer	R-12.181	425.366	254mm plastic			1.205	
	8+438	79	Telephone	L-14.75	425.038	38mm DB			1.57	
	8+438	79	Telephone	L-14.75	425.038	127mm plastic			1.57	
	8+438	79A	Telephone	L-11.674	425.328	76mm DB			1.325	
85	8+450	R						2 (B,J)		
86	8+447	L						2 (B,J)		
87	8+547	L						2 (B,J)		
88	8+575	CBC								
89	8+600	L						2 (B,J)		
90	8+603	R			1 (H)	1 (I)				
91	8+880	L						2 (B,J)		
92	8+883	R			1 (H)	1 (I)				
93	8+930	L						2 (B,J)		
94	8+933	R				1 (I)				
	9+023	80	Gas	R-9.367	426.588	267mm steel			1.4	
	9+045	81	CATV	R-25.499	427.263	(3) 63.5mm conduit			1.295	
	9+045	81	Telephone	R-25.499	427.263	(2) 38mm conduit			1.295	
	9+057	82		L-9.699	427.364	610x885 encase			0.91	
	+058	83	CATV	R-11.106	427.097	(3) 63.5mm conduit			1.51	
	+057	84	Gas	L-8.25	427.145	1219mm cap			1.285	
95	9+057	R								
96	9+060	L						2 (B,J)		
97	9+107	L						2 (B,B)		
98	9+110	R		1 (K)	1 (H)					

A) 13mm DB
B) 25mm DB
C) Abandon gas
D) (4) 89mm electric
E) 559x995 concrete electric
F) (3) 89mm electric

68927
Conflict Summary

(G) Unknown
(H) 400mmDIP water
(I) 250mm plastic sewer
(J)114mm plastic FO
(K)(3)63.5mm CATV FO
(L) New gas

	Station	L/R	ILS	Cable	Water	Sanitary Sewer	Gas	Telephone	Electric	Irr Sleeves
	9+359	85	Telephone	L-11.351	427.703	38mm DB			0.735	
	9+360	86	CATV	R-10.543	426.791	(3)63.5mm/(2)38mm			1.59	
	9+359	87	Gas	L-6.671	427.413	1219mm cap			1.26	
99	9+417	L						2 (B,B)		
100	9+420	R		1 (K)	1 (H)					
	9+525	*CBC*								
101	9+527	L						2 (B,B)		
102	9+530	R		1 (K)	1 (H)					
103	9+581	L						2 (B,B)		
104	9+584	R		1 (K)	1 (H)			2 (B,B)		
105	9+627	L					1 (L)	2 (B,B)		
106	9+630	R		1 (K)	1 (H)					
	9+659	88	Telephone	L-11.312	428.235	38mm DB			0.83	
	9+659	89	CATV	R-10.272	427.485	(3)63.5mm/(2)38mm			1.301	
107	9+747	L					1 (L)	2 (B,B)		
108	9+750	R		1 (K)	1 (H)					
	9+810	90	Gas	L-6.918	428.381	127mm plastic			1.57	
	9+897	L	Developer							
	9+900	R	Developer							
	10+089	92	CATV	R-21.598	431.085	(3)63.5mm/(2)38mm			0.87	
	10+143	L	Developer							

6/1/2001 New gas installed from 10+154 to 6+668
12/31/02 New gas installed from 6+668 to 1+006

amec

Fax

To Bob Davies

Company

Fax

Charge no

File no

From Sheri

Direct Tel

Fax 602-343-2499

Pages (inc. this page)

Date AUG 4, 2004

Subject

AMEC Infrastructure Inc.
2001 W. Camelback Rd., Suite 300
Phoenix, AZ 85015
Tel +(602) 343-2400
Fax +(602) 343-2499
www.amec.com

This fax message is confidential. If you are not the intended recipient please notify us by telephone as soon as possible and either return the message by post or destroy it. If you are not the intended recipient, any use by you of its contents is prohibited.

Date of meeting: 8-04-04

Subject: Ellsworth Rd. Phase I Scoping
WO No. 68927, Contract No. 2004-94
Date of issue: 8-11-04
From: Jim Martin P.E. RLS

Attendees:

NAME	REPRESENTING	PHONE
Peter Laaninen	MCDOT	602-506-8649
Olin Sutton	MCDOT	602-506-5992
Joe Pinto	MCDOT	602-506-8068
Sami Ayoub	MCDOT	602-506-4662
Robert Herz	MCDOT	602-506-4760
Coral Sheehan	MCDOT PWLR/W	602-506-4639
Don Rerick	FCDMC	602-506-4878
Tom Kmetz	City of Mesa	480-644-4292
Nick Bokaie	AMEC Infrastructure	480-830-3700
Jim Martin	AMEC Infrastructure	602-343-2400
Greg Holverson	AMEC Infrastructure	602-343-2400
Bob Davies	AMEC Infrastructure	480-648-5316
Chris Mexas	AMEC Infrastructure	602-343-2436

The purpose of this meeting was to discuss the relative issues that affect the project, and to come up with ideas that will help in putting together the cost proposal.

Introductions were made. Sami Ayoub began the meeting by pointing out that the schedule is his top priority, and that every effort must be made to keep the project within schedule.

A handout was provided, which listed the key issues that should be discussed.

A. Paving Plan and Profile

The Pecos and Ray Road realignments should be as shown in the current set of plans. The grade modifications at Germann Road will need to be incorporated as called out on the redlines. It was MCDOT's understanding that CH2MHill used MCDOT minimum longitudinal slopes instead of City of Mesa's minimums, which created ditch width issues and correspondingly added to the need for additional ROW.

The issue of the intersection configurations was brought up. Jim Martin explained that the redlines seemed to indicate that the major intersections should be designed to their ultimate configuration. Tom Kmetz stated that the intersection configurations should be okay as shown in the current set of plans. Tom Kmetz had given direction to CH2Mhill to only look at the ultimate configuration to make sure that the utility conflicts were addressed to accommodate the ultimate configuration. However, the final design should not be for the ultimate intersection configuration. There were some modifications that CH2MHill were

working on with the City of Mesa. Tom indicated that there should be some electronic files provided by CH2MHill, along with correspondence explaining how to incorporate some of these changes. There was also an agreement between City of Mesa and GM to temporarily leave out the median island to allow left turn lanes into their facilities.

Sami Ayoub and Coral Sheehan both pointed out that it is important to keep the design within the 70% proposed right-of-way limits. The need for new right-of-way will cause significant impacts to the project schedule, because of the time needed to acquire new right-of-way.

A 404 permit exists under the present design. AMEC was directed to approach the final design and avoid disturbing the existing requirements as permitted under the existing 404. MCDOT will provide AMEC with a PDF version of the existing 404 permit.

Survey notes and survey books were delivered to MCDOT. Apparently, this information has been misplaced. MCDOT has included electronic files for AMEC to review with survey information. **MCDOT directed AMEC to review the electronic information and if additional backup information is needed MCDOT will request through CH2MHill.**

Don pointed out that if the H&H models are not on the CD's MCDOT has provided AMEC today, we should be able to get the data from Bing Zao, Cathy Regester, or Dave Degerness all of whom are familiar with the project. He suggested we start with Cathy Regester whom is currently on vacation.

The Germann intersection is designed for two through lanes in each direction with a single left turn lane. The design should be worked out to accommodate dual left turn lanes, but striped for single left turn lanes at this time. The lane configuration is to remain as shown on the 70% plans, however, **Sami and Tom directed AMEC to ascertain whether or not the existing drainage condition can be maintained by providing a raised median on German east of Ellsworth Road.** If not, cut back the raised median.

Pecos Road improvement plans have been included in the materials provided to AMEC today. This is a separate project, which was done for the City of Mesa. The project is nearing construction completion. It probably has not yet been incorporated into the current CH2MHILL design. It was not clear whether the digital data has yet been provided to AMEC.

B. WGA Access Roads

The three northern access road locations were coordinated with WGA are OK in the current design. AMEC will still have to check the lane widths, radii, and geometrics for the ultimate lane and sidewalk configuration, handrail design and other aesthetic features, as well as culvert length requirements across channels.

The southernmost 4th access point is a fire lane and may need to move to the south if it has not already been done, so that crossing the drainage channel can be avoided, thus eliminating the need for an additional box culvert. Median curbs at this location should be mountable curb to allow fire trucks to cross over the median. This particular location is not truly an access point for the WGA, it is a fire access only.

C. Drainage Plan and Profile

Sami discussed drainage issues where overtopping of Ellsworth Road occurs. There are three locations where overtopping of Ellsworth Road exceeds 6" in the current 100-year storm. **Sami directed AMEC to not make matters worse than existing conditions from a drainage standpoint while refining the roadway design. The overtopping phenomena will require AMEC to prepare a design exception/variance package.** When the ultimate improvements are in place, overtopping shall not exceed 6".

AMEC reported that it appears that the excess freeboard issues in the flood control channel which were commented on in the 70% plan submittal do not appear to have been addressed in the so called 90% plan submittal done by Dibble. Sami, Don and Bob discussed the freeboard criteria, which Dibble should have designed to. As stated in Dibble's report; the required minimum freeboard is calculated as 0.25 times the sum of the flow depth plus the velocity depth with a minimum of one foot. The freeboard requirement shall be met for the ultimate improvement conditions but is not mandatory under the interim improvement condition. It appears that excessive freeboard is still present in the existing channel design. There may be opportunities to minimize the difference between the freeboard provided to the minimum required. There are substantial cost implications in earthwork due to providing excess channel freeboard. **AMEC will review the freeboard condition and prepare a Design Exception / Variance package if needed.**

Sami went into some detail about what will be required to prepare Design Exception/Variance packages. He indicated that the project couldn't go to bid until the Design Exception/Variance packages have been approved by MCDOT. He did say that that these packages must include alternatives, costs, and implications. He said CH2MHILL had submitted some packages, which were rejected because they were not complete. CH2Mhill had $14,000 in their fee proposal for the preparation of design exceptions. **Sami directed AMEC to put the Design Exception/Variance in the Scope and provide a level of effort to prepare these packages.** He said that MCDOT should consider including this as a line item in many of the standard Scopes of Work.

Tom summarized several of Mesa's comments regarding catch basin spacing and design requirements. Where there will be curb and gutter sections catch basins and the storm sewer systems are provided. Mesa requires the ultimate design to use the M-64 catch basins. For interim roadway drainage Dibble has specified standard ADOT area drain catch basins with aprons at locations necessary for ultimate improvement conditions. Mesa criteria for catch basin spacing is that one wet lane is allowed for a three lane roadway. In sag locations flanking catch basins will be provided.

D. Connector Pipe Sections

Olin Sutton reported on the status of the utility relocations. He said that the southern portion of utility relocations has not yet been completed. He has been holding off on these relocations (mainly SRP Power and Qwest) until the Phase I drainage questions have been resolved. **MCDOT directed AMEC to review and revise drainage issues ASAP so that utility relocations can proceed.** QCIDD (irrigation) and Southwest Gas have relocated their lines according to what was shown in the 70% plans. Southwest Gas has already relocated their utilities in two locations: Guadalupe to Ray Road, and a vertical realignment

(dipped) under the box culvert at Ray Road. As-builts for these relocations are in the data, which is being provided to AMEC today. **Olin directed AMEC not to move the catch basin locations since some utilities have already been relocated.**

E. Channel Plan and Profile

Greg said that one of the comments questioned whether the maintenance road is on the correct side of the roadway, since it is on the opposite side of the roadway. MCDOT responded that the maintenance road is on the correct side and should remain as shown on the 70% plans.

Sami discussed the lack of channel in the current design for the stretch of Ellsworth Road (east side) from just north of Germann Road to the new Pecos alignment. Dibble has evaluated several alternatives at this location to reduce a previously designed 80-foot wide channel to a much smaller channel in conjunction with underground storm sewer system because the landowners objected to the 80-foot wide channel. The end result is that a channel will not be provided for this section of Ellsworth. **Don and Tom directed AMEC to not further evaluate alternatives for providing a flood control conveyance facility for this reach of Ellsworth.** Don commented that it was not clear whether the channel is still in the H&H models. He directed AMEC to verify this. Tom, Bobbie, and Dave Degerness are very familiar with this issue. Tom said the resulting concept for drainage here is that drainage on the east and west sides of the roadway ~~side~~ will flow in a grader ditches along Ellsworth Road within the right-of-way to the channel at the new Pecos Road. Flows on the west side will require a diagonal pipe ~~to~~ cross to the other side ~~of~~ at the new Pecos Road and Ellsworth Road intersection. Bottom line is that offsite flows are not an issue as long as matters are not made worse.
The drainage channel improvements will start at about ½ mile North of Germann Road.

The channel lining material has been a point of contention for some time. There are significant cost implications depending on which erosion protection material has been selected. A gravel mulch design is presently being proposed. FCDMC has made some comments suggesting it is over designed based on typical projects they have done. **Don directed AMEC to take a fresh look at erosion protection material design. Sami directed AMEC to provide a line item in the scope and fee proposal to evaluate the erosion protection material design.**

It has been pointed out that Powerline Channel Special Flood Hazard Area may be impacted by the roadway design. **AMEC should evaluate whether or not this is an issue and design accordingly.**

Don asked whether the channel excavation versus roadway fill requirements had been evaluated and whether earthwork calculations were available. Sami said CH2MHILL had done some initial work but is not to 70 % level. He said AMEC and Stantec will be required to perform pre-final and final earthwork calculations including shrink swell factors etc. Once this is done and potential stockpile locations have been identified and mass haul diagram can be done. Adjacent stockpile locations such as WGA and GM will be considered.

F. Pavement Markings

There is still some work to be done to complete the pavement marking sheets. These will be done in compliance with COM standards.

G. Signal Plan Sheets

Will be done to COM standards. Mesa concurs with present design.

H. Street Lighting Plan Sheets

CH2MHILL reported that they were unable to get the light ratios to work, and were suggesting a design exception. Tom had requested CH2Mhill to re-evaluate, stating that other projects did not encounter these problems and the lighting should be made to work as specified. The City of Mesa strongly feels that this should not be a design exception situation and further engineering work is required to properly address the issue.

I. Traffic Control Plan Sheets

These will be done to MCDOT standards. The 70% plan set included traffic control sheets and construction sequencing plans. These plans will be deleted from the final set. In lieu of the plans, the Special Provisions will spell out the details for the traffic control and construction sequencing.

J. Landscaping / Irrigation Channel Sheets

Tom indicated that the landscape plant selection was OK. In general it met the City of Mesa and WGA requirements. He wasn't sure at first whether or not the median was to be landscaped and Sami asked him to provide AMEC direction. **Tom decided that the present design with no landscaping in the median would stand for this contract. Tom clearly said it is important that AMEC make sure that the drop inlets along the channel discharge in the existing lateral storm sewers as designed and not have separate pipe outlets into the channel.**

K. Landscaping / Irrigation Roadway Sheets

Tom directed AMEC that there will be no landscape in the roadway or along the east side. Decomposed granite will be used for the median islands, and brick pavers will be used where the median island width is less than 5'.

L. Utility Conflicts

There are some private irrigation lines to relocate. Letters were sent out to property owners to determine if these private ditches need to be abandoned or relocated. Ownership and locations are available but have not yet been provided to AMEC. Private irrigation ditches are to be relocated inside private property.

Olin stated that QWEST has some lines that will need to be verified. Also, SRP overhead power needs to be relocated at Germann. The MCDOT assumption has been that the storm drain will not change in profile. CH2MHILL has pointed out that there is a water valve above ground, which is not shown in the plans. COX facilities are in phase II only. **MCDOT has**

directed AMEC survey to pick up new power pole, QWEST manhole and water valve locations. May also need to pick up irrigation line locations. The utilities, which have been relocated since 70% **will be shown on the plans.** The goal is to have all utility relocations completed by mid-December.

There are many potholes and supplemental potholes, which have been done by MCDOT. This information is available and will be provided to AMEC. The half mile of SRP underground power relocation north of Germann on the east side of Ellsworth is the most critical utility relocation. MCDOT directed AMEC to review private irrigation relocations at two locations, and make a recommendation.

1. South of the new Pecos Road where a PVC pressure pipe has been redone. This pipe will need to be extended at ends.
2. Harris Cattle Company, which has a gravity storm sewer, which will need to be relocated.

M. **Fiber Optic Duct Bank** – Will be done according to the City of Mesa Standards.

N. Metric to English Conversion

Sami discussed the need to convert the plans from Metric units to English units. He suggested converting the as-built plans only, leaving the design sets in metric. Tom Kmetz pointed out that Mesa requires as-builts in English units. Jim Martin pointed out that an English set of plans might provide better bids. Sami agreed that a conversion to English units may be desirable, but keeping the proposed schedule should be the top priority. He agreed that the plans should be converted to English units, as long as there are no impacts to the schedule. **The consensus was that we would convert the project at the beginning. This wording needs to be added to the scope. The scope will need to be revised to replace the word "metric" to "English" at the appropriate locations.**

Closing comments

- AMEC will be responsible for consolidating all the review comments from the 70% review. These comments will be presented with their appropriate disposition.
- Bob asked Sami whether our fee proposal should be segregated into roadway design fees vs. channel design fees. Don directed AMEC to segregate the channel costs versus the roadway costs. This will facilitate the IGA cost share distribution between the stakeholder agencies MCDOT, FCDMC, and the City of Mesa.
- Robert H. directed AMEC to provide consolidated estimates for this project.

Upcoming meeting milestones:

August 11 – Revised scope and fee proposal
August 16 – Negotiation meeting.

Compilation and Response to Comments to AMEC's Cost Proposal for Ellsworth Road Phase 1 Dated Aug. 11, 2004

FCDMC
From Gary Shapiro – FCDX via Sami Ayoub and Bobbie Ohler
Wednesday, August 18, 2004 7:44 AM

General comments to scope:

1. There is a lot of duplication of man hours and tasks
   Response: Task Descriptions have been revised to more clearly define work element. Additionally, each task has been reviewed and compared to related tasks to identify and eliminate any duplication of effort. Reduction in level of effort was made as required.

2. There appear to be a lot of effort man-hours to things that have already been accomplished.
   Response: Inherent in changing design firms while the design is in progress necessitates an overlap to:
   - Define current level of design development
   - Review past work to the degree that is necessary to assure work quality is appropriately meets appropriate design standards and regulations.

3. In the scope Items that state "Metric" need to change to "English"
   Response: Agreed

4. Scour analysis is required to determine bed behavior
   Response: Task 8.2.2 has been added to address these concerns.

5. Pipe profiles must show all utilities and other pertinent information.
   Response: Agreed, fees for such work have already been included in fee schedule.

6. Do not use the wording "storm sewer" we are installing a "storm drain" there are numerous reasons for this distinction.
   Response: Agreed

7. Not an FCD item but there was no mention of the WGA and FAA guide slope clearance. Has this been approved or is the consultant required to track and obtain?
   Response: Task 11.1.3 has been added to scope of work to address these concerns.

FCDMC
From Bobbie Ohler – FCDX via Sami Ayoub
Tuesday, August 17, 2004 1:00 PM

Comments to AMEC's Cost Proposal for Ellsworth Road Phase 1 Dated Aug. 11, 2004

1. The hours need to be broken down in to Channel and Road work, and all invoices need to show what hours are applied to the Channel and what hours are applied to the Road. I would like to review this again with hours broken out so I can see what finishing the channel design is going to cost.
   Response: Breakdown of hours is included in Attachment A.

2. The total cost proposed is approximately half of what our original cost was to do the entire Project from scratch, including an alternatives analysis – too high.
   Response: Inherent in changing design firms while the design is in progress necessitates:
   - Defining current level of design development,
   - Review and analyze past work to the degree that is necessary to assure work quality appropriately meets design standards and is conducted in such fashion to address regulations concerning professional conduct as set forth by AZ Board of Technical Registration, Article 3 Regulatory Provisions, R4-30-301.

3. Consultant should provide a listing of drawings needed and a sheet count.
   Response: Sheet count is 397; Attachment B has List of Drawings.

4. Section 2.1 – Consultant and subs should work safely without us paying them extra to do so.
   Response: Agreed

5. Section 2.2 – Access and permits for access – this should not be a separate pay item. This should just be included in a fieldwork item. We have access to most sites already, and the access to WGA and GM will take some small amount of coordination, but can be included under fieldwork.
   Response: Will include under fieldwork- Survey

6. Section 3.0 describes standards to be used in the design of the Project, and does not include anything about a VE, so VE hours should be deleted from the fee proposal.
   Response: Will include as an allowance per resolution reached at scoping meeting held on August 18, 2004.

7. Section 3.1.1 includes review and analysis of H/H models and reports, so the fee proposal (Table C) should call this "Review/analysis of H/H models and reports", say 60-80 hours.

Response: Will comply with requested action by adding tasks 3.1.1 Review and Analysis of H/H Models and Reports.

8. Add a Section to written part and Table C to describe an informal value engineering-type review/brainstorming session, say three people for three days, or 72 hours. Also suggest
   Response: Will comply with requested action by adding task 3.1.1.1 Informal Value Analysis.

9. There is no section 3.1.2 describing "Conflict clarification" – what is this about on Table C? Should delete these 38 hours since this should be included in other items of work.
   Response: Will comply with requested action

10. Section 4.0 – There are 328 hours applied to QA/QC. Although we do want an excellent set of plans at 100%, this seems high to take 70% plans to 100% plans. 160 hours seems more reasonable (two people two weeks, assuming two submittals).
    Response:
    - AMEC will follow resolution reached at scoping meeting held on August 18, 2004.
    - Inherent with the amount, magnitude, and significance of owner comments in the 70% plans, major QC/QA is required in both calculations and plans.

11. Section 4.1.1 – Is it necessary to submit a QA/QC plan, does MCDOT want this? Consultant is responsible for QA/QC, regardless of how he does it.
    Response: Will comply with requested action, which is to remove QA/QC plan.

12. Table C - 4.2 and 4.3 – provide written subsections to describe the constructability review and cost estimating. The hours appear reasonable.
    Response: Will comply with requested action

13. Survey hours (5.1.1 through 5.1.6) should be listed as "Optional". Not sure why there should be a separate item called "Survey scheduling". Why not just list one 5.0 item on Table C called "Surveying" and apply 150 - 170 optional hours. Not sure if Table C - 5.1.5 "Provide r/w calcs and cords" is for new (optional) survey or for existing survey? Doesn't MCDOT do this anyway?
    Response: Survey work has been broken out into an allowance.

14. Section 5.2.3 "Verification of data" – this section should say "except for H/H data and reports". (Covered under section 3).
    Response: Will comply with requested action

15. Delete Section 5.2.6 – says same thing as Section 5.1.6.
    Response: Will comply with requested action

16. Olin should review sections 5 and 6 carefully. Hours applied to this are 532 and he has probably done or will do most of this work. These hours should be combined to one listing called "Utilities relocations support" – and have about 100 hours maybe (check with Olin).
    Response: AMEC will follow resolution reached at scoping meeting held on August 18, 2004.

17. Section 7 should be reviewed carefully by Coral Sheehan and John Palmieri. Items on Table C - 7.2.2, 7.2.3, 7.2.4 seem to be duplicates and/or done by MCDOT R/W already.
    Response: R/W work has been broken out as an allowance.

18. Table C – 8.2.1 – Why should there be any hours for a CADD tech for providing drainage calculations?
    Response: Intent is to use technician to assist engineer in drainage calculations. The CADD portion of this labor column was not intended to be utilized for this task.

19. Section 8.3.4 through 8.3.6 – Check with Mesa on minimum pipe size allowable, cover, etc.
    Response: Scope revised accordingly

20. Section 8.3.7 – AZPDES is the correct acronym.
    Response: Scope revised accordingly

21. Section 10.3 and erosion protection – District prefers that Consultant not evaluate the Dibble channel lining – our engineers have already done that. Consultant should provide his own recommendations for channel lining. District engineers have recommended a standard gravel mulch on side banks only.
    Response: Scope revised accordingly

22. Section 11 – There is no mention made of the channel.
    Response: Scope revised accordingly

23. Section 11 – There is no mention made of the landscape plans.
    Response: Scope revised accordingly

24. Section 11.3.1 – this says metric but we want English.
    Response: Scope revised accordingly

25. Sections 18.1.1 and 19.0 – delete these sections and associated hours in Table C.
    Response: Scope revised in section 18.1.1 to more accurately describe the original intent, which was to provide separate listing of quantities for the channel and roadway
    Response: Scope revised in Table C Item 19.0 has been deleted

26. The proposed hours for the subs are not defined anywhere.
    Response: Please refer to Table C of Fee Proposal, which defines subs' hours per task

Ellsworth Project Status Meetings Held March 10 and 11, 2004

ATTENDEES:

Sami Ayoub - MCDOT PM
Dave DeWeese - MCDOT Eng
Olin Sutton - MCDOT Utilities
Coral Sheehan - MCDOT ROW
Herb Miller - MCDOT Const.
Joe Pinto - MCDOT Environ.
Pete Laaninen - MCDOT Eng.
John Thayer - MCDOT Traffic
David Benton - MCDOT Eng.
Abedon Fimbres - MCDOT CGR
Bobbie Ohler - FCDMC
Cathy Regester - FCDMC
Tricia Brown - CH2M HILL

COPIES: Brian Fry - Dibble
Eric Shimizu - CH2M HILL SEA
Project File

FROM: Tricia Brown

MEETING DATE: March 11, 2004

DATE WRITTEN: March 29, 2004

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

A project status meeting was held with MCDOT and FCDMC team members at two meetings on March 10 and March 11, 2004. The purpose of the meetings was to familiarize MCDOT's Project Manager, Sami Ayoub, with the project and update the status to the team.

ACTION ITEMS

1. J. Pinto to check on approvals and expiration date of 404 permit.
2. D. DeWeese to coordinate traffic control plan with City of Mesa.
3. B. Fry to provide limits of drainage easement at Elliot Road wash crossing and pipe on northeast corner of Elliot and Ellsworth Roads.
4. B. Fry to provide exact limits of GM Channel to C. Sheehan.
5.

MEETING SUMMARY

Hydrology and Hydraulics Update: B. Ohler reported that Flood Control District has reviewed the latest drainage report for this project and there are no outstanding issues.

Flood Control District will review the roadway drainage design for conformance to their standards.

Environmental Update: J. Pinto reported that the 404 permit has been approved by USACE. The habitat mitigation report was also approved. Joe will verify the approvals and the expiration date for the 404 permit.

Utilities Update: O. Sutton summarized the utility relocation activities that are ongoing. The project for design and construction will be divided into two (2) phases. Phase One (1) will be from the new Pecos Road alignment north to Guadalupe Road. Phase Two (2) will be from the new Pecos Road alignment south to Germann Road.
Phase One (1) schedule:
90% design plans 06/14/04
100% design plans 08/23/04
All right of way needed for utility relocation has been acquired.
Project Bid date is 11/01/04.
All utility conflicts within Phase One (1) will be completed by 10/15/04.
Known utility conflicts with-in Phase One (1) are:
1) SWG: as of 3/11/04 SWG has relocated all known conflicts.
2) QWEST: a) QWEST has a new installation from Warner Road south to the GM entrance - this work is underway and will clear all know conflicts within this area. b) QWEST has submitted plans for review from Guadalupe to Ray. Comments have been returned to QWEST with corrected plans and permits back to MCDOT by 03/26/04. c) QWEST should have the design plans for the area from Ray Road south to the new Pecos Road alignment to MCDOT by April 16, 2004.
3) SRP: All relocation design plans have been received by MCDOT. SRP will start relocation once MCDOT has released the permits. SRP is working on estimated relocation costs.
4) COX: COX needs to furnish MCDOT relocation design plans by 03/19/04.
5) City of Mesa: Force main valve will require relocation at Elliot Road intersection. O. Sutton to coordinate at 90% design.

Traffic Update: J. Thayer reported that the Traffic Group has reviewed all of the plans submitted to date and there are no known issues. The signing, striping, lighting and signal plans are being prepared in accordance with City of Mesa standards. Coordination needs to take place with City of Mesa for traffic control during construction.

Right-of-Way Update: Coral Sheehan has acquired right of entry permits along the entire length of the project. She still needs to know the limits of the drainage easement at the Elliot Wash crossing and the pipe on the east side of Ellsworth, north of Elliot.

Roadway Update D. DeWeese and T. Brown gave history of the roadway design and outstanding issues. A Public Meeting was held in December 2003 to show the 70% design to the public. Discussions are taking place between Flood Control District and MCDOT to determine who will handle the construction management of this project.

Project issues affecting the roadway design are listed below:

1. WGA Glide Slope

2. Germann intersection design and drainage design criteria along entire length of Ellsworth
3. Design of channel on General Motors
4. Elliot Road drainage design at the intersection and at the wash crossing
5. Traffic signal and lighting design standards

Project Schedule and Budget: S. Ayoub explained that in the future Stakeholder Meetings will be held quarterly at MCDOT. Monthly project status meetings will be held at MCDOT and will include team members from MCDOT and FCDMC, consultant will attend and prepare minutes for meeting. A revised project schedule was developed and will be distributed to the team. The FY 2005-2009 Project Budget was distributed. Estimated total project cost is $12.5M.

The next monthly project status meeting is scheduled for April 20, 2004, at 1:00 p.m.

Meeting adjourned.

Ellsworth Drainage Review Meeting - March 18, 2004

ATTENDEES:

Sami Ayoub - MCDOT	Cathy Regester - FCDMC
Dave DeWeese - MCDOT	Brian Fry - Dibble & Associates
Pete Laaninen - MCDOT	Dan Frank - Dibble & Associates
Bobbie Ohler - FCDMC	Tricia Brown - CH2M HILL

COPIES: Project File

FROM: Tricia Brown

MEETING DATE: March 18, 2004

DATE WRITTEN: March 29, 2004

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The Drainage Review meeting was held on March 18, 2004, at MCDOT. The purpose of the meeting was to provide an update on the drainage design criteria and concepts to MCDOT Project Manager.

MEETING SUMMARY

B. Fry presented an overview of the drainage design history on the project to date. He distributed an updated drainage report and identified the key areas of decision making and also highlighted the changes that have been made since the 70% submittal.

A project history was presented from development of the ADMP to our current project. Design criteria definitions and assumptions were highlighted (see attached report). Brian showed the group a summary table of the flows inundating the roadway under current design concepts. MCDOT wants to develop a design that meets or exceeds FCD standards and criteria.

The group brainstormed ways to accommodate the 100-year 'interim-CIP' storm flows and maintain a maximum of 6-inches of water overtopping the road. Ideas included constructing a channel in the third, unbuilt lane on Ellsworth Road (east side); piping the flows; widening the channel along the entire length of the WGA frontage (i.e. as soon as it crosses east to west under Ellsworth, start the widened section); build the regional flood control channel to outfall flows at the Germann intersection into the Rittenhouse Channel; design and construct the CIP features concurrent with this project; design and construct retention/detention basins (applies to both Germann and Pecos Roads).

These ideas will be presented to the stakeholder's at the next meeting to be held March 30, 2004. Based on the outcome of the meeting, consultants will develop a scope and budget to evaluate these alternatives. Meeting adjourned at 4:45 p.m.

Ellsworth August 2003 Stakeholders Meeting

ATTENDEES:

Ray Smith – MCDOT
Dave DeWeese - MCDOT
Olin Sutton – MCDOT
Coral Sheehan – MCDOT
Herb Miller - MCDOT
Bobbie Ohler - FCDMC
Cathy Regester – FCDMC
Gary Shapiro – FCDMC
Tom Kmetz – City of Mesa
Art Allan – WGA
Tom Narva – Town of Queen Creek
Jake Schacler – Vistoso Development
Bruce D. – Vistoso Development
Ken Nelson – OTAK, Inc.
Don Fuller – Fuller & Stowell Law
Brian Fry - Dibble & Associates
Dan Frank – Dibble & Associates
Ruben Valenzuela - Terrano
Tricia Brown – CH2M HILL

COPIES: Scott Klinger – GM
Chris Solinski – Stanley Consult.
Scott Hindman – CH2M HILL
Eric Shimizu – CH2M HILL
Bruce Prommersberger – CH2M

FROM: Tricia Brown

MEETING DATE: August 26, 2003

DATE WRITTEN: August 28, 2003

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The August Stakeholder's Meeting was held on August 26, 2003, at CH2M HILL's Phoenix office. The core design team was present at a pre-meeting that began at 12:30 p.m. to discuss the topic of drainage at the Germann / Ellsworth Road intersection and how it relates to the Fuller property at the northeast corner of that intersection. The general Stakeholder meeting began at 1:30 p.m.

ACTION ITEMS (FROM THIS MEETING)

1. D. DeWeese to send e-mail to Vistoso Development / Fuller Law Firm describing the two options available to them at the Germann / Ellsworth Road intersection by (August 28, 2003).
2. D. DeWeese to verify MCDOT permit for pressure piping system along Ellsworth Road and identify responsibility for relocation (September 3, 2003).
3. D. DeWeese to provide to CH2M HILL recorded document for right-of-way acquisition along GM south of Elliot Road (September 5, 2003).
4. R. Valenzuela will meet with D. Frank to discuss the down drain locations and coordinate the grading the Dibble's design.

5. R. Valenzuela will supply electronic files identifying locations of the irrigation sleeves into the median to CH2M HILL.

6. T. Brown to request case number from Karen McDonald at FAA for second application (September 2, 2003)

7. S. Hindman to remodel Ellsworth Road at the Pecos Road crossing with a 1.5% cross slope and have Dibble re-evaluate design based on criteria (September 5, 2003)

8. C. Sheehan will update the electronic files with new right-of-way at southeast corner of Ellsworth and Elliot Roads and forward a copy of the files to CH2M HILL for incorporation into the plan set (September 5, 2003)

9. T. Kmetz to arrange meeting with GM to discuss off-site drainage options and access into GM from Ellsworth Road (September 5, 2003)

10. Dan Frank will provide the latest box culvert design to Terrano and CH2M HILL so placement of the irrigation sleeves parallel to Ellsworth Road can be determined (September 3, 2003)

MEETING SUMMARY

Pre-Meeting Discussion, Germann / Ellsworth Intersection Drainage. A field visit to the Germann intersection was initiated and organized by Dave DeWeese, MCDOT, on Monday, August 25, 2003. The purpose of the field visit was to observe existing conditions and identify alternatives for the intersection design. The Town of Queen Creek was represented by Dick Shaner and Tom Narva. The property owners at the northeast corner of the intersection were represented by Don Fuller, Attorney, and the Vistoso Development. Tom Narva from the Town of Queen Creek was present at the field visit and presented survey information that he has collected at the intersection. The survey data confirmed that existing flows at the intersection split west and northwest.

On Tuesday, August 26, 2003, the core design team met prior to the Stakeholder's Meeting to summarize the outcome of the field visit and to obtain concurrence on options for the intersection design. Agreement was reached between COM, MCDOT, and FCDMC to use the following approach:

1. Along the east side of Ellsworth Road, the flood control channel will begin at the mid-section line north of Germann Road. A grader ditch will be constructed between Germann Road and the channel start location to convey pavement runoff to the channel.

2. The ultimate roadway improvements will start just north of the Germann intersection. The roadway will transition to the intersection, keeping the intersection at approximately the existing grades to maintain the existing drainage patterns.

3. The intersection will be widened to accommodate the additional travel lanes, but will be considered 'throw-away' with no curb and gutter.

4. Ultimate drainage and intersection improvements will be made with a future project.

This approach will be evaluated by CH2M HILL for roadway design and by Dibble and Associates for drainage. If this design can maintain existing flow patterns through the intersection, the 90% design will proceed with this approach.

General Stakeholder's Meeting Representatives from the Fuller Property and the Vistoso Development discussed the 'Fuller Alternative' of moving the channel from along the Ellsworth Road frontage to the mid-section line between Ellsworth Road and Crismon Road, continuing north to outfall in the existing channel along the southern limits of General Motors. The property owners are not in favor of having the channel along their Ellsworth Road frontage due to the limitations it will impose on future development of their property, unless they have the option of reconfiguring the channel at time of development.

The design team evaluated the Fuller Alternative and concurred that it does not meet the intent of the regional ADMP for this area. Dave DeWeese will send a letter to the Fuller representatives identifying this conclusion and provide 2 options for them to select from. Option 1 is to provide a channel for 100-year flows at the alignment shown in the 70% design, without the north/south pipes. Option 2 is to remove the channel shown in the 70% design between Germann Road and a point ¼-mile north of Germann and construct a roadside ditch with this project. Option 2 would require an agreement between the property owners and City of Mesa that future development of the property will require on-site detention, ½-street detention along their frontage, and the ability to pass through off-site flows.

Final Breakout Analysis Dibble will finalize the breakout analysis based on Cathy Regester's initial review and submit to FCDMC prior to the 90% submittal. This information will also be included in the Final Drainage Report as an appendix.

Roadway profile / drainage at Pecos Road According to the current design criteria for drainage overtopping the roadway, there is still an encroachment at the Pecos Road crossing of approximately 2-inches. At COM's direction to maintain a 6-inch raised median, CH2M HILL revised the roadway profile at this location and Dibble has re-evaluated the design. Further revisions are needed to meet the design criteria. CH2M HILL will remodel the roadway with a 1.5% cross slope through this section and have Dibble re-evaluate it. The design team will be notified of the outcome of this analysis.

Ray Road Intersection Realignment Design is progressing forward with the centerline of Ray Road moved to a point 73-feet north of the existing FCDMC fenceline. T. Brown handed out an exhibit with the limits of the ultimate intersection to MCDOT, FCDMC, and COM, based on this centerline location. The exhibit showed the areas of potential encroachment on the existing FCDMC fence and north maintenance road for the Powerline Floodway.

Storm Drain Plan and Profiles with Utility Information Olin Sutton will review the 90% plans for conflicts between the new storm drain laterals and existing utilities.

Private Irrigation Letters mailed on July 28, 2003 Letters were sent to the property owners that have private irrigation facilities affected by construction of this project. O. Sutton has received responses from all four property owners and design will move forward based on their requests. Corral Sheehan has the original, signed, letters in MCDOT Right-of-Way files. Copies have been provided to CH2M HILL.

Outstanding issues with the irrigation design include the status of the pressure piping located near the existing siphon and the location of the channel and irrigation ditch along the Fuller property. Dave DeWeese will research whether the pressure piping was installed under permit with MCDOT. The property owner may be required to relocate the system. Final decision on the Fuller property is pending.

Right-of-Way Along GM Dave DeWeese confirmed that the right-of-way along Ellsworth Road, south of Elliot Road, was obtained from GM during construction of the FCDMC project. D. DeWeese provided CH2M HILL with an unrecorded document containing legal descriptions of the 75-feet and 65-feet of right-of-way. MCDOT ROW will update the electronic files with this information and forward a copy of the files to CH2M HILL for incorporation into the plan set.

FAA Application Update T. Brown spoke with Karen McDonald, FAA, August 21, 2003. The permit application is still being processed. Review of MCDOT's application is being done concurrently with all of the applications from ADOT for the Santan Freeway, and final approval may be slow. T. Brown will contact FAA for the case number of our permit. A. Allan reported that the first permit application, Case Number 02AWP008-NRA, has been sent back to the FAA from ADOT's Aviation Department. Art will follow-up with Kevin Flynn to check on the status of the first permit.

Utilities

Olin Sutton gave a brief overview of the utility relocation status. Stanley is nearing completion of the SRP relocation plans and Olin has the permits to review once the 90% plans are complete. The storm drain lateral locations with the potholed utility information will be supplied to Olin during the 90% plan submittal.

T. Brown will contact C. Solinski (Stanley Consultants) to verify POD locations along the GM entrances have been identified as current rather than for future use. Olin Sutton will be copied on all correspondence with Stanley.

Landscape. Ruben Valenzuela was introduced as Rick Campbell's replacement from Terrano. R. Campbell has recently taken a position with a new company and Ruben will be completing the design for the Ellsworth Road project. Ruben reported that the 90% landscape design is nearing completion. He will meet with Dan Frank to discuss the down drain locations and coordinate the grading the Dan's design. Ruben will also supply electronic files of the irrigation sleeves into the median to CH2M HILL. Dan Frank will provide the latest box culvert design to Terrano and CH2M HILL so placement of the irrigation sleeves parallel to Ellsworth Road can be determined.

Offsite Drainage from GM Brian Fry presented two options for handling off-site flows from the GM property. This issue was previously addressed in the 70% design with a parallel drainage system to the roadway storm drain system. Review comments suggested removing the parallel system. The two new options include a new 54-inch siphon system to drain the flows to the west side of Ellsworth Road and a series of new retention basins along the GM frontage to collect and retain the water on-site. MCDOT and COM will discuss the three options with GM to determine the best solution.

Access and Raised Median Locations at GM GM sent a letter to COM requesting left-turn access into and out of their southern employee parking lot. COM has denied the request because the driveway will be less than the required 660-feet from the realigned Ray Road intersection. A written response to GM will be sent by COM. In order to accommodate the street lighting at the main GM visitor entrance, it was suggested that the raised median be extended. The extension of the raised median will not change the access of the entrance. Discussion needs to take place with GM to get an idea of the truck traffic and employee traffic that may be queued in this location concurrently.

Project Schedule: The stakeholder team was made aware that due to resolution and client direction on various design issues, the schedule has slipped and the 90% submittal will be delayed beyond the end of September 2003. Critical path items affecting the establishment of a firm submittal date are drainage and roadway design at the Germann intersection, relocation of the private irrigation along the Fuller property, status of the pressure piping system along Ellsworth Road, and the offsite drainage from GM. Resolution is still needed for the median and lighting layout at the north, main, and south GM entrances.

Discussion took place about possibly splitting the bid package into a north phase and a south phase. This would allow progress on the northern portion of the project to get a biddable package so construction can begin while design decisions are still being made at the southern end. CH2M HILL has requested direction on this approach by Friday, August 29, 2003,

Meeting adjourned at 4:45 p.m.

Ellsworth July 2003 Design Progress Meeting

ATTENDEES:

Dave DeWeese - MCDOT
Olin Sutton – MCDOT
Richard Wallace – MCDOT
Tom Kmetz – City of Mesa
Mark Venti – City of Mesa
Dan Frank - Dibble & Associates
Tricia Brown - CH2M HILL
Scott Hindman - CH2M HILL

COPIES:

Bobbie Ohler – FCDMC
Ray Smith - MCDOT
Brian Fry – Dibble & Associates
Eric Shimizu – CH2M HILL
B. Prommersberger, CH2M HILL

FROM: Tricia Brown

MEETING DATE: July 17, 2003

DATE WRITTEN: July 21, 2003

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The July Design Progress Meeting was held on July 21, 2003, at MCDOT's Yavapai Conference Room. The purpose of the meeting was to discuss design issues related to the revised drainage criteria and the impacts to the roadway design. The meeting began at 1:30 p.m.

ACTION ITEMS (FROM THIS MEETING)

1. S. Hindman will evaluate two alternatives for maintaining the raised median at Pecos North Drain.
2. O. Sutton will update team with regards to meeting with QCID about private irrigation. Meeting held on Friday, July 18, 2003.
3. T. Brown will prepare letters to four property owners discussing proposed design of private irrigation facilities.
4. S. Hindman will relocate the Ray Road intersection by establishing a new centerline of Ray Road 73-feet north of the fence line currently on the north side of the Powerline Floodway.
5. D. DeWeese to verify status of the right-of-way at the north end of GM.
6. D. DeWeese to arrange upper management meeting with COM, FCDMC, and MCDOT.

7. T. Brown will submit Contract Modification #4, with additional scope changes, to MCDOT, FCDMC, and COM by Tuesday, July 22, 2003.

8. D. DeWeese and T. Kmetz to review Contract Modification #4 so a negotiation meeting can be held on August 4 or 5 to finalize.

9. T. Kmetz will contact B. Ohler to get her concurrence on the removal of the north/south pipe at Germann Road intersection.

10. E. Shimizu will contact Bill Hansing to discuss revising the phasing on traffic signal design.

11. T. Kmetz will provide concurrence on leaving the construction note format the same on the street light plans.

12. T. Kmetz will arrange a meeting between City of Mesa and landscape design team.

MEETING SUMMARY

Review of Median Layout at Three Locations. D. Frank discussed three locations that the raised median potentially should be revised from the 70% design due to changes in drainage criteria at these locations. At the Elliot Wash, raised median can remain because the median will not make the water surface elevation higher than the Pre-CIP condition. At the GM Manifold, Dan recommended that the median be taken out, but with further discussion between the design team, City of Mesa and MCDOT, the conclusion was reached that the median will remain and because the water surface elevation is lower than the Pre-CIP condition. At the Pecos North Drain, Dan recommended that the median be removed since the addition of the median would raise the water surface elevation above the Pre-CIP condition. T. Kmetz ask that the design team find another alternative to removing the median. Many options were discussed and two will be explored further to allow the median to remain. The first option is to change the roadway profile and the second is to change the roadway cross slope to 1.5% and use a 4-inch median. If neither of these alternatives work then the median will be removed from the design.

Critical Path Items. T. Brown discussed three critical path items that are slowing down progress on the 90% design: 1. Direction on private irrigation; 2. Location of Ray Road intersection; and 3. Right of way on GM south of Elliot Road.

Direction on Private Irrigation. O. Sutton is meeting with QCID on July 18, 2003, to verify that the irrigation facilities that need to be relocated are all private. After verification that the irrigation is private, T. Brown will prepare letters to the property owners to get confirmation of which irrigation lines will be abandoned and which ones will be replaced outside the R/W. The letters will be on MCDOT letter head and signed by O. Sutton.

D. DeWeese and T. Kmetz provided direction to the design team and marked up a roll plot identifying the disposition of irrigation facilities. T. Brown will use the roll plot that was marked up after the meeting. Once confirmation is received from the property owners design can proceed on the private irrigation.

Relocation of Ray Road Intersection. The COM and FCDMC will hold an upper management meeting to discuss joint-use right-of-way north of the Powerline Floodway.

CH2M HILL was directed by MCDOT to proceed with the relocation of the Ray Road intersection with the new centerline located 73-feet north of the north fence line along the Powerline Floodway. If this location changes in the future, it will be revised in the field and no further revisions will be made to the design plans.

Right-of-Way on GM South of Elliot Road. MCDOT is verifying that the R/W at this location was acquired by the Flood Control District.

Upper Management Meeting. An upper management meeting is being scheduled between MCDOT, COM, and FCDMC to discuss various project issues. D. DeWeese is trying to arrange the meeting for the week of July 25 or August 1.

Contract Modification #4. T. Brown discussed Contract Modification #4 and the additional scope changes that will be added. T. Brown will submit Contract Modification #4 with the additional items to the partners by Tuesday, July 22, 2003. On August 4 or 5 CH2M HILL will meet with City of Mesa, and MCDOT to discuss Contract Modification #4. D. DeWeese to arrange the meeting on August 4/5 at a time convenient for Ray Smith to attend.

Project Schedule. T. Brown discussed that the project schedule for the 90% submittal has continued to slip and that it looks like the middle of September for the submittal.

Drainage Pipe on East Side of Ellsworth at Germann. Discussion took place regarding the drainage at southeast corner of Germann Road if the drainage pipes heading north on the east side of Ellsworth should be constructed as part of this project to improve the overall intersection drainage. The COM is not in favor of constructing these pipes. R. Wallace stated that if FCDMC does not have an opinion either way, then it could be removed. T. Kmetz will contact B. Ohler to get her agreement on removing the pipe from the design.

Traffic Signal Phasing. T. Brown discussed that there are conflicting comments between the 70% submittal and the interim review from the City of Mesa about the traffic signal phasing. T. Kmetz suggested that E. Shimizu give Bill Hansing a call to discuss. T. Brown stated that if there is a change in the phasing from the 70% comments that this would be added to Contract Modification #4.

Street Light Plans Format. CH2M HILL had received a comment from COM requesting a change in formatting for the construction notes. R. Wallace indicated that this change does not need to be made in order to maintain the project schedule. T. Kmetz will verify if the notes can be left as is and let CH2M HILL know.

Ellsworth June 2003 Stakeholders Meeting

ATTENDEES:

Ray Smith – MCDOT
Dave DeWeese - MCDOT
Olin Sutton – MCDOT
Coral Sheehan - MCDOT
Bobbie Ohler - FCDMC
Cathy Regester – FCDMC
Gary Shapiro – FCDMC
Tom Kmetz – City of Mesa
Art Allan – WGA
Dan Darms – Stanley Consultants
Chris Solinski – Stanley Consultants
Zack Heim - SRP
Brian Fry - Dibble & Associates
Dan Frank – Dibble & Associates
Rick Campbell - Terrano
Scott Hindman - CH2M HILL
Jim Wilburn – CH2M HILL
Tricia Brown – CH2M HILL

COPIES: Scott Klinger – GM
Bruce Prommersberger – CH2M

FROM: Tricia Brown

MEETING DATE: June 24, 2003

DATE WRITTEN: July 25, 2003

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The June Stakeholder's Meeting was held on June 24, 2003, at CH2M HILL. The purpose of the meeting was to meet with Salt River Project and their design consultants to establish points of service locations; provide voltage drop, photometric calculations, and light pole locations for City of Mesa interim review and approval; discuss roadway and drainage issues and how they relate to utility relocations; update stakeholder team on status of the landscape design. Discuss the project schedule and projected submittal date for 90% plans. The meeting began at 1:00 p.m.

Project Schedule: An updated project schedule was distributed at the meeting and indicated an approximate submittal date of August 22, 2003. Critical path issues to complete design are private irrigation and GM frontage / right-of-way.

ACTION ITEMS (FROM THIS MEETING)

1. D. Frank to provide current storm drain layout to O. Sutton and Stanley Consultants for coordination during SRP relocations. (July 29, 2003)

2. T. Brown to provide final POD locations with metered / unmetered locations to SRP by July 8, 2003.

3. D. DeWeese to arrange upper management meeting with COM, FCDMC, and MCDOT. (August 11, 2003)

4. D. Frank and S. Hindman to coordinate the fence layout along the channel and the GM frontage. (August 8, 2003)

5. S. Hindman to prepare earthwork quantities for the roadway in 1-mile increments and provide to COM and MCDOT. (July 29, 2003)

MEETING SUMMARY

SRP Relocation. J. Wilburn gave a brief overview of the street lighting design and provided a photometrics report and voltage drop calculations to COM and MCDOT. Coordination will take place with Stanley Consultants, SRP relocation design consultants. D. Frank will provide updated storm drain information to O. Sutton and Stanley. C. Sheehan indicated that condemnation proceedings are pending for GM property since the new right-of-way layout has not been finalized. MCDOT is moving forward with 65-feet along the GM frontage until direction is received from D. DeWeese. By the end of August, MCDOT will have possession letter along with the right-of-entry to access GM property. SRP will place their equipment within the 65-foot limit . C. Sheehan will provide a copy of the possession letter to O. Sutton for SRP construction activities.

R. Campbell provided locations of the irrigation controllers. He has had conversations with COM maintenance staff and they have given direction to use battery CalSense controllers in lieu of powered controllers along the channel.

The COM was given a roll-plot identifying the POD locations. CH2M HILL will meet with COM to confirm final locations. Information to be provided to Stanley includes the POD locations, metered vs unmetered locations. In general, the metered locations will be at the irrigation controllers and the traffic signals, and the unmetered locations will be for street lighting. CH2M HILL to provide this information to SRP by July 8, 2003.

Utilities O. Sutton gave a brief overview of the utility relocation status. SW Gas lines will be relocated at the box culverts as soon as design is confirmed and QWest will wait for the 90% plans before they relocate. Pothole information at Germann Road has been received from O. Sutton and will be incorporated into the 90% design.

T. Brown asked about the air release valve at the southeast corner of Elliot and Ellsworth Road intersection. O. Sutton said to submit a copy of 90% plans to City of Mesa Utilities and ask what the special requirements will be to relocate the valve. Jim Neibergall is the contact at City of Mesa (480-644-2518)

An exhibit was handed out showing the southwest corner of Warner Road and Ellsworth. During a recent field visit, it was observed that the SRP overhead power lines were relocated very near the edge of pavement. This project will construct a wider curb return and will place traffic nearer the pole than it currently is. It was decided to extend the curb return to the west with curb and gutter in order to protect traffic approaching the intersection.

Landscape. R. Campbell gave a status update on the landscape design. He is currently working on finalizing the irrigation layout and bringing a water source from the water main in Ellsworth Road. The irrigation system will need to provide water to the northwest end of the channel. Landscape design for the median will consist of constructing conduit for future use. Power will not be brought to the median as part of this project.

Drainage and Roadway Design. The project schedule has slipped to the end of August. The design team is waiting for direction from the stakeholders on several issues. D. DeWeese will arrange a meeting with upper management of MCDOT, COM, and FCDMC by the week of July 8, 2003. Issues to be discussed at this meeting are channel lining, gabion / bank protection, Powerline Floodway Right-of-Way, drainage along the east side of Germann Road, and the median cut at the south employee parking lot for GM. All of these issues except the channel lining are impacting the design teams progress on the 90% design.

B. Fry presented an updated table for the culvert summary at four locations, Pecos North Drain, GM Manifold, Elliot Drain, and Elliot Wash. Exhibits were also handed for these locations showing the culvert crossings and grading. Dibble will check the water surface elevations for pre-CIP and interim.

B. Fry presented a copy of the final breakout analysis to C. Regester and indicated that was a pre-submittal addressing FCDMC comments. This analysis will be incorporated into the final drainage report.

B. Fry handed out the draft Design Memorandum summarizing the background and technical data on the design of channel bank protection for this project. MCDOT, FCDMC, and COM were requested to review the report for content and ask for additional information no later than July 1, 2003. Additional information was not requested, therefore the design team assumes that the memo is complete. B. Ohler commented that the unit costs needed to be adjusted. Final direction on the bank protection design is pending the upper management meeting to be held the week of July 8, 2003.

T. Brown requested direction from MCDOT on the layout of the private irrigation. None was provided to date. The design and preparation of plan sheets for the irrigation design is expected to take 4 to 6 weeks to complete.

T. Brown handed out plan and profile sheets of the three WGA access roads. COM and WGA requested that the sidewalk not be constructed beyond the western curb returns to avoid attracting pedestrians to the airport fence. Signs will be placed on the fence to notify vehicular traffic of no through street. The stakeholders concurred with the culvert design, roadway profile, fence location, and pavement limits. WGA requested that the connector roads be paved in kind rather than the graded dirt shown on the exhibits. This revision will be made for the 90% plans.

S. Hindman handed out an exhibit showing the difference in the median layouts for a single left turn lane vs. a double left turn lane. *After the meeting S. Hindman spoke with Dan Cleavenger from COM and his direction was to shorten up the deceleration length on the single left turn lanes to make them similar to the double lefts. This change will be reflected in the 90% plans.*

Direction on the final location of the Ray Road intersection will be provided to the design team after the upper management meeting during the week of July 8, 2003.

A summary of the roadway and channel earthwork was presented. MCDOT and COM had requested this information for use during their construction phasing and traffic control. COM asked that we provide this information in one-mile increments.

T. Brown gave an update on the FAA application. Karen McDonald has been contacting CH2M HILL requesting various information. Prior to this stakeholder meeting, Karen

indicated she had all of the information she needed and was routing the permit through other departments. A. Allan said he would follow-up with K. McDonald on this.

D. DeWeese, T. Kmetz, S. Hindman, and T. Brown reviewed the layout for the right-of-way along the GM Frontage. Concurrence was reached and this will be reflected in the 90% plans.

Action Item List. An updated list was handed out and briefly discussed.

Meeting adjourned at 6:15 p.m.

Ellsworth May 2003 Stakeholders Meeting

ATTENDEES:

Dave DeWeese - MCDOT
Olin Sutton – MCDOT
Bobbie Ohler - FCDMC
Cathy Regester – FCDMC
Gary Shapiro – FCDMC
Tom Kmetz – City of Mesa
Art Allan – WGA
Scott Klinger – GM
Brian Fry - Dibble & Associates
Tricia Brown - CH2M HILL
Bruce Prommersberger - CH2M HILL
Scott Hindman - CH2M HILL

COPIES: John Palmieri – MCDOT, Coral Sheehan - MCDOT, Ann Curren – MCDOT, Dan Frank – Dibble & Associates

FROM: Tricia Brown

MEETING DATE: May 20, 2003

DATE WRITTEN: June 2, 2003

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The May Stakeholder's Meeting was held on May 20, 2003, at CH2M HILL. The purpose of the meeting was to discuss design issues along with their resolutions so the project team remains informed of the project status. The meeting began at 1:00 p.m.

Project Schedule: An updated project schedule was distributed at the meeting and indicated a two-week slip from our April 22, 2003, schedule. This is resulting from team members not meeting deadlines for their respective Action Items. We discussed the importance of the entire team being committed to meeting their deadlines. The 90% submittal is scheduled for July 14, 2003. *Note: As of June 5, 2003, the schedule has slipped another three (3) weeks, pushing the 90% submittal to the beginning of August.* Tom Kmetz requested that a realistic schedule be developed to allow the design team adequate time to prepare a comprehensive 90% plan set.

ACTION ITEMS (FROM THIS MEETING)

1. O. Sutton will provide pothole information from additional requests at Germann intersection by June 6.
2. S. Hindman to update right-of-way files to reflect the 100-feet of ROW from the FCD project at southeast corner of Elliot and Ellsworth Roads.
3. S. Hindman to verify the maximum grade break allowable by AASHTO for clear zone requirements.

4. S. Hindman to provide final roadway model to MCDOT ROW as soon as it is finalized.

MEETING SUMMARY

Fence Layout along GM and WGA. Evaluation of the fence locations along GM and WGA took place. MCDOT would like to take 55-feet of right-of-way along GM and steepen up the back slopes of the roadway ditch. S. Hindman will verify the grade break recommended in AASHTO guidelines to maintain a safe clear zone. A temporary fence around the GM manifold will be necessary during construction to maintain security. A. Allan suggested that the WGA fence be placed 12 to 18-inches off of the maintenance road.

Main GM Entrance for Street Lighting Needs. The main GM entrances will be provided with street lights as part of this project.

Traffic Signal Layout and POD Locations. The traffic signal layout and point of delivery locations were provided to City of Mesa for review. Once they are approved, the POD locations will be sent to Stanley so they can revise their SRP relocation plans.

Trash Racks & GM Culverts Per T. Kmetz e-mail, the trash racks will be designed with 4-inch clear space and will be angled.

Water Surface Elevations. C. Regester provided the results of Flo 2-D model at Pecos Road and at GM Manifold. FCDMC will compile this information as backup documentation to be added an an Appendix to the final drainage report. All four locations that were analyzed using various methods to determine water surface elevations will be described and the methodology used to analyze them.

Private Irrigation Layout. Design team requested direction on layout. None provided to date.

Typical Section of WGA Access Roads. A copy of the City of Mesa Detail M-19.1 was handed out and identified the 48-foot f/c to f/c section at Sta 3+817 (south entrance) and Sta 5+020 (north entrance). The 68-foot f/c to f/c section will be used at Sta 4+241 (Williams Field Road Alignment). The stakeholder's concurred with these roadway typical sections.

Utility Layout for E-Streets and Street Lighting Conduit. An exhibit showing the utility clearance between the maximum sized storm drain, e-streets vaults, and street light conduit was presented. The minimum clearance between the storm drain and the utility vault is approximately 3-feet. COM approved this utility layout and clearance and design will proceed to 90%.

Right-of-Way along Channel and Roadway. This will not be finalized by MCDOT until the GM frontage is finalized. The final roadway model will be provided to MCDOT ROW as soon as it is finished.

Concrete Staining Cost Estimate. B. Ohler presented several textures and colors that could be applied to the box culverts to improve the asthetics of the channel. WGA, GM, and COM are ok with flat, gray concrete. FCDMC prefers stain and formwork. COM and FCDMC will have an offline meeting to discuss. Design will continue without staining or formwork.

Channel Lining Plans and Specs. This will be discussed at an off-line meeting between COM and FCDMC. (May 30, 2003)

FAA Application Re-submitted on May 14, 2003. Karen McDonald at FAA was contacted about this project. A new application was submitted to her on May 14, 2003, along with roadway and street lighting plans. T. Brown will follow-up on the status in two weeks.

Ultimate Germann Intersection Layout. D. Frank handed out an exhibit of the concrete overflow structure with the pipe going north/south. An exhibit was presented to identify the ultimate intersection layout, future signal layout, and the drainage configuration. When the ultimate intersection is built, it will be a challenge to modify the drainage system to prevent conflicts with the curb and gutter and signals. The property owner at the northeast corner of Germann and Ellsworth is disputing the channel along their property. COM and MCDOT to discuss this further along with the north/south pipe that drains into this channel.

Action Item List. An updated list was handed out and briefly discussed.

Meeting adjourned at 4:45 p.m.

Ellsworth April 2003 Stakeholders Meeting

ATTENDEES:

Dave DeWeese - MCDOT
Ann Curren – MCDOT
Olin Sutton – MCDOT
Bobbie Ohler - FCDMC
Cathy Regester – FCDMC
Gary Shapiro – FCDMC
Tom Kmetz – City of Mesa
Art Allan – WGA
Scott Klinger – GM
Dan Frank - Dibble & Associates
Brian Fry - Dibble & Associates
Tricia Brown - CH2M HILL
Bruce Prommersberger - CH2M HILL
Scott Hindman - CH2M HILL

COPIES: John Palmieri – MCDOT
Coral Sheehan - MCDOT

FROM: Scott Hindman

MEETING DATE: April 22, 2003

DATE WRITTEN: April 23, 2003

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The April Stakeholder's Meeting was held on April 22, 2003, at CH2M HILL. The purpose of the meeting was to re-status the project with the stakeholders and design team, discuss several design issues along with their resolutions so the project team understands what will be in the 90% submittal, and present an updated project schedule. The meeting began at 1:00 p.m.

Project Note: The format of this meeting was changed in an attempt to shorten the meeting time and to provide more efficient discussion. The agenda was prepared so the first hour was spent discussing WGA and GM issues. The remainder of the meeting was spent on COM/FCDMC/ and MCDOT issues. This format worked well and will be used from this point forward. The team has fine-tuned the 'Action Item List' and we are now adding to it on a regular basis and moving completed items to the end of the list. At the April meeting, the team was in favor of setting firm due dates for action items and identifying the person(s) responsible for each item. This will ultimately make us a more efficient and organized team. Critical path action items are highlighted below.

ACTION ITEMS (FROM THIS MEETING)

1. B. Ohler will provide cost estimates for stained / formed wall designs for concrete box culverts.

2. A. Allan will provide proposed gate locations and gate type that WGA would like along their security fence.

3. A. Allan will provide FAA fence spec.

4. D. DeWeese and T. Kmetz will provide direction on the surfacing type to be used along the WGA perimeter road. *[Based on A. Allan e-mail dated 04/24/2003, the WGA security fence will remain as it is shown in the 70% design rather than the location suggested by A. Allan at this meeting.]*

5. T. Kmetz will coordinate maintenance agreement with GM along new right-of-way that will be outside of GM's existing security fence.

6. B. Fry to identify location of right-of-way fence at Pecos Road box culvert.

7. D. DeWeese, T. Kmetz and B. Ohler to notify their respective reviewers that the 90% submittal will be made July 2, 2003, so they can schedule review time and meet the project schedule.

8. C. Regester to provide water surface elevations by COB Monday, April 28.

9. B. Fry to provide response to FCD comments on channel breakout memorandum by COB Monday, April 28, 2003. *[On April 25, 2003, B. Fry requested a meeting with FCD to discuss outstanding issues on the response to comments. Meeting date has not yet been determined.]*

10. T. Kmetz to provide direction on lighting of the GM entrances by April 25, 2003.

11. T. Brown to provide O. Sutton with new POD for street lighting by May 6, 2003.

12. O. Sutton will coordinate the new POD with Stanley to update their relocation plans.

13. D. DeWeese to provide direction on roadway profile sheets by April 30, 2003.

14. T. Brown to follow up with C. Sheehan to obtain electronic file for the channel right-of-way.

15. O. Sutton will request potholes at the Germann / Ellsworth Road intersection to identify the vertical location of QCID relocations by May 20, 2003.

MEETING SUMMARY

WGA Fence Layout and Gate Locations. Team agreed on the new WGA fence layout done by A. Allan. A. Allan requested that this project provide a 25′ wide surfaced perimeter road. Surfacing alternatives that were discussed are millings or aggregate base. D. DeWeese and T. Kmetz will provide further direction on the surfacing of the WGA perimeter road. D. DeWeese will follow-up with J. Palmieri and MCDOT Construction about TCEs and getting the fence constructed before the Ellsworth Road project starts. A. Allan will provide proposed gate locations and type that WGA would like in the security fence. A. Allan will also provide the FAA spec for the security fence. *[Based on A. Allan e-mail dated 04/24/2003, the WGA security fence will remain in its location shown on the 70% plans. Any portion of the perimeter road disturbed or replaced by the Ellsworth Road project will be replaced in kind.]*

GM Fence Relocation. The team decided to leave the GM fence at its existing location where possible to accommodate the proposed design. GM has agreed to provide maintenance to the portion of MCDOT's right-of-way that will remain behind GM's fence. T. Kmetz will coordinate COM's maintenance agreement with GM.

Security at GM Culverts. D. Frank presented a detail for a breakaway fence that would be placed in the culvert flowline. S. Klinger prefers an alternative that can not be vandalized as easily as the breakaway fence. For the GM manifold culverts, the fence will be moved to the top of the headwalls and trash racks will be constructed at the culverts. At the Pecos culvert, B. Fry will evaluate the possibility of moving the fence further on the GM property so no trash rack or breakaway fence will be needed.

Project Schedule. T. Brown distributed the updated project schedule. This schedule identifies the 90% submittal will be made on July 2, 2003, and the final PS&E submittal will be made November 3, 2003. The team agreed to the schedule except for two items. Activity 190 "Client Review Period" will be changed to 25 days of duration and activity 240 "Submit Final PS&E" will be changed to 10 days of duration to allow adequate time for plotting and reproduction of plans.

Water Surface Elevations. CH2M HILL has provided all available mapping to FCDMC for their evaluation of pre-CIP water surface elevations. C. Regester has reviewed the four locations (Elliot Wash, Elliot Intersection, Pecos & GM Manifold) and will be providing to Dibble and CH2M HILL the remaining water surface elevations by COB Monday April 28,2003. Once the information is received, B. Fry will summarize the water surface elevations at each of the four locations and distribute them to the design team by May 1, 2003. The design team will review and concur by May 5, 2003.

Lighting Along WGA and Major Intersections. T. Kmetz provided a list of intersections that will be lit as part of this project. They are Germann Road, new Pecos Road, existing Pecos Road, Warner Road, and Elliot Road. Germann and Elliot Roads will have traffic signals. T. Kmetz to provide direction on the lighting of the GM entrances. CH2M HILL to provide O. Sutton with new POD for lighting by May 6. O. Sutton will coordinate the new POD locations with Stanley, who is preparing the SRP relocation plans for MCDOT.

MCDOT Direction For Roadway Profile Format. D. DeWeese to provide direction on formatting of the roadway profile sheets.

Private Irrigation. CH2M HILL presented an exhibit identifying the private irrigation and whether it would be abandoned, relocated, or replaced in kind. CH2M HILL requested information from MCDOT's meeting with Harris Cattle Company. A. Curren will set up a second meeting between the property owners and MCDOT, COM, and CH2M HILL to discuss relocation or abandonment of their facilities.

Status of Utility Relocations. O. Sutton summarized the progress of the utility relocations and stated that they will be completed by December 2003. Queen Creek Irrigation District had previously provided as-builts of their relocations at Germann Road. The as-builts provide little information about the vertical location of the utilities. O. Sutton will be requesting potholes at this location.

Channel and Roadway Right of Way. A. Curren summarized the status of right-of-way acquisitions and requested locations of any additional TCEs needed for the project. T. Brown to follow up with C. Sheehan for electronic files of the final channel right-of-way.

Field Survey. CH2M HILL has received field survey for Elliot Road west of Ellsworth Road and the remaining survey should be completed by April 30, 2003. The remaining survey includes location of water valves, manhole covers, gas valves, etc.

Meeting adjourned at 4:30 p.m.

Ellsworth September 2003 Stakeholders Meeting

ATTENDEES:

Ray Smith - MCDOT
Dave DeWeese - MCDOT
Olin Sutton - MCDOT
Gary Lasham - MCDOT
Bobbie Ohler - FCDMC
Cathy Regester - FCDMC
Gary Shapiro - FCDMC
Tom Kmetz - City of Mesa
Art Allan - WGA
Tom Narva - Town of Queen Creek
Scott Klinger - General Motors
Dan Frank - Dibble & Associates
Ruben Valenzuela - Terrano
Tricia Brown - CH2M HILL
Scott Hindman - CH2M HILL

COPIES: Brian Fry - Dibble & Associates
Eric Shimizu - CH2M HILL

FROM: Tricia Brown

MEETING DATE: September 30, 2003

DATE WRITTEN: October 27, 2003

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The September Stakeholders Meeting was held on September 30, 2003, at CH2M HILL's Phoenix office. The purpose of the meeting was to discuss design issues along with their resolutions so the project team remains informed of the project status. The meeting began at 1:00 p.m.

ACTION ITEMS (FROM THIS MEETING)

1. T. Kmetz will confirm with COM management their recommendation on the southern terminus of the project.
2. COM & FCDMC to meet and discuss FCDMC access at the northern maintenance access to the Powerline Floodway .
3. D. Frank will provide backup drainage calculations for GM off-site drainage. Distribute to COM, MCDOT, FCDMC, and CH2M HILL.
4. T. Brown to call Karen McDonald at FAA for update on application.
5. T. Brown will forward updated Stakeholder's mailing list to Roberta Crowe/MCDOT.
6. R. Valenzuela and D. Frank to coordinate the down drain locations and Dibble will incorporate into the grading plans along channel.

7. S. Hindman to update vertical profile for Ellsworth Road at the Pecos Road crossing with a 0.2% vertical slope and have Dibble re-evaluate design based on criteria.

MEETING SUMMARY

Updated Project Schedule. An updated project schedule was distributed and estimates final PS&E submittal on March 31, 2004. This schedule was based on the assumption that the remaining design issues have been addressed by the stakeholders and full design would resume on September 30, 2003.

Germann Road/Fuller Property Update. D. DeWeese summarized his email about FCDMC and MCDOT Ellsworth Road meeting that was sent out earlier that day. The email gave four options of what to do about the offsite flow at Germann. The recommendation that came out of the meeting was to do option 4, which would end the project approximately at New Pecos. T. Kmetz will check with COM to get concurrence.

GM Entrance/Median Layout. S. Hindman presented an exhibit of the median layout for the GM entrances. FCDMC asked if the median on the south side of the Ray Road alignment could be shortened to accommodate their Powerline Floodway driveway. S. Hindman provided COM and FCDMC an exhibit showing the turning movements of a WB-40 and WB-50 vehicle at this entrance. COM & FCDMC will meet to resolve final layout.

Drainage System for GM Off-Site drainage. D. Frank handed out an exhibit delineating the drainage areas from the off-site GM areas. He also presented backup data for flow calculations from these areas. D. Frank provided 3 alternatives for accommodating the off-site drainage. All three alternatives provided 10-year protection for the roadway. Two of the alternatives provided 10-year protection for off-site flows and one alternative provided protection for 100-year off-site flows. D. Frank stated it is highly likely that the GM buildings will be inundated during larger period storms. T. Kmetz did not accept the 10-year off-site storm protection as viable options and asked Dibble to evaluate additional solutions. D. Frank will provide backup for off-site drainage flow calculations to COM, MCDOT, FCDMC, and CH2M HILL.

Private Irrigation Relocation. T. Brown stated that CH2M HILL is on hold pending final direction from MCDOT at the Germann intersection.

FAA Application Update. T. Brown left a message for Karen McDonald but has not received a return call. No update available.

Public Meeting. Final date for the public meeting is not known. T. Brown will send Roberta Crowe the updated Stakeholders mailing list.

Utility relocation update. Olin Sutton gave a brief overview of the utility relocation status.
Right-of-Way Acquisition update. MCDOT requested WGA to provide a warranty deed. WGA stated that they have a 'fee simple' deed not a warranty deed but A. Allan will talk to J. Palmieri about the deed. A. Allan stated that the ROW for the road needs to go to the FAA for approval and the easement for the channel goes to the board. D. DeWeese to talk to J. Palmieri about the WGA property east of Ellsworth.

Update on Landscape Design. R. Valenzuela reported that the landscape design is moving forward and he was working with Dibble on the downdrain locations.

Roadway Profile / Drainage at Pecos Road T. Kmetz & D. DeWeese agreed that the profile at the Pecos intersection could be lowered to 0.2% vertical slope where needed to keep the median. S. Hindman will update the profile to show the 0.2% and let Dibble look at it to see if the profile will work.

Meeting Adjourned at 4:15 p.m.

Ellsworth 70% Comment Resolution Meeting

ATTENDEES:

Dave DeWeese – MCDOT PM
Coral Sheehan – MCDOT ROW
Olin Sutton – MCDOT Utilities
Pete Laaninen - MCDOT
Bobbie Ohler – FCDMC
Lucia de Cordre – FCDMC
Gary Shapiro – FCDMC
Dave Degerness – FCDMC
Carlos Rivera – FCDMC
Warren Rosebraugh - FCDMC
Tom Kmetz – City of Mesa
Art Allan – WGA
Brian Fry – Dibble & Associates
Dan Frank – Dibble & Associates
Rick Campbell – Premier Engr.
Scott Hindman – CH2M Hill
Dave Allard – CH2M Hill
Tricia Brown – CH2M Hill

COPIES:

Scott Klinger – General Motors
Richard Wallace - MCDOT

FROM: Tricia Brown

DATE: October 8, 2002

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding, please contact me at 480-966-8188.

The Ellsworth 70% Comment Resolution Meeting was held August 20, 2002, at CH2M Hill's Phoenix office. The purpose of the meeting was to discuss review comments received for the 70% submittal.

Project Note: The meeting was divided into 3 parts: Part 1 Channel Design; Part 2 70% Comment Resolution; and Part 3 70% Comment Resolution (continued on August 28, 2002). These meeting minutes document and summarize discussions held during all 3 parts of the meeting.

Action Items:

1. T. Brown will meet with S. Klinger to discuss access locations and left-turn lanes into the GM property.
2. T. Brown will meet with O. Sutton and coordinate the irrigation relocation at Germann intersection with Dibble and Queen Creek Irrigation District.
3. T. Brown will coordinate design of siphon on irrigation system.
4. B. Fry to evaluate the culvert system design at Elliot Road intersection for 100-year existing flow conditions.
5. S. Hindman will arrange for additional field survey to locate all utility pedestals, relocated power poles, and manholes.

6. D. Frank to provide an electronic file showing the channel layout and the fence and gate locations to A. Allan and B. Ohler.

7. T. Kmetz and G. Shapiro to confirm that the design criteria for the channel should be the 100-year future water surface elevation 1-foot below the pavement subgrade.

8. D. DeWeese to send out information on the slab bridge design to the design team.

9. T. Kmetz will verify whether or not this project will provide landscaping south of Pecos.

10. R. Campbell will contact WGA for input on their theme along the access roads.

11. R. Campbell will coordinate the need for treatment of the bottom of the grade control structures with Dibble and FCDMC.

12. T. Kmetz to provide to T. Brown example profile sheets showing City of Mesa preference on how the Ellsworth Road plan set will be presented. T. Brown will discuss this format with D. DeWeese and get final approval from MCDOT prior to changing the profiles.

13. D. DeWeese will talk with MCDOT's survey group and find out what they would require to tie the channel and roadway together.

14. T. Brown to talk with A. Allan about the access location for WGA Gate #3 and the potential for combining the access at the concrete box culvert crossing.

15. T. Brown to meet with S. Klinger and follow up on comments from GM on 40%, 55%, and 70% plans.

16. T. Kmetz to confirm with City of Mesa maintenance group that they will be able to drive over 4-inch riprap.

17. B. Ohler will provide to Dibble an example of the curve data layout for the channel.

18. B. Fry to provide a summary of flows for concrete box culvert design beneath the roads. Summarize existing and future flows and overtopping limits.

Summary (Part 1):

Part 1 of the meeting focused on the channel design. A summary of the key discussions and decisions made during this portion of the meeting are listed below:

- FCD brought up the discussion of the channel lining material gradation being too expensive. The question was raised whether a simpler mix could be used to reduce the channel costs. Based on the criteria provided by FCD to the design team, in order to meet the filter and lining requirements, this is the most cost effective gradation. D. Allard reported that in his conversations with local material suppliers, due to the large quantity of material it would be most cost effective to set up the material processing plant at the material source. If the supplier will be setting up the plant anyway, it will not be an increase to cost to provide the current gradation design. He explained that the cost of the channel material is not significantly increased due to the gradation of the material, but rather the availability and production of the material.

The channel design will proceed with a 4-inch thick gravel mulch lining. The material gradation will be as proposed in the 70% Drainage Report.

- The channel lining thickness will not be increased to resist tractive shear forces exerted under existing conditions 100-year flow rates. The Drainage Report will state that the lining will provide approximately a 20-year level of protection when constructed and will increase to 100-year protection when the watershed is built out. The watershed build-out assumption includes future construction of the Pecos Basins as recommended in the East Mesa ADMP.
- The channel drop structures will be lengthened to contain the hydraulic jump for existing conditions 100-year flow rates as proposed in the 70% Drainage Report. This decision was based on an e-mail sent by Dan Frank on July 12, 2002, indicating that the cost to lengthen these structures would be $12,136 for all 5 drop structures.
- Crossroad box culverts will be designed for future conditions 50-year flow rates within the box and checked for overtopping for existing conditions 100-year flow rates. Existing conditions 100-year flow rate overtopping will be limited to a maximum of 6-inches depth over the roadway.
- Reno mattresses will be included in the channel design to protect the channel from scour resulting from overtopping flows identified in the above bulleted item, which would flow down the channel sideslope. The gabions will be covered with the channel lining material in areas adjacent to Ellsworth Road for aesthetic purposes.
- The Final Drainage Report will contain a statement regarding the potential impacts of future land subsidence on the channel performance. No additional evaluation of the potential for subsidence will be performed as part of this project. The channel reach between Germann Road and Pecos Road is the area of primary concern.
- Three hydrology models will be maintained as the basis of design. One future conditions "full CIP" model will be used as the primary design hydrology. Two existing conditions models will be used as a design check. A "partial CIP" model was provided by FCDMC for use in the area north of the PLF, which is based on the Elliot and Siphon Draw basins not being constructed. A "full CIP" model will be used for the area south of the PLF, which is based on future construction of the Pecos Basins and channel. Output from these models will be submitted on CD for future submittals with no hardcopy output contained in the appendices.

<u>Summary (Part 2):</u>

Part 2 of the meeting was focused on general design elements of the project, including roadway and roadway drainage issues. This part of the meeting also began individual discussions with plan reviewers on the 70% submittal. A summary of the key discussions and decisions made during this portion of the meeting are listed below:

- Based on a City of Mesa comment, Dibble and Associates was directed to move the storm drain from its current location at 5-feet east of the roadway centerline to the center of the driving lane immediately west of the centerline. The storm drain was originally placed east of the centerline in accordance with City of Mesa standard utility locations.
- The quad-duct bank will be placed 5-feet east of the centerline in the median. This will be in a joint trench with the street lights.

- T. Brown will meet with GM to discuss the access point into their operations. The 70% design plans provide a left turn lane into two of the GM's current access points. This needs to be verified with GM.

- B. Fry presented three options for the Germann intersection. Option 1 is the current design and has one pipe to the west and two pipes to the north, and it provides 100-year protection for Ellsworth and Germann Roads; Option 2 has one pipe to the west and allows ponding at the southwest corner of the intersection, and it does not provide 100-year protection for the roadways; Option 3 has siphons to equalize and distribute the flow from the east side to the west side of the roadway. COM, MCDOT, and FCDMC agreed on either Option 1 or Option 2. Option 1 will be used provided it will not significantly increase costs and the drainage system will not require changes when the ultimate intersection is built.

  The east-west 24-inch pipe will be extended west to a point beyond the newly constructed Town of Queen Creek entrance signage. The proposed north-south culverts will remain in the design unless other design issues make it too difficult to implement.

  T. Brown will meet with O. Sutton to talk about the relocation of the irrigation system at the Germann intersection. Discussion was held regarding the relocation of the system to outside the ultimate channel location and headwall locations. The current design provides for the irrigation box to be moved outside of the ultimate intersection location. T. Brown will coordinate with Dibble and O. Sutton.

- T. Brown will identify the location of the irrigation siphon needed.

- The proposed box culvert within GM, oriented parallel to the roadway will be eliminated from the design (approximately Sta 6+750). The GM on-site runoff is contained within GM and conveyed to the PLF via an existing storm drain system. A swale may still be required to handle local runoff adjacent to the roadway.

- The Elliot Road intersection with Ellsworth Road and the wash crossing north of Elliot Road was discussed. Dibble handed out exhibits identifying flow locations and flow rates. A culvert system was proposed to handle the future conditions 50-year flow rates. The design will be checked by Dibble to ensure that existing conditions 100-year flows rates will not exceed 6-inches over the roadway. The concept was approved pending the evaluation of 100-year existing flows.

  A box culvert will be constructed at the Elliot Wash crossing. Due to a shallow wash, the box will be designed for traffic to drive on the top slab of the box. The top slab will be modified to build-up the roadway crown and approach slabs will be provided.

  A modified storm drain layout was proposed based on the new design concept resulting from the hydrology changes in the vicinity of Elliot Road.

Summary (Part 3):

Part 3 of the meeting was focused on individual discussions with plan reviewers on the 70% submittal. A summary of the key discussions and decisions made during this portion of the meeting are listed below:

Olin Sutton – MCDOT Utilities

- Identify all pedestal locations. SRP has relocated a portion of their poles. S. Hindman will arrange for additional field survey to locate all pedestals and relocated poles.
- Southwest Gas is currently installing a new 10-inch gas line. At the time of the meeting they were boring under the Powerline Floodway. They anticipated completion of their construction by the end of September, early October.
- Three manhole locations need to be added to the plans. S. Hindman will arrange for survey of these manholes.

Art Allan – Williams Gateway Airport

- A. Allan requested a copy of the layout of the channel showing fence and gate locations.
- A. Allan stated that the channel must be piped through the Runway Safety Zone. WGA will provide an electronic file of the limits of the Runway Safety Zone. *[Subsequent to the meeting, A. Allan agreed that the channel does not need to be piped through this zone. Reference meeting minutes from 09/24/2002 meeting.]*

Coral Sheehan – MCDOT Right-of-Way

- A current set of right-of-way plans was provided to T. Brown. C. Sheehan reported that appraisals are due the week of August 26, 2002.

Bobbie Ohler – FCDMC Project Manager

- Concrete rubble along WGA existing channel needs to be addressed in the specifications.
- A request was made to move the down-drain locations to coincide with lateral inlet locations. Dibble stated that would be done for the next design submittal.

Gary Shapiro – FCDMC Operations

- It is ok to take the storm drain laterals into the manholes. This is in agreement with the comments received from City of Mesa.
- It may be necessary to use structures to connect storm drain laterals to the trunkline instead of the manholes, at certain locations. Dibble to evaluate these locations.
- The cost estimate will be revised to use the area quantity for the channel lining. T. Kmetz and G. Shapiro were in agreement with this approach.
- Discussion was held regarding the water surface elevation of the channel and the elevation used to set the bottom of the channel. The design assumption is based on keeping the 100-year future water surface elevation 1-foot below the pavement subgrade. The question was raised whether the water surface elevation should be below the gutter elevation. T. Kmetz and G. Shapiro to confirm this and report back at the next meeting.

Tom Kmetz – City of Mesa Project Manager

- Preference is to use prefabricated end sections in lieu of the 70% design headwalls for the laterals outletting into the channel.

- T. Kmetz will verify whether or not this project will provide landscaping south of Pecos.
- T. Kmetz requested that the 16-foot O&M road be shown hatched on the landscape plan.

Lucia de Cordre – FCDMC Landscaping

- Premier Engineering will landscape around the WGA concrete box culverts.
- Consider using the slab bridge idea in lieu of concrete box culverts multiple barrel design for aesthetic purposes. D. DeWeese will send out information on the slab bridges to the design team.
- R. Campbell will contact WGA for input on their theme along the access roads.
- Discussion was held regarding the need for treatment of the bottom of the grade control structures. R. Campbell will follow-up with this issue by coordinating with Dibble and FCDMC.

Pete Laaninen – MCDOT Engineering (Continued meeting on August 28, 2002)

- Requested that laterals be shown on profiles of the new storm drain trunk line.
- Requested that the plans provide better detail for the median transition and the delta h does not work for all medians. The median details will be revised for 90% submittal.
- Roadway profiles should show grades for curb and gutter, edge of pavement at median, and grade breaks. The centerline profile will not be shown.
- The meandering sidewalk will be stationed by using the stationing and offsets from the roadway. The maintenance roads along the channels do not require stationing, but will be field staked. A suggestion was made to tie the channel and roadway stationing together at two or three locations. D. DeWeese will talk to MCDOT's survey about this approach and provide the design team with final direction. Curve data will be presented along the sidewalk alignment and will not be tabulated.

Ted Giannini - MCDOT

- Requested that the pipe type not be called out on the plans. His preference is to give the contractor the option of using RGRCP or HDPE.

General Discussion

- If Access Gate #3 can be coordinated with the box culvert crossing, then the access ramp to the channel will be relocated to Sta 44+700 and oriented downstream. T. Kmetz will check with City of Mesa maintenance forces and verify that they can drive on 4-inch riprap. If not, then additional ramp locations will be necessary.
- The comment to 'grade to drain' on Sheet CH13 will be further detailed by Dibble on the 90% plans to provide better detail for the manifold area.
- On Sheet CH41, the culvert design will be revised to eliminate the 2-48-inch pipes. [*This issue was subsequently discussed between MCDOT, FCDMC, and WGA and agreed upon to remove the 48-inch pipes.*]
- Dibble will provide a key map for the channel with the 90% submittal.

- B. Ohler deleted her comment number 5. City of Mesa confirmed that the channel elevation should be set so the 100-year water surface elevation is 1-foot below the pavement subgrade. The channel elevation will be left as is in 70% plans.
- The access ramps into the channel will remain at 8:1 per City of Mesa.
- The channel centerline curve data is currently provided in tabular form. The table will be labeled as 'centerline'. B. Ohler will provide an example of the curve data layout format to Dibble.
- The City of Mesa confirmed that the maintenance road along Ellsworth Road will be surfaced with decomposed granite. Away from Ellsworth Road it will be surfaced with 4-inch ABC.
- The downdrain spillway locations will be coordinated by Dibble with the landscape grading once the details are approved. Area drains will be placed at concrete box culvert locations.
- At Sta 40+400 (CH41), the pipe will be sized for 25-year event, but will not be less than 48-inches.
- The channel will slope to one side if the bottom width is less than 16-feet; the channel will slope to the middle if the bottom width is greater than 16-feet.
- A comment-by-comment review was conducted between the design team and the reviewer(s). The comment resolutions are too extensive to print here but will be provided in the official comment disposition as submitted with the 90% plans.

Adjournment

Ellsworth September 2002 Core Team Meeting

ATTENDEES:

Dave DeWeese - MCDOT PM
Richard Wallace - MCDOT
Olin Sutton - MCDOT
Bobbie Ohler - FCDMC
Gary Shapiro - FCDMC
Dave Degerness - FCDMC
Cathy Regester - FCDMC
Tom Kmetz - City of Mesa
Brian Fry - Dibble & Associates
Dan Frank - Dibble & Associates
Scott Hindman - CH2M Hill
Tricia Brown - CH2M Hill

COPIES:

Coral Sheehan - MCDOT ROW
Olin Sutton - MCDOT Utilities
Art Allan - WGA
Scott Klinger - General Motors
Rick Campbell - Premier Engr.

FROM: Tricia Brown

DATE: October 2, 2002

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding, please contact me at 480-966-8188.

The Ellsworth September 2002 Core Team Meeting was held September 24, 2002, at CH2M Hill's Phoenix office. The primary purpose of the meeting was to review roadway and hydrology issues to move design forward to 90%.

Action Items:

1. T. Brown to prepare letter to Harris Cattle Company to identify irrigation canal abandonment and request concurrence from property owner. A meeting will be held with property owner to discuss.
2. T. Brown to prepare letter to property owner for reconstruction of canal system (siphon system). A meeting will be held with property owner to discuss.
3. S. Hindman to compile additional field survey request by October 4, 2002.
4. B. Fry to provide utility locations (pothole information) on storm drain lateral profiles once the storm drain re-design is completed.
5. T. Brown to contact C. Sheehan to discuss roadway and channel right-of-way. Coordinate with Ken Green to obtain latest right-of-way information from MCDOT.
6. D. Frank to evaluate the need for a drainage easement at southeast corner of Germann and Ellsworth Roads. Identify TCE limits for WGA outlets and channel fill slope.
7. T. Brown to discuss with A. Allan fence alignment and potential TCE needs for WGA.

8. B. Fry to provide back-up documentation for Pecos Flow Split Memo to D. DeWeese and T. Kmetz by October 1, 2002. B. Fry to provide to design team the flow / frequency at which breakout occurs in the channel.

9. D. Frank to provide costs and quantities broken out for individual structures to B. Ohler and T. Brown by October 1, 2002.

10. D. Frank to provide the cost estimate backup calculations for end sections to T. Kmetz, D. DeWeese, B. Ohler, T. Brown, by October 1, 2002.

11. T. Brown to talk with D. DeWeese and R. Crowe about setting up public meeting.

12. T. Kmetz to discuss with A. Allan the channel realignment.

13. T. Kmetz will talk with COM maintenance personnel about eliminating the use of gabions.

14. D. DeWeese to obtain a set of right-of-way plans from Coral Sheehan and provide a copy to B. Ohler by October 1, 2002.

Summary:

UTILITIES: O. Sutton gave an overview of the utility relocations along Ellsworth Road. Field survey has been completed at the Germann Road intersection. O. Sutton is coordinating with the Queen Creek Irrigation District (QCID) for the relocation of the irrigation box at the northeast corner of the intersection. [*Subsequent to the meeting, correspondence from O. Sutton indicates that QCID may design the irrigation system to eliminate the box at the northeast corner of Germann and Ellsworth. This design will require an air release valve on the northwest corner of the intersection.*]

T. Brown will prepare letters to the landowners of property that will either have irrigation canals abandoned or reconstructed for this project. A meeting with MCDOT, property owners, and CH2M Hill will be arranged to discuss. The meetings will discuss work during the dry-up period of 2003, and relocation at MCDOT's cost.

The new 10-inch Southwest Gas line is currently under construction. There will be future relocation of the gas line to accommodate the box culverts passing beneath Ellsworth Road.

Conflicts with Qwest and fiber optic lines have not been evaluated yet. This evaluation will take place once the storm drain trunk line design is completed (move to the west side of the street) and the lateral pipe design is updated. Once Dibble has completed this re-design, they will plot the utility information on the profiles and provide to O. Sutton and T. Brown.

Most of the SRP power lines have already been relocated. There is a small portion of lines that still need to be moved. Additional field survey will be necessary for the power poles that have recently been relocated along the west side of Ellsworth Road. There are also several manholes, valves, etc. that need to be surveyed and shown on the roadway plans.

RIGHT-OF-WAY: T. Brown provided a set of right-of-way plans to D. DeWeese and C. Sheehan. These plans were marked with inconsistencies between the roadway plans and the right-of-way plans. T. Brown will contact C. Sheehan to follow-up on roadway and channel right-of-way.

Ken Green needs to be contacted to obtain the latest channel right-of-way design that MCDOT is preparing. Also need to discuss staging areas and how they are being addressed with the current right-of-way plans.

B. Ohler stated that a minimum 50-foot wide TCE needs to be obtained along the length of the channel drainage easement.

D. Frank will evaluate the southeast corner of Germann and Ellsworth Road to determine the need for a drainage channel. Also, need to identify the limits of a TCE for outlets at WGA and fill slope where the channel heads west from Ellsworth Road.

PAVEMENT DESIGN: T. Brown provided a copy of CH2M Hill's pavement analysis memo to D. DeWeese, T. Kmetz, and R. Wallace. Discussion took place at the last meeting regarding the pavement section. The decision was made to use the current design section of 5.5-inches of AC over 10-inches of ABC.

Schedule for Hydrology Models to FCDMC: B. Ohler requested that B. Fry supply a copy of the hydrology models being used for design to FCDMC on a quarterly basis.

Pecos Flow Split Memo: B. Fry gave a brief overview of his memo that was sent out prior to the meeting. The memo described the methodology, evaluation, and conclusion of the channel design compared to 100-year existing flows. The methodology assumes that the construction of the channel will not make conditions worse.

T. Kmetz and D. DeWeese asked for copies of the backup documentation and at what storm frequency does breakout in the channel occur. B. Ohler requested an evaluation of the breakout of the channel south of Pecos Road and across WGA runway. She requested the documentation for the FCDMC files.

T. Kmetz concurred with the approach that Dibble used for this analysis. B. Fry will present the methodologies and conclusions to the stakeholders at the October Stakeholders meeting on October 29, 2002.

Culvert Design: D. Frank a summary of the culvert design used throughout the project. FCDMC has directed the design team to assume there are no Elliot Basins. Dibble's current culvert design is based on 50-year future conditions and 100-year existing with less than 6-inches of overtopping. D. DeWeese stated that the FCDMC Hydrology Manual requires the design be based on 50-year existing conditions. A quick review of the table presented by D. Frank showed that both conditions are met except in two instances.

The core team decided that the 2- and 7-inches of overtopping (50-year existing and 100-year existing, respectively) at the 'Elliot Drain' (Sta 8+940) were acceptable. The outstanding location is 'North Pecos Drain' (Sta 2+740), which will require further discussion and redesign. The design criteria for culverts was decided to be for 50-year existing and less than 6-inches of overtopping for 100-year existing flows.

End Section Cost Comparison: B. Frank provided the cost evaluation for Option A, B, and C of the end sections (presented 09/05/2002). The prefabricated end section is estimated to cost $400 each and the concrete headwall is estimated to cost $700. Based on this information, it was decided that the Option A headwall would be used for the storm drain laterals outletting into the channel. D. Frank to provide the cost estimate backup calculations.

Open Discussion: B. Ohler asked if the public meeting has been scheduled. T. Brown will coordinate this with D. DeWeese. It needs to be held before the end of the year. B. Ohler asked about the realignment of the channel that WGA is proposing. T. Kmetz will talk with A. Allan to discuss this issue and get WGA's commitment to mitigate the schedule lapse and any additional costs. B. Ohler stated that FCDMC does not want to pay the additional costs for gabions to protect against existing flows when the rest of the design is for future conditions. T. Kmetz will verify with COM maintenance personnel if they can eliminate the gabions. G. Shapiro handed out calculations on the channel lining material.

Ellsworth Road Final Design - WGA Meeting

ATTENDEES:

Dave DeWeese - MCDOT
Bobbie Ohler - FCDMC
Dave Degerness - FCDMC
Cathy Regester - FCDMC
Tom Kmetz - City of Mesa
Art Allan - Williams Gateway Airport
Brian Fry - Dibble & Associates
Dan Frank - Dibble & Associates
Scott Hindman - CH2M Hill
Tricia Brown - CH2M Hill

COPIES:

Coral Shehan, MCDOT ROW
Olin Sutton - MCDOT Utilities
Scott Klinger - General Motors
Rick Campbell - Premier Engr.

FROM: Tricia Brown

DATE: October 1, 2002

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding, please contact me at 480-966-8188.

The Ellsworth Road Final Design - WGA Meeting was held September 5, 2002, at CH2M Hill's Phoenix office. The purpose of the meeting was to discuss project issues with Williams Gateway Airport (WGA) related to the 70% design comments.

<u>Action Items:</u>

1. A. Allan will provide comments to the fence layout along the WGA property by September 6, 2002.
2. A. Allan to check on interpretation of the Object Free Zone (OFZ) regulations. [*Subsequent to the meeting, A. Allan sent an e-mail, dated 09/10/2002, stating that the channel could remain open through the OFZ.*]
3. T. Kmetz will provide direction on landscaping along east side of Ellsworth Road south of existing Pecos Road.
4. D. Frank to provide cost comparisons for the three different end section options.
5. D. DeWeese will develop a cost estimate for slab bridges vs. concrete box culverts and will evaluate having MCDOT do internal design on this alternative. D. DeWeese will fax the information he has collected on the slab bridges to the design team by September 6, 2002.
6. T. Brown and O. Sutton to discuss irrigation box relocation at northeast corner of Germann and Ellsworth.
7. T. Brown to provide copy of the pavement analysis memo to D. DeWeese.

8. B. Fry will evaluate the hydrology model and the channel design and provide documentation to the project team by September 12, 2002.

Summary:

Fence Layout: A. Allan was present at the meeting to represent WGA. Comments on the fence layout were requested and will be provided by September 6, 2002.

Channel Encroachment on Object Free Zone: Discussion was held regarding the channel encroachment on the Object Free Zone at the southern end of the WGA Runway #3. D. Frank reported that his interpretation of the regulations indicate that as long as the channel is at or below the existing ground, it would be allowable to construct within the OFZ. A. Allan stated that he believes the channel cannot be constructed anywhere within the OFZ. A. Allan agreed to check on the interpretation and give a final answer from WGA. Possible alternatives are construction of a concrete box culvert through this part of the channel or moving the channel alignment east and using steeper side slopes.

WGA Security Gate (South): Instead of omitting WGA's southern entrance, A. Allan was asked if the entrance could be moved down to the concrete box culvert south of the channel crossing at existing Pecos Road. The suggestion was made to grade out the connector road to the crossing and surface with aggregate base or millings. This would still provide fire / emergency vehicle access at this southern location. This would also allow for relocation and / or reorientation of the maintenance access ramp into the channel at this location.

MCDOT, FCDMC, WGA Meeting: A telephone conversation was held on September 4, 2002, between B. Ohler, D. DeWeese, and A. Allan. The following decisions were made:

A. North Perimeter Channel Drain – The double barrel culvert will be omitted at this location. This area can drain through a bleed-off pipe sized to drain in less than 24 hours.

B. Williams Gateway Airport Drain –25-year storm flows will go through a pipe (minimum 48-inch diameter) and the remaining flows will overtop the roadway. Provide a spillway for 50-year storm. The 100-year storm will overtop the roadway by no more than 6-inches of depth.

Security Issues During Construction: T. Brown asked about the security issues of constructing the new fence along WGA. A. Allan stated that the new fence would need to be constructed first and then the existing fence removed. A. Allan is still looking at the fence layout and thinks he can minimize the overall length of the security fence.

End Sections: D. Frank had prepared a summary memo documenting three types of end sections that could be used on the storm drain laterals that drain into the channel. See attached memo for explanation of the options. City of Mesa preferred Option B; MCDOT preferred Option A; FCDMC preferred either Option A or C. The group agreed that a decision could be made easier if costs were prepared for each of the three options. Dibble will prepare a cost comparison and distribute to the team for review. City of Mesa will have the final decision on what is used.

Landscaping South of Pecos: T. Kmetz was asked about the status of the decision on whether or not to landscape the roadway frontage east of Ellsworth south of existing Pecos. T. Kmetz will check with his management and get an answer. T. Kmetz stated that City of Mesa is still in support of the screen-type landscape along channel north of WGA.

Slab Bridges vs. Concrete Box Culverts: At the last team meeting, a suggestion was made to consider using slab bridges at selected locations where large concrete box culverts are currently designed. D. DeWeese has collected information from the MCDOT bridge group and agreed to fax the information to the design team. D. DeWeese provided direction to continue with the current design and he will develop a cost estimate between the two alternatives. Evaluation of the slab bridges will be done internally through MCDOT forces.

Germann Intersection: The drainage design at the Germann intersection can take flows to the north provided it does not create significant design and/or construction constraints. T. Brown will meet with O. Sutton to discuss the irrigation box that needs to be relocated at this intersection.

Miscellaneous Design Issues: T. Brown confirmed with T. Kmetz that the channel design is based on the hydraulic grade line being 1-foot below the roadway gutter elevation.

B. Ohler requested that Premier provide samples of concrete color and formwork for the drop structures. [*Premier has provided this information to B. Ohler for review*].

D. DeWeese asked about the pavement analysis that CH2M Hill has prepared. MCDOT has completed their analysis and find that a thicker pavement section is warranted than the standard City of Mesa section. T. Brown will get a copy of CH2M Hill's analysis to D. DeWeese.

B. Ohler began a discussion of the hydrology models being used for the channel design. Due to a discrepancy in the models, it was brought to the teams' attention that the 100-year existing flows are approximately 1,000 cfs higher than what was previously being used. Dibble will evaluate this issue and provide a summary of the results. Discussion about this issue will take place at the next team meeting.

Ellsworth June Stakeholder's Meeting

ATTENDEES:

Dave DeWeese - MCDOT PM
Coral Sheehan - MCDOT ROW
Bobbie Ohler - FCDMC
Tom Kmetz - City of Mesa
Tom Narva - Town of Queen Creek
Art Allan - WGA
Scott Klinger - General Motors
Brian Fry - Dibble & Associates
Dan Frank - Dibble & Associates
Rick Campbell - Premier Engr.
Chris Hassert - CH2M Hill
Tricia Brown - CH2M Hill

COPIES:

Olin Sutton - MCDOT Utilities
Jeff Englemann - Premier Engr.
Scott Hindman - CH2M Hill
Amy Jones - CH2M Hill

FROM: Tricia Brown

DATE: July 22, 2002

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding, please contact me at 480-966-8188.

The Ellsworth June Stakeholder's Meeting was held June 25, 2002, at CH2M Hill's Phoenix office. The primary purpose of the meeting was to discuss design issues of the 70% submittal.

Project Note: Prior to the Stakeholders' Meeting, a Flood Control District of Maricopa County (FCDMC) meeting was held at the same location to discuss the design of the Powerline Floodway widening. Four widening options were presented and the 'Excavation Option' was selected by the group. These minutes do not reflect a summary of the FCDMC meeting.

Action Items:

1. T. Brown will complete cost estimate for realignment of roadway around Runway Protection Zone (RPZ) and submit exhibit with cost estimate to Kevin Flynn of Federal Aviation Administration (FAA).
2. T. Brown will provide a set of 70% plans to Dibble & Associates and Premier Engineering.
3. D. DeWeese will distribute the 70% plans for review and comments by June 12, 2002. He is requesting that all comments be returned to him by July 15, 2002.
4. FCDMC to supply updated hydrology results to Dibble & Associates (from Dave Degerness).
5. CH2M Hill will separate the 70% cost estimate into channel costs and roadway costs. This information will be provided to T. Kmetz, B. Ohler, and D. DeWeese.

6. C. Sheehan to provide ROW information to A. Allan so he can submit it to the FAA as soon as possible. Actual ROW is more critical than the easement.

7. B. Fry to provide to B. Ohler an estimate of the costs to extend the length of the drop structures.

8. T. Brown and B. Ohler will follow with collecting information on subsidence in the vicinity of the channel.

Summary:

T. Brown gave an overview of the plan submittal. The 70% plans include lighting, signals, signing and striping, which have not been included in previous submittals. T. Kmetz questioned the organization of the plans. T. Brown stated that the plans are split up in 3 Volumes due to the size of the submittal, divided by the roadway, channel, and cross sections. T. Kmetz will provide his suggestions and comments on how future organization could be done.

D. DeWeese stated that the current bid date is mid-August 2003. Construction to begin mid-September 2003. CH2M Hill's current schedule will meet MCDOT's bid schedule.

The following design issues were discussed by the respective designers:

A. Elliot Road – B. Ohler stated that FCDMC is 99% sure that the Elliot Road Basins will be not constructed. ADOT is planning on constructing two retention basins as part of the San Tan Freeway design to accommodate the additional drainage that will not be collected by the Elliot Basins.

B. Fry requested the updated hydrology that Dave Degerness completed. The drainage design concept for Ellsworth Road north of Elliot Road will be evaluated by Dibble using the new hydrology and incorporated into the 90% design. It may be necessary to construct an additional culvert south of Elliot.

D. DeWeese reported on his discussions with MCDOT's Bridge Engineer regarding the top of a concrete box culvert (CBC) serving as a driveable surface. According to the Bridge Engineer, unless a minimum of three (3) feet of fill material will be placed on top of the CBC, it would be a better design to use the CBC as the driveable surface. This design could use a normal crown or a one-way crown. T. Kmetz stated that with a cast-in-place CBC, a 2% normal crown could be built. Approach slabs at each of these locations will be used to provide a smoother transition between the pavement and the concrete. ADOT has a standard for the approach slabs that this project will utilize. T. Kmetz said that the City of Mesa (COM) concurs with this design concept.

B. Williams Gateway Airport Access Roads – T. Kmetz stated that COM wants a five (5)-foot sidewalk on both sides of these access roads. A. Allan and T. Kmetz will be providing additional comments on the guardrail and headwall design once they have completed their review.

C. Right-of-Way – C. Sheehan gave an update of the ROW acquisition and said that she has everything she needs to proceed. She is in the process of ordering appraisals and should have them all by the first of September. WGA, GM, Bureau of Land

Management (BLM), and State Land are the key properties to focus on as they will most likely take the longest to acquire.

S. Klinger stated that MCDOT should begin discussions with GM immediately. One remaining item that C. Sheehan is waiting on from MCDOT (Ken Green) is the legal description for the channel. Some minor alterations have been made to the channel easement delineation by MCDOT in order to reduce excess acquisition. C. Sheehan will also be working closely with FCDMC to delineate the ROW necessary for the PLF work.

D. Frank brought up the issue of the three (3) large culvert crossings that have inlets close to the GM ROW limits. The drainage and roadway design will need to detail a security fence to prevent public access at these locations. D. Frank will coordinate with GM on this issue once 70% comments have been received. S. Klinger said he would be sure to look at this issue closely.

D. Parallel Pipe System at General Motors – D. Frank identified the parallel storm drain system that is shown on Plan Sheet P36. This 3 X 6 CBC intercepts offsite flows from GM and directs it south to the PLF in a separate system from the Ellsworth Road storm drain. Once comments are received and evaluated, possible alternative designs will be looked at by Dibble.

E. Realignment of Ellsworth Road to Avoid RPZ – A. Allan explained that the Runway Protection Zone (RPZ) can have limited facilities but the FAA prefers nothing is constructed within the RPZ. He also explained that there is an additional zone, the Object Free Zone, which cannot have anything constructed within in this area.

T. Brown presented an aerial photograph with the proposed realignment shown along with the realigned channel. This realignment is based on the minimum criteria for roadway geometry recommended by the MCDOT design manual. T. Kmetz commented on the tight curves, but agreed that this would be adequate to provide to FAA along with a cost estimate identifying the increased cost to the project.

F. Conduit for Signal Interconnect – T. Kmetz explained that COM typically uses quad-conduit. If E-Streets goes in, it will use a 12 bank which eliminates the need for quad. At this time, there has been no decision on whether E-Streets will happen. T. Kmetz suggested that the design should assume a quad bank. This consists of 4-2" quads at 48" depth and a 2" conduit for lighting at a 24" depth (COM standard). This quad bank is for fiber optic and transportation facilities, such as signals and lights. T. Kmetz directed that one fiber optic line will go in as part of this project and the remaining three are for future conduits.

G. Channel Design – Dibble proposed revising the drop structures to counteract the effects of the hydraulic jump downstream and the drawdown on the upstream side. The results in additional concrete and additional costs. B. Ohler requested that Dibble provide the increase in costs to her. B. Fry estimates that the extension is 10-feet downstream and 8-feet upstream.

B. Fry explained that some type of filter material is needed to provide stabilization to the channel banks. B. Fry explained that he has evaluated the channel lining material using the 'armoring concept'. This is explained in detail in the Drainage Report on pages 17 and 19. The results of the evaluation indicate that the thickness of the

channel lining should be between 5.1-inches thick and 6.5-inches thick. The current cost estimate assumes a thickness of 4-inches throughout the length of the channel. The increased thickness of liner material will also require additional excavation quantities and costs. B. Ohler would like to compare costs for the increased lining thickness versus the use of a filter material.

B. Fry explained that the FCDMC has previously directed them to use plugging factors for the CBC design. B. Fry suggested that FCDMC consider using future conditions with plugging factors applied and checking that design against existing conditions with no plugging factors. Using this approach could potentially downsize the CBC's. B. Ohler will check with Gary Shapiro, FCDMC, on the use of this approach.

The geotechnical report mentions the potential for subsidence in the area of the channel. The geotechnical report evaluated benchmarks in the general vicinity and reports subsidence in inches per year. T. Kmetz suggested that airport survey data could be evaluated to identify historical trends that may signify subsidence. T. Brown will follow up on this with Dave Allard and A. Allan. B. Ohler offered to question FCDMC employees about their knowledge of subsidence in the area.

D. Frank explained that a trapezoidal channel (4-foot bottom width with 4:1 side slopes) is necessary to control drainage at the southwest corner of Ellsworth Road and Germann. Dibble's design splits flows from the southeast corner of this intersection and takes ½ to the north and ½ to the west. This design will impact four driveways and require pipes/culverts to pass the flows at these locations. Further evaluation will be done by Dibble to ensure that a channel of this size is necessary, the primary factor is keeping the hydraulic grade line below the roadway subgrade.

H. Utility Relocation – O. Sutton was not present at the meeting. T. Brown reported that potholes have been completed and received by CH2M Hill, but were not incorporated into the 70% submittal. T. Kmetz indicated that it would be difficult for the reviewers to comment on the plans without the utilities shown in profile. The pothole information will be included in the 90% plans.

D. DeWeese brought up the subject of a 12kV line that runs in front of WGA. O. Sutton prefers to use an in-kind replacement, but acknowledges that it will go underground if it is between the road and channel. T. Kmetz stated that COM prefers the line go underground. COM will discuss this and give direction in conjunction with MCDOT.

I. 404 Application – B. Ohler was meeting with Bob Stevens (FCDMC) to discuss status of the permit. The 404 application was scheduled for submittal by July 8, 2002.

J. Public Meeting – D. DeWeese stated that Roberta (MCDOT) will need approximately 5 to 6 weeks of notice to get the public meeting arranged. It will be held at WGA the end of August, beginning of September. There will be a pre public-meeting briefing the beginning of August. MCDOT, FCDMC, Dibble, COM, and CH2M Hill will attend the briefing.

Ellsworth May Core Team Meeting

ATTENDEES:

Dave DeWeese - MCDOT
Olin Sutton - MCDOT
Bobbie Ohler – FCDMC
Brian Fry – Dibble & Associates
Dan Frank - Dibble & Associates
Rick Campbell – Premier
Scott Hindman – CH2M Hill
Chris Hassert – CH2M Hill
Amy Jones - CH2M Hill
Tricia Brown - CH2M Hill

COPIES:

FROM: Amy Jones

DATE: May 10, 2002

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The Ellsworth Design Team Meeting was held May 7, 2002, at CH2M HILL's Phoenix office. The primary purpose of the meeting was to discuss the status of design issues and provide the team with an update on the project.

ACTION ITEMS:

1. Dibble and Premier will provide CH2M Hill with reproducible full size plots of their plans to be inserted into the final plan set. Dave DeWeese will send Tricia Brown a list detailing who should receive full size and/or half size plots.
2. CH2M Hill will send Jim Smith (FCDMC) an electronic file containing cut and fill limits for the roadway and channel, proposed right of way and top and bottom of bank lines for the channel. Bobbie Ohler and Dave DeWeese are to be copied on this transmittal.
3. Dibble will provide CH2M Hill with a full size set of the channel plans to be forwarded to Olin Sutton for his use.
4. Dibble will send Premier a sample spillway detail.
5. Dave DeWeese will check with MCDOT bridge section regarding the use of 2 ½" of asphalt pavement on top of the channel culverts.
6. CH2M Hill will verify the proposed 65' right of way is needed for the interim conditions and will revise the proposed right of way offsets north of Germann.
7. CH2M Hill and Dibble will meet with GM to discuss drainage design in the area of their berms. Dave DeWeese and Bobbie Ohler are to be notified of the meeting.
8. CH2M Hill will revise the frontage along the Airpark property and the grading along GM. The new grading limits will be provided to Dibble and Premier.

Also, Olin Sutton stated 95 pothole locations have been identified, and the information should be back by May 31st, 2002. It was decided the pothole locations determined using Dibble's 55% storm drain design would be used because they provided a good overview of the utilities. No adjustment for the current storm drain design would be needed. Dibble will provide a full size set of channel plans to O. Sutton for utility coordination. It was also decided FCDMC will coordinate utilities for the PLF but O. Sutton will be the utility coordinator for the project.

Following this discussion, Rick Campbell gave an update on the landscaping plans. He said the meandering sidewalk has been laid out and Premier was starting the landscape design. R. Campbell said he would send B. Ohler and D. DeWeese samples of the design. For the 70% design, no irrigation lines will be shown and landscaping will be shown between the maintenance road and back of sidewalk. Landscaping will also be provided in between the channel and roadway in the wide sections of the meander. The sidewalk design will be based on MAG Standard Detail 230, the swale off the side of the main road will be shown and the DG used will be the same for the channel and right of way area. CH2M Hill will design the grading between the channel and roadway and provide the new surface to Premier and Dibble. Premier will send Chris Hassert the cost estimated and specifications associated with the landscaping design.

Dibble will send Premier a spillway detail to be used as an example for this project. It was stated that something other than a concrete spillway should be used. Several alternatives were suggested including staining the concrete or using a catch basin with a connector pipe, which would be a higher cost. Brian Fry said the spillway would only be on the east side of the channel in the area of the WGA and a design similar to CAP Basin No. 5, located at Crismon and Southern, could be used.

Dan Frank began a discussion of the roadway drainage along the east side of the project. He stated that it is necessary to force a grader ditch along the east side of the project in the area of GM which may result in a need for more right of way. D. DeWeese asked if the purpose of the ditch was to catch water from the road. Dibble wants to create the ditch to insure water flows to the catch basins. D. DeWeese noted MCDOT typical sections provide the flexibility to add a ditch.

D. Frank noted the swales are actually higher than the subgrade which does not meet COM standards (the water surface elevation needs to be lower than the subgrade). The swales are set in this manner due to the placement of the storm drains. C. Hassert said an exception may be possible due to the interim design. D. DeWeese asked if using 10:1 slopes instead of 20:1 would help. D. Frank stated the catch basins can not be lower than the hydraulic grade line. CH2M Hill will remodel the surface forcing a ditch along the east side and Dibble will re-evaluate the ditch along the east side.

B. Ohler asked if it was still necessary to purchase right of way from GM and D. DeWeese confirmed that it was. Slope easements could be acquired for the drainage ditch work; however, slope easements are similar to pay in fee acquisitions. For an additional 10 foot strip of right of way one mile long, it would cost approximately $60,000. D. DeWeese asked if it was necessary to purchase right of way for the ultimate condition at this time. T. Brown said CH2M Hill will evaluate the right of way needs for the interim condition.

D. Frank asked if the drainage design should be based on 50-yr Future or 50-yr Existing. Currently, Dibble is using a 50-yr Future model, which includes future land use, on-site retention, Siphon Draw Basins but not the Crismon and Elliot systems. B. Ohler and D. DeWeese thought a 50-yr Existing design should be used, including the GM manifold. B. Ohler said Dave Degerness (FCDMC) is updating the existing model and this model could be used by Dibble in their design.

D. Frank recommended a depressed median about 100 meters south of the intersection of Elliot Road and Ellsworth Road. The swale that crosses Ellsworth south of the intersection can not have the same outlet as the culverts crossing in that area because the flows can not be concentrated at the dairy. B. Fry said D. Degerness should add the hydrographs for the FCD culverts and the area draining to the Elliot/Ellsworth intersection to determine flows for the Elliot stub-out. B. Ohler noted purchasing property from LKY should be avoided. It was decided to add a note about the dip crossing in the 70% plans but the design would wait until D. Degerness has finished the updates to the existing model. In the same respect, the signal plans for the intersection would be fairly basic for the 70% submittal.

Three roadway overtopping locations were indicated by D. Frank. The locations are at GM manifold (for two separate culvert crossings), the Elliot wash (north of Elliot Road) and just south of the Elliot intersection. All locations would have depressed medians. A normal crown will be used at these locations except for the Elliot Wash where the road will be the top of the culvert. D. DeWeese said he would talk to someone in the MCDOT bridge section about using a layer of AC on top of the culvert. Other suggestions regarding the culvert as a driveable surface were using approach slabs and using an extra layer of concrete with a stamped median.

D. Frank also stated Dibble would like to reroute the flows to the existing CMP under the GM berms 300 feet to the south. An easement would be necessary to plug the existing pipes and work in front of the berms. It was decided a meeting needed to be scheduled with Scott Klinger at GM to discuss this design. D. DeWeese and B. Ohler will be notified of the meeting once it is scheduled.

A. Jones stated the shift in the roadway alignment at Germann road is completed. A construction line will also be used for Elliot road in the 70% plans. The right of way for Elliot Road was based off the section line and will not need to be changed. D. DeWeese asked if the right of way was offset off the construction line or section line north of Germann. A. Jones said it was currently based on the construction line. D. DeWeese said the MCDOT right of way section recommended basing the right of way lines off the section line regardless of construction line angle. A. Jones said the right of way file would be updated and the file sent to Jim Glendening at MCDOT.

D. DeWeese inquired about the FAA submittal. T. Brown said she would follow up on the submittal. It was decided T. Brown and D. DeWeese would meet to go over any issues related to the FAA submittal.

C. Hassert stated the signal and lighting plans are in good shape for the 70% submittal. The cost estimates and specifications are current as well. Dibble received the general specifications from CH2M Hill. B. Fry asked if the ADOT standards referred to in the plan would need to be reproduced. D. DeWeese said it would not be necessary.

Design issues raised in the agenda were then addressed. It was decided to reduce the proposed frontage to 2 lanes along the Mesa Airpark property. D. DeWeese said he would check on MCDOT policy regarding using Portable Speed Display Systems as well as installing illuminated street signs at the intersections. C. Hassert will coordinate with Tom Kmetz (COM) regarding the use of photo detection devices instead of loop detectors. T. Brown will check with CH2M Hill's geotech regarding subsidence in the project area. She will also have the geotech check on sulfate III concrete requirements for Ellsworth Road.

Adjournment

ELLSWORTH SPECIAL PROVISIONS & COST EST QUESTIONS

- Will Partnering be required?
- Will Community Relations be required?
- Remember – Mesa uses fences on all its headwalls near the pavement and sidewalks.
- We may need some concrete work to transition the PLF extension into the concrete PLF channel.
- *If Fill Construction is to be paid for as Channel Excavation do we list Fill Construction on the Plan set Quantity Sheets? If so, do we show this a s a NPI?*
- *Bid Item 215 is Channel Excavation. Spec Item 215 is Earthwork for Open Channels. Should we change either the Bid Item callout or the Spec title so that the two match?*
- *How does Channel Excavation and Removal of Concrete Rubble and Debris relate to one another?*
- Will need SPECS to add in the Fiber Optic Duct Bank for the City of Mesa. NOTE: First we need to complete a C.O. to add this design work to our Contract.
- Need SPECS from Mesa for their Waterline and Sewerline construction for the relocation we need to do at the CBC crossings.
- Uniformed off-duty officer?
- Need to address Removal of Concrete Rubble on WGA Property. Can contact Dave Allard (CH2M) who has done a similar spec (Rio Salado?). Contact Bob Pan. @FCD to see how they did their concrete rubble removal Change Order.
- Construction Water – Is this a bid Item? C.O.M. Specs show this as a non-bid-item and have some text in the Specs section.
- In Cost Estimate – May need to add a line item for 404 Permit Compliance.
- Is there any irrigation affected? Will need to check the south end of the Project for this.
- *Should we be using a "CLEARING AND GRUBBING" item?*
- Are we adding illuminated COM Street name signs? This is Mesa Standard (M-95.4).
- COM requires steel handrails on top of their headwalls.
- Need to define "Miscellaneous Removals and other Work" 350.50000.
- Signalization – Check MCDOT Supplement, Section 470.4. May have to change this to indicate the City will supply the controller cabinet. Currently, the spec says MCDOT will supply the controller cabinet. Will also have to rewrite the next few sections.
- Remove Concrete Rubble – What were the terms of FCD's C.O. w/ SRSR to remove the concrete rubble and boulders from the CIPP trench area? Is there language in the C.O. that I could use for a special provision?
- Street Lighting – Above ground facilities at the intersections and WGA major entrances only. Underground hardware for the rest of the alignment. Calculations should provide for ultimate street lighting to determine electrical needs, etc…
- Need to define the utility relocation work for the waterline and force main at the new CBC crossing locations.
- *I eliminated Pavement Sawcut from the cost estimate. Make sure this is accounted for somehow. This should be shown on the Plan Quantity sheet as a (NPI).*

- Our typical sections call for MAG guardrail. Do we want to use MCDOT Standard guardrail?
- Is the Thickened Asphalt Pavement Edge a Pay Item?
- Add COM Handrail as a cost item.
- The Signing and Striping Plans note to salvage existing MCDOT traffic signs in the current Project area. Is this accounted for this in the Cost Estimate.
- *Add to Quantity Sheet, Item 336.00000 Pavement Sawcut (NPI). Can this be an NPI?*
- Does MCDOT want signs salvaged on site placed for MCDOT Pickup? Are there certain signs that aren't wanted for salvaging?

PLAN REVIEW QUESTIONS: *(Italicized questions are for Core Team Meeting).*

- NPDES Areas need to be defined – General Note Sheets.
- General Notes – Check sample set of Mesa Specs to see if there is anything important which should be added to this text.

Ellsworth January Core Team Meeting

ATTENDEES:

Dave DeWeese - MCDOT
Bobbie Ohler - FCDMC
Coral Sheehan – MCDOT
Olin Sutton - MCDOT
Chris Hassert - MCDOT
Tom Kmetz – City of Mesa
Dan Frank - Dibble & Associates
Tricia Brown - CH2M HILL
Tom Wolf - CH2M HILL

COPIES: Attendees

FROM: Tom Wolf

DATE: April 3, 2002

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The April stakeholders meeting was held on April 2, 2002, at CH2M HILL. The purpose of the meeting was to discuss project status and obtain direction from MCDOT, FCDMC and the City of Mesa on certain design issues.

ACTION ITEMS

1. CH2M HILL will contact TBE for designation of underground electrical to WGA's ILS facility at Pecos Rd.
2. CH2M HILL will coordinate relocation requirements of ILS with Art Allan/WGA.
3. CH2M HILL will coordinate Pecos Road intersection and design limits with Mesa/AMEC. To be done after Pecos Rd. design is 90% complete.
4. Dibble & Associates will define culvert/channelization of the GM 'manifold' and meet with GM and CH2M HILL to review proposed design.
5. FCDMC will arrange for IRP meeting with MCDOT, FDCMC, and others to review and reach decision regarding the wash crossing north of Elliot Rd. and the impacts of not constructing the Crismon Lateral and basins.
6. MCDOT will review invoice #12 by 4/5/02, and other outstanding invoices immediately thereafter.

7. CH2M HILL will determine the right-of-way needs for the channel easements and other temporary easements by April 17th.

MEETING SUMMARY

Realign Ellsworth to avoid R/W takes on west side, south of Germann. CH2M HILL was able to adjust Ellsworth Road alignment approximately 10 feet east of the section line alignment (at the midpoint of the intersection) to avoid right-of-way takes from the Ellsworth Suburban Mini-Farms property on the west side south of Germann Rd. Future right-of-way will eventually be required to accommodate the ultimate roadway section. A ½ ° deflection was placed in the Ellsworth alignment approximately 1100 feet north of the Germann Rd. intersection. Effort performed to date in the realignment is considered negligible, however, a redesign of the Germann Road grading plans will be necessary, and a Project Issues Memorandum will be submitted. There is negligible work to readjust the drainage channel on the east side of Ellsworth north of Germann.

Pecos Intersection. Coordination efforts have taken place with AMEC regarding their design of the Pecos Road and the intersection location. AMEC is approximately 90% complete, and construction NTP is scheduled for this summer. Additional coordination will be necessary including temporary intersection tie-in conditions, drainage, lighting/signals, and sewer line planned along Ellsworth Rd.

Utility Coordination. Olin Sutton has been coordinating with Tricia in developing the potholing plan. Olin will provide CH2M HILL a copy of the plan for review and concurrence. MCDOT will then initiate the potholing, using TBE through their on-call contract with the county. Olin suggested that the work may take six weeks.

Coordination with FAA (PIM #11 - Glide slope clearance approval). MCDOT needs to discuss the proposed work effort described in PIM#11 with the City of Mesa. The City indicated that they were doing a similar approval process at Falcon Field. The issue was tabled pending MCDOT and Mesa review.

Status of Drainage. There are two specific areas of concern for the drainage design; the wash north of Elliot (and now the Crismon Lateral issue), and the channelization of the GM drainage outlet ('manifold' area).

The current design proposes two 24" culverts to cross Ellsworth at the wash, and carry up to 40 cfs to maintain flow in the wash. The channel along the east side of the road will carry up to 346 cfs and discharge to the stubout on the Elliot Pipes. A CBC will be set at a specific elevation north of the 24" culverts to allow greater flows (than in the channel) to be diverted under Ellsworth Road. Flows greater than the 50 yr. Event will pass over Ellsworth Rd. This was schematically drawn for the group by Dibble & Assoc. at the meeting.

FCDMC stated that the Crismon lateral and basin project is essentially scrapped, meaning that there are no longer plans to construct the facilities. The pipe construction will be completed and will still handle runoff from the east. Consequently, there will be no additional capacity to accommodate the 346 cfs from the channel along Ellsworth. Additional discussion was held regarding the status of the Elliot channel and basin project and its impacts on the drainage design for the Ellsworth Road. It was concluded that the

FCDMC will arrange for an IRP meeting with MCDOT and FCDMC management to determine what should be done. In the meantime, the Ellsworth Rd design team will make no further design progress in the area and plan to submit the 70% plans showing the current design proposal. A minimum amount of grade and elevation information is to be presented to aid in decision making process.

The second area of concern pertains to the GM drainage outlet, or 'manifold' area. The current design proposes to construct approximately 400m of concrete channel along the east side of Ellsworth Road to direct flow from the three major drainage outlets at the manifold area, to a single box culvert under Ellsworth Road. From brief discussion, the design team was requested to consider two CBC crossings and avoid the concrete channel. A meeting will be held with GM to review the proposed plan since it may require a drainage/construction easement.

70% plans submittal. Plans will be submitted for QC review and reprographics by mid-May (May 17th was discussed with Brian Fry). Plan submittal is then scheduled for the first week of June. The funding partners concur with the revised schedule as submitted in last month's Core meeting. A change request will be submitted by CH2M HILL addressing the reasons for the revised schedule. Some additional cost will be associated with the schedule delay and is associated with increased labor costs over time.

404 Permit Application. The FCDMC is making some revisions to the 404 application and will be submitting it to the COE in the near future. CH2M HILL will provide assistance in the colored graphics and other information if requested.

Right-of-way Acquisition. Final draft right-of-way plans were provided for review by CH2M HILL. The plans do not include drainage easements for the channels. Temporary construction easements also need to be identified. This information will be provided by April 17th. It was stated that the GM acquisition process could take up to a year.

City of Mesa Fiber Optic Duct Bank. The is planning to install a fiber optic duct bank in Ellsworth Road as part of their 'E-Street' loop program. The duct bank will consist of 12 (3X4) 2-inch conduits. Details and specifications have or are being developed. The City is considering reuse of the existing 10-inch sewer force-main, but recognizes some concerns that need to be discussed internally before that decision is made. The City intends to include the FO system in the Ellsworth Road project, and will discuss the change in the future.

Sign In List
Core Team Ellsworth Road Project

DATE: 02-26-02

Final Design of Ellsworth Road - Germann Road to Guadalupe Road

Work Order #68927

Name	Company/Organization	Phone Number	Fax Number	E-Mail Address	In Attendence?
DeWeese, Dave	MCDOT	602-506-8626	602-506-5969	daviddeweese@mail.maricopa.gov	
Allan, Art	Williams Gateway Airport	480-988-1013	480-988-2315	aallan@flywga.org	
Britt, Eden	CH2M Hill	480-966-8757	480-966-9450	ebritt@ch2m.com	
Brown, Tricia	CH2M Hill	480-377-6225	480-966-9450	tbrown3@ch2m.com	
Campbell, Rick	Premier Engineering	480-829-6000	480-829-6016	rcampbell@pre-engr.com	
Cline, Mike	Williams Gateway Airport	480-988-1013	480-988-2315	mcline@flywga.org	
Counts, Rick	Harris Cattle Co.	602-955-7097	602-955-7169	scienceaz@aol.com	
Engelmann, Jeff	Premier Engineering	480-829-6000	480-829-6016	jengelmann@pre-engr.com	
Foy, Mitchell	City of Mesa	480-644-3556	480-644-3130	mitchell-foy@ci.mesa.az.us	
Frank, Dan	Dibble & Associates	602-957-1155	602-957-2838	dfrank@dibblecorp.com	
Fry, Brian	Dibble & Associates	602-957-1155	602-957-2838	bfry@dibblecorp.com	
Hassert, Chris	MCDOT - Technical	602-506-6167	602-506-5969	chrishassert@mail.maricopa.gov	
Kmetz, Tom	City of Mesa	480/644-4292	480-644-3392	tom_kmetz@ci.mesa.az.us	
Klinger, Scott	GM Proving Grounds	480-827-5109	480-827-5965	scott.klinger@gm.com	
Mullen, Dan	GM Proving Grounds	480-827-5130	480-827-5905	daniel.mullen@gm.com	
Ohler, Bobbie	FCDMC	602-506-2943	602-506-8561	bao@mail.maricopa.gov	
Wolf, Tom	CH2M Hill	480-377-6205	480-966-9450	twolf@ch2m.com	

Ellsworth Road Final Design WO #68927

55% Review Comment Meeting

ATTENDEES: Dave DeWeese, MCDOT PM
Chris Hassert, MCDOT
Nicolaas Swart, MCDOT Traffic
Tony Perez, MCDOT Traffic
John Counts, MCDOT Traffic
Amy Jones, CH2M Hill
Tricia Brown, CH2M Hill

COPIES: Tom Wolf, CH2M Hill
Scott Hindman, CH2M Hill

FROM: Tricia Brown

DATE: January 25, 2002

This meeting was held on January 23, 2002, at MCDOT to discuss comments made by the Traffic Group on the 55% roadway plans. The following bullet items were discussed with the reviewers and resolution to the comment is shown in italics. Resolution to these comments will be incorporated into the 70% plan submittal.

1. Roadway Plan and Profile Sheets (Comments by John Thayer)

- Sheet P15: Left turn lane to WGA at Existing Pecos Road – *Art Allan, WGA, was contacted after the meeting to confirm that the access to their southern gate (along the existing Pecos alignment) should remain. The access must remain and current design provides a driveway at this location. The gate is typically padlocked and used only for emergency purposes. The plans will be revised to provide a single left turn for NB traffic for the purposes of U-turns.*
- Future Subdivision Entrance – *Design and construction of the Arizona Skyline subdivision are currently underway. This future subdivision entrance has been staked and graded. This location will remain as is and requires no additional revision.*
- Comment Nos. 8 and 9: Taper lengths - South of Germann and Sheet P3 – *The taper lengths south of Germann will be revised to 55:1. The intersection and lane assignments will remain as they are shown on the 55% plans (SB Ellsworth will have 2 thru-lanes and a dedicated right turn). A 100-foot tangent length will be added to the SB roadway and then the taper will begin. The NB taper length will be evaluated to possibly shorten it based on traffic demands and queuing lengths. Additional taper lengths were discussed (8:1 vs. 15:1). We have received comments from City of Mesa to use 8:1 tapers for adding pavement, per Nicolaas Swart, all 8:1 tapers will be revised to 15:1 (meets AASHTO requirements for a design speed of 90 kmh).*
- Comment No. 18: 3-lane ultimate section along WGA – *This comment was discussed between N. Swart and D. DeWeese. The IGA between COM and MCDOT was written to construct the ultimate section along WGA. N. Swart rescinded this comment. No revisions are necessary.*

Section 430 - Landscaping and Planting

Add Gravel Mulch to the Standard Specifications.

Section 430 - Landscaping and Planting

Add Gravel Mulch to the Standard Specifications.

Gravel Mulch:

Gravel mulch will be graded material and shall be free of chemicals harmful to plant growth, debris, fines, and soil particles. Gravel mulch will consist of a combination of crushed and rounded material with a minimum of 50 percent by weight crushed material. Crushed rock shall have at least two (2) fractured faces. A sample must be approved by the Engineer prior to delivery to site.

The percentage wear of the material to be used as gravel mulch will be determined by the test procedure of ASTM Standard C 131, Grading B. The percentage of wear of the material shall not exceed 40 after 500 revolutions. The aggregates shall be well-graded when tested in accordance with ASTM C 136 and C 117. The percentage composition by weight shall be with the following limits:

Size of Opening	Percentage Passing Sieve
2 inches	90 - 100%
3/4 inches	0 - 15
No. 4	0 - 5

Gravel mulch color shall be natural desert. Color shall be approved by the Engineer prior to delivery to site.

October Stakeholders' Meeting

ATTENDEES:

Dave DeWeese – MCDOT
Mark Venti - COM
Tom Kmetz – COM
Bobbie Ohler – FCDMC
Scott Klinger - GM
Art Allan - WGA
Brian Fry - Dibble & Associates
Dan Frank - Dibble & Associates
Tom Wolf – CH2M HILL
Tricia Brown - CH2M HILL
Rick Campbell – Premier
Kevi Wallin - Premier

COPIES: Jeff Englemann - Premier

FROM: Tom Wolf

DATE: October 31, 2001

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The October stakeholders meeting was held on October 30, 2001, at CH2M HILL. The purpose of the meeting was to obtain direction from MCDOT, FCDMC and the City of Mesa on certain design issues, and to obtain concurrence from the three funding partners on specific decisions and directions.

ACTION ITEMS

1. COM will respond to the Oct 30th FCDMC letter regarding reduced flow at GM.
2. COM will send CH2M HILL a copy of the City's revised pavement structure section.
3. COM will check with management on the issue of meandering the channel south of Pecos Road.
4. CH2M HILL will coordinate with MCDOT and SRP to obtain service for lighting the Pecos intersections.
5. CH2M HILL will review the design approach and assess impacts if FAA does not approve the 1.24-foot object penetration.
6. CH2M HILL will update the roadway profile for 13.76-foot clearance at the Runway Protection Zone.
7. Dibble will assess the safety factor of the three channel sections presented.

MEETING SUMMARY

Overview of Project Status

Tom Wolf opened the meeting with a brief update of the current progress. He stated that if all issues were resolved and design could move forward, the mid-December submittal was still possible. However, there were issues to be discussed in the meeting which will likely impact that schedule.

Roadway Design

The status of the roadway design was reported:

- 55% Progress Plans were submitted on Oct 12th
- Finalizing determination of Right-of-Way needs including TCEs. Will be meeting with MCDOT next week to transfer information.
- Preparing designs for driveway turnouts, and crossroads.
- Utility conflicts are being determined. Coordination is ongoing with Southwest Gas regarding the 12-inch gas line under construction.

The roadway profile under the proposed WGA "Glide Slope" (Runway Protection Zone) was presented. It was discussed that the design profile could be adjusted to meet the 15-foot clearance requirement barring or it could be raised to match the existing clearance condition. With the latter, the roadway profile could be raised approximately 1.24 feet, which in turn raises the channel profile by 1.24 feet, thereby reducing construction costs by an estimated $350,000. However, this would require FAA approval. The FAA form 7460, Notice of Proposed Construction or Alteration, will be submitted to show a 1.24-foot object penetration into the proposed RPZ. The discussion presented in the form states that the reconstruction of Ellsworth would not make impacts worse than what currently exists. After considerable discssion, it was resolved that the design team will proceed on the basis of raising the roadway profile to meet the existing minimum clearance distance of 13.76 feet. The Roadway, Drainage and Landscape designs will assess what work elements can be accomplished now and what elements should be deferred until approval comes from FAA (anticipate 4 weeks review).

The pavement design parameters were reviewed and a revised pavement section developed. The asphalt section consists of 5-inches minimum (4.8 inches calculated) of asphalt over 10 inches of aggregate base. The COM new standard for major arterial roadways is to use 5 ½ inches asphalt over 10 inches. Therefore, we recommend that the city requirement be used. The final pavement design report will address consideration of stabilized subgrades, geotextiles, and other products/techniques used in pavement designs.

The lighting analysis has determined that street lights will be required on the outside of the roadway at two locations; at the overflow area north of Elliot where no median is provided, and under the Runway Protection Zone where supplemental lighting is necessary. At these locations, the lighting conduit will be placed on both sides of the street as part of the

Ellsworth Road construction. The fiber optic quad conduit, however, will continue along the centerline of the road through these sections.

It is intended to light all intersections in accordance with the scope of work, however, electrical service is not available at certain locations. This was shown in the Lighting Design Memorandum, dated July 3rd. Based on the discussions, it was resolved that the Pecos intersections will be lighted as part of this project, but the two southerly access turnouts to WGA would not require lighting at this time.

Drainage Design Issues

Brian Fry distributed a synopsis of drainage design directives given to date regarding the channel design (see attached). Each of these design directives were reviewed and discussed, and except as noted on the attached, there was no objection to the documented directives.

The FCDMC sent a letter to the City of Mesa (Oct 30th) regarding the potential of reducing channel size by considering a developed condition for the GM property. The letter states that a reduction from 2700 cfs to 1744 cfs could be realized if GM were developed according to the plan currently being considered for the property. Although the City is in favor of reducing the channel size, they rebutted with the argument that GM has not been annexed into the City, therefore they can not impose detention requirements as requested by the FCDMC. The FCDMC will check to see if the County can provide such assurance. The City intends to respond to the letter.

Discussion was held regarding the channel south of Pecos Road. FCDMC suggested that the channel meander to achieve the best asthetics. The COM felt that it would not be worth the additional right-of-way costs, but would check with management on the issue.

Landscaping Design Issues

Design directive was given in the Oct 23rd FAX and email regarding the channel alignment, typical section, and landscape elements.

September Stakeholders' Meeting

ATTENDEES:

Dave DeWeese – MCDOT
Chris Hassert - MCDOT
Keith Nath – COM
Ron Krosting – COM
Mitchell Foy - COM
Jeff Kramer – COM
Tom Kmetz – COM
Bob Collins – COM
Ted Stalder – COM
Steve Stettler - COM
Lucia de Cordre – FCDMC
Bobbie Ohler - FCDMC
Art Allan - WGA
Brian Fry - Dibble & Associates
Dan Frank - Dibble & Associates
Tom Wolf – CH2M HILL
Tricia Brown - CH2M HILL
Rick Campbell - Premier

COPIES: Jeff Englemann - Premier

FROM: Tom Wolf

DATE: October 30, 2001

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The September stakeholders meeting was held on September 25, 2001, at the City of Mesa Engineering Building. The purpose of this meeting was to obtain input from the City of Mesa on certain design issues, and to obtain concurrence from the three funding partners on specific decisions and directions.

ACTION ITEMS

1. CH2M HILL will review the existing survey information and WGA Master Plan, and submit the FAA form 7460 for Notice of Proposed Construction.
2. CH2M HILL will review and finalize the pavement design.

MEETING SUMMARY

Project Status

Tom Wolf opened the meeting with introductions and provided an overview of the project status. Progress prints (approximately 55% complete) are being prepared and three copies will be submitted by October 12th. The purpose of the progress prints is to demonstrate compliance/incorporation of the 40% review comments and to give the funding partners the most current set of plans for further reference.

An updated schedule was provided to those in attendance. It shows that the 70% submittal will be made mid-December 2001, and design completion in the summer of 2002. Construction would likely follow design (fall of 2002). There are no significant issues

regarding schedule or funding. The COM indicated that they will need to continue to monitor the schedule with MCDOT and adjust their CIP to match.

VE Recommendations

Dave DeWeese provided a summary of the VE recommendations.

Drainage Design Issues

Brian Fry summarized the drainage design progress and status of issues that require stakeholder input.

Crismon Lateral - Without the Crismon Lateral in place, existing drainage will flow toward Ellsworth Road north of Elliot Rd., and must be dealt with accordingly. Options were to divert it south to the Elliot channel or to allow it to flow over Ellsworth Rd. Issues were discussed with the following conclusion:

> The low flow wash north of Elliot will be maintained for 404 permit requirements and will be accomplished with 2 - 24 inch culverts. The remainder of the flow will be split between diverting it south to the Elliot channel and overtoppping Ellsworth Road to the west. Flows overtopping the road will not exceed a 9-inch depth during the 50-year event.

Powerline Floodway - Overview of proposed work was given for widening the PLF. This was presented to MCDOT and FCDMC in a propsed change order dated August 16th.

Controlling hydraulic criteria - Brian presented the status of the drainage design based on comments from the 40% review. Major issues affecting the design of the channel include:

- the controlling elevation requirement at the WGA glide slope,
- size of channel lining material,
- size and configuration of drop structures (example handed out).

Typical cross sections were presented, which reflect the review comments. The channel width has become substantially wider due to the required 2-inch aggregate size for the channel lining material.

Landscaping Design Issues

Review of the channel cross sections spurred various discussions in the room for several moments, but later regrouped and focused on landscape issues. The following summarizes the concensus of the discussions:

The detached sidewalk will meander in a window that is 6' to 16' from back of sidewalk. The channel maintenance access drive is to be a 16-foot wide driveable surface free of trees and bushes, and located along the east bank of the channel. Meandering is desirable to blend the access drive into the landscaping of the channel.

Channel side slopes are to be 4:1 but some variation would be necessary to blend the final grading. The area between Ellsworth Rd and the channel would be landscaped and graded to control runoff by means of retention areas and stabilized swales into the channel.

The width of landscape area between Ellsworth and the channel is to be no more than approximately 45 feet (further discussion and directions were provided on this issue on October 23rd via email).

Landscaping would extend down to the 100 year WSE, and minimal landscaping in the channel.

Roadway Design

Roadway Design South of Germann – Ellsworth Road will taper back to existing condition south of Germann as quickly as possible to minimize drainage issues. The roadway profile will match existing to avoid disturbance of the existing drainage patterns. A portion of the drainage from the area east of Ellsworth will be diverted north to Germann as it already does, and the remainder will continue to flow over the roadway to the west.

Pavement Section – The initial pavement design suggests a 7 ½ - inch asphalt section. The COM has recently approved a 5 ½ -inch asphalt section. CH2M HILL will review the design parameters used in the initial pavement design. The final report will address the use of cement/lime stabilization, geotextiles, overexcavation, and other products / techniques used in pavement structures.

Ellsworth City of Mesa Meeting

ATTENDEES:	Dave DeWeese - MCDOT Keith Nath - COM Ron Krosting - COM Kelly Jensen - COM Tom Kmetz - COM	Brian Fry - Dibble & Associates Tom Wolf - CH2M HILL Tricia Brown - CH2M HILL Amy Jones - CH2M HILL
COPIES:	Jeff Englemann - Premier Chris Hassert - MCDOT	Mario Brown - CH2M HILL
FROM:	Tricia Brown	
DATE:	June 22, 2001	

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The Ellsworth City of Mesa Meeting was held June 14, 2001, at the City of Mesa Engineering Building. Tom Kmetz will be taking the place of Kelly Jensen as the Project Manager for the Ellsworth Road Final Design. The purpose of this meeting was to familiarize the City of Mesa team with the project and clarify roadway design issues that affect the limits of right-of-way.

ACTION ITEMS

1. Tom Wolf will verify with Williams Gateway Airport (WGA) the number and location of their proposed access roads. The City of Mesa is suggesting that they be placed at the Williams Field Road alignment and at the ½-mile section line.

MEETING SUMMARY

Tom Wolf provided an overview of the project and discussed the channel evaluation and alignment, and roadway design. The 40% plan submittal is expected by the middle of July and will identify right-of-way needs for the roadway. A drainage easement will be granted by WGA for construction of the channel through their property. The remainder of the channel, south of Pecos Road, will require a drainage easement from Harris Cattle Company.

Roadway Issues

Lane configurations developed in the Design Concept Report (DCR) were distributed to the group. General comments relating to the overall design are summarized below:

1. A 6-foot wide shoulder will be used instead of a 4-foot wide shoulder to act as a bike lane.

2. Right-of-way will be acquired for the DCR lane configurations. This project will not acquire the ultimate right-of-way, it will be dedicated by future developments.

3. The raised median will be placed in its permanent location. Lane configurations presented in the DCR will be used for this project. The ultimate dual left-turn lanes will be designed but striped as a single lane (as called for in the DCR).

4. All right turn lane storage bays will be 250 feet.

5. All crossroads will be designed for a speed of 50 mph.

6. Access roads for Williams Gateway Airport will consist of a 48-foot wide section for the minor access points and a 68-foot wide collector street section for the main access. Median breaks will be provided for each access.

7. Underground conduit will be placed at each intersection for future signals. This project will include signalization of Germann Road and Elliot Road.

8. The GM frontage, from Pecos Road north to Elliot Road, will be constructed with the interim, two-lane section. Future development of the GM property will construct the ultimate section.

9. The WGA frontage, from approximately ¼-mile south of the Pecos Road section line north to Ray Road, will be the only section of this project constructed as the ultimate three-lane section.

10. The median treatment funded by this Project will consist of decomposed granite.

Each intersection was discussed in detail. The following summarizes the main features of each:

Germann Road: Lane configurations will remain as presented in the DCR, except NB Ellsworth will have one thru lane and one optional thru/right turn lane. The Germann / Ellsworth intersection will be signalized as part of this project. The signals will be placed at the interim location with curb and gutter. The ultimate construction of the intersection will require new curb and gutter and relocation of the signals.

Pecos Road: Pecos Road west of Ellsworth Road will be aligned at the ½-mile section line. This roadway is currently under final design by AMEC for the City of Mesa. CH2M HILL will coordinate with AMEC as their plans progress and incorporate into the Ellsworth design. A paved return will be constructed at the western Pecos alignment.

Pecos Road will not continue east of Ellsworth Road at the ½-mile alignment. The existing Pecos Road (east along the section line) will remain until future developments take place. A single median break will be constructed to provide SB access to the existing Pecos Road. This access will be designed with a 150-foot long left-turn storage bay.

Ray Road: The Mesa Airpark development is currently on hold and the completion date is unknown. No curb cuts will be designed at Ray Road, it will be constructed with a paved edge. The raised median in Ellsworth Road will be constructed with left turn lanes at their ultimate location. No signals will be constructed at Ray Road. The third lane for SB

Ellsworth Road will be added north of the Ray Road alignment to allow for the full ultimate section to begin at the WGA property.

Warner Road: A paved return will be constructed west of Ellsworth Road to match existing Warner Road. Median cuts in Ellsworth Road will be constructed in their final, ultimate locations. Warner Road will be a median island street in the future.

Elliot Road: This will also be a median island street in the future. MCDOT is currently working on a Candidate Assessment Report (CAR) for the western leg of this intersection. The CAR is recommending two lanes approaching the intersection. It was suggested that the Ellsworth Road Project construct 550-feet of median at its ultimate location and connect with the CAR. The dual right turn lanes proposed in the DCR will not be constructed with this Project.

FCDMC is finalizing plans for a storm drain project along the southeastern side of Elliot Road. The Elliot / Ellsworth intersection will remain on the section line. The roadway right-of-way (65-feet) for the eastern leg of the intersection was acquired as part of the Elliot Road FCDMC project.

This intersection will be signalized and constructed with curb and gutter as part of this Project. Future development will improve the intersection to its final configuration and will relocate the signals and reconstruct the curb and gutter. Nicolaas Swart (MCDOT) is designing interim signals at this intersection as part of the Elliot Road project. It may be possible to coordinate his design with this Project.

The third thru-lane and dedicated right-turn lane proposed in the DCR for NB Ellsworth will not be constructed as part of this Project due to the interim section used along the GM frontage. The two left-turn lanes proposed along NB Ellsworth will be designed but striped as a single lane.

Guadalupe Road: Improvements at this intersection have been completed and are not included with this Project. The limits of this Project will extend north from Elliot Road to approximately the Salt River Project powerline easement. Several developments are currently under design within these limits. The City of Mesa contact for these developments is Dave Heinert (Arizona Skyline, west of Ellsworth and Las Palmas Grande, north of Guadalupe).

Drainage Issues:

The City of Mesa will maintain the Channel once it is constructed. The smaller channel along the east side of Ellsworth south of Pecos will be placed beyond the ultimate right-of-way limits in a drainage easement. One channel access location will be designed between each concrete box culvert. One 16-foot wide decomposed granite maintenance path will be placed on the east side of the channel (north of Pecos Road). The final landscape design for this Project will incorporate this path into the parkway area along Ellsworth Road.

ELLSWORTH ROAD FINAL DESIGN PROJECT

QUESTIONS to ADDRESS WITH CITY of MESA

June 14 2001 Meeting with City of Mesa

ROADWAY

1. *What lane configurations should be used for the crossroads?* Number of lanes in DCR are based on 2020 traffic.
2. *What ROW should be obtained at the crossroads?*
3. *Is full ROW (130') required where interim Ellsworth Road is being provided and doesn't require additional ROW?*
4. *What is current status of developments north of Elliot Rd.?*
5. *Will Ellsworth Road be improved to three lanes along the south half of GM property?*
6. *How will right-of-way for the cross roads be determined?* It is our understanding the right-of-way will be based on the number of lanes and intersection geometry as presented in the DCR (not withstanding minor corrections/adjustments). The number of lanes presented is based on the traffic analysis for the deign year. For most cross roads, this is less than the number of lanes presented in the City of Mesa Intersection Detail, which shows ultimate or maximum allowable lane configuration. However, there are likely to be certain circumstances which may dictate that the maximum right-of-way be obtained even though not all the lanes will be provided.
7. *Will private utilities be placed in road right-of-way? Utility corridor?*

DRAINAGE

1. *Will the channel have a designated right-of-way or will it be considered a drainage easement?* Based on discussions in the May 29th stakeholders meeting, a drainage easement will be issued between WGA and either the FCDMC or the City of Mesa.
2. *Who will maintain the drainage channel?* Also discussed in the May 29th stakeholders meeting, we understand that the City of Mesa will maintain the channel. Therefore, maintenance related questions (i.e., access) will be determined by the City. This affects the WGA fence location and whether the WGA perimeter road would be used as the maintenance road for the channel along Ellsworth Road. This question also applies to the channel on private property south of Pecos Rd. section line.
3. *Where will the WGA access drives be located, and how wide will they be?* We are proceeding with the locations and configurations as presented in the DCR. However, we understand that WGA may be considering something different.

Ellsworth May Core Team Meeting

ATTENDEES:	Dave DeWeese - MCDOT Bobbie Ohler - FCDMC Art Allan –WGA Scott Klinger - GM Rick Counts – CSC/HCC	Brian Fry - Dibble & Associates Rick Campbell – Premier Tom Wolf - CH2M Hill Tricia Brown - CH2M HILL Mario Brown – CH2M HILL
COPIES:	Jeff Englemann - Premier Chris Hassert – MCDOT Tom Kmetz - City of Mesa	Dan Frank - Dibble & Associates
FROM:	Tricia Brown	
DATE:	June 4, 2001	

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The Ellsworth Core Team Meeting was held May 29, 2001, at CH2M HILL's Phoenix Office. Tom Wolf gave a project update and presented a revised schedule to Dave DeWeese. The purpose of this meeting was to discuss the typical sections for final design of the channel and right-of-way delineations along the channel and roadway, specifically the arterial intersections.

ACTION ITEMS

1. Tricia Brown will verify with COM that one 16-foot wide maintenance road is acceptable since they will be maintaining the channel.
2. Art Allan will confirm the N-3 alignment with WGA management. He will provide an answer by May 30, 2001.
3. Art Allan will research and provide utility information for the localizer located at the southeast corner of Germann and Ellsworth Roads.
4. Art Allan will provide copies of the WGA deed that describes the property boundary.

MEETING SUMMARY

The geotechnical investigation, supplemental survey, and plan development are progressing on schedule. The channel design will be submitted as a roll for the 40% submittal rather than in sheet form. Both Dave DeWeese and Bobbie Ohler agreed to this format. The Channel Evaluation Report is nearing completion and the final draft version will be distributed the week of June 4th.

Landscape concepts for the channel were presented by Rick Campbell. These concepts represent a compilation of what WGA and COM are requesting.

Tom Wolf stated that the land for the channel will be granted as an easement from WGA. Art Allan agreed that this would be the easiest way to obtain the property. If right-of-way is requested, it would require approval from the FAA. Art Allan will work directly with John Palmieri (MCDOT) during development of the easement transfer.

There was discussion regarding the need for two maintenance roads for the channel. This is a requirement of the FCDMC. Since the COM has agreed to maintain the channel, it will be their decision whether there are one or two maintenance roads. This will be confirmed with COM. Art Allan stated his preference for one 16-foot wide maintenance road.

Typical sections in the DCR called out a future 17-foot wide right turn lane along the three WGA access points. Dave DeWeese suggested that this be removed from the final design. He feels that it will not be necessary with a three-lane roadway.

Rick Counts indicated that there will be a T-intersection at the proposed ½-mile alignment of Pecos Road. It will continue east of Ellsworth Road at the existing Pecos Road alignment until that property is master developed in the future. The T-intersection will be constructed with curb returns west of Ellsworth Road.

Art Allan expressed some concern over the alignment of the N-3 alternative as it approaches the Powerline Floodway. WGA anticipated that the channel would outlet into the PLF west of the existing confluence. Instead the current N-3 alignment shows the channel following the existing channel and using the existing confluence at the PLF. WGA would prefer not to have such an acute parcel remaining to develop (east of the channel confluence).

There was some discussion on how the alignment could be altered to improve the potential use of the segregated parcel. CH2M will check the grade on the proposed alignment change. Art will check with WGA management regarding possible adjustment of the channel to eliminate the existing bend (at the existing temporary road crossing). If this is acceptable, CH2M HILL will determine a preliminary cost estimate.

Ellsworth April Core Team Meeting

ATTENDEES:	Dave DeWeese - MCDOT Chris Hassert - MCDOT Bobbie Ohler - FCDMC Dave Degerness - FCDMC Keith Nath - City of Mesa Kelly Jensen - City of Mesa	Art Allan -WGA Leo Huppert - WGA Dan Frank - Dibble & Associates Tom Wolf - CH2M Hill Tricia Brown - CH2M HILL Tom McLean - CH2M HILL
COPIES:	Jeff Englemann - Premier Rick Campbell - Premier Brian Fry - Dibble & Associates Scott Klinger - GM	Eden Britt - CH2M Hill Rick Counts - Harris Cattle Co.
FROM:	Tricia Brown	
DATE:	April 23, 2001	

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The Ellsworth Core Team Meeting was held April 3, 2001, at Williams Gateway Airport Administration Office. Tom Wolf gave a brief overview of the 11 channel alternatives and described the reasoning behind alternative development. The purpose of this meeting was to further discuss the alternatives and obtain input from the funding partners.

ACTION ITEMS

1. Bobbie Ohler will meet with Flood Control District of Maricopa County (FCDMC) Management on Thursday, April 5, 2001, to present the alternatives.

MEETING SUMMARY

Tom Wolf discussed revisions that were made to the cost estimates from the previous meeting. These revisions were made in response to discussions at the March Core Team Meeting. No adjustments to the costs were made to include construction of the Ray Basin or the Pecos Basins. A cost for removing and processing the existing concrete rubble was developed, but a salvage cost (i.e., reduced cost for reuse as AB) was not applied to any of the alternatives.

- Alternative S-1 was modified (and costed) by routing the channel around the existing buildings on the north side of Pecos Road, east of Power Road. This eliminates the concrete box culvert in Pecos Road and significantly reduces the cost of the alternative.
- Concrete rubble removal costs were added to Alternatives N-2, N-3, and N-4.
- The cost estimates included one sloping grade control structure (20:1) for each alternative. It is likely that multiple structures will be necessary in both the Powerline

Floodway (PLF) and the Rittenhouse Channel (RHC). For the purposes of the meeting discussion, $200,000 was added to all costs. For the final channel evaluation report, a more detailed cost analysis will be included for the multiple structures.

- Additional right-of-way costs for the reconstruction of the PLF were added to Alternatives N-1, N-2, N-3, and N-4.
- Additional right-of-way costs for the reconstruction of the RHC were added to Alternatives S-1, S-2, S-3, S-4, S-5, and S-6.
- Costs for environmental mitigation and cultural resource mitigation were applied to all the alternatives.
- Mobilization and construction survey costs were adjusted to accommodate specific site conditions anticipated in each of the alternatives, rather than applying a uniform percentage of construction costs.
- Maintenance of traffic costs were reviewed and revised according to the anticipated traffic impacts (e.g., street crossings, haul routes) for each alternative, rather than applying a uniform percentage of construction costs.
- Due to the refinement of the costs described above, the overall project contingency was reduced from 30% to 25%.

Keith Nath stated that aesthetics of the channel are very important to the City of Mesa (COM). Art Allan prefers the soil cement option to reduce right-of-way, but anticipates the need for some landscaping such as screening. Keith suggested that land usage could be maximized by obtaining a drainage easement from WGA rather than buying right-of-way. The COM also stated that a smaller setback distance is required to a drainage easement than to a right-of-way.

As of this writing, COM council has approved the ½-mile alignment for Pecos Road. However, the COM does not prefer a southern alignment for the channel because of the potential disturbance of cultural resources, change in the natural drainage flows in the area, and adverse impacts to development of proposed businesses and residential areas.

The FCDMC prefers a southern alignment because of reduced impacts to the East Maricopa Floodway (EMF). With a northern alignment, the freeboard requirements for the EMF can not be met, and there is a potential for flooding the adjacent golf course and WGA property to the north.

FCDMC indicated that construction of the Ray Basin is estimated to cost $16 million, and construction of the Pecos Basins is estimated to cost $15.5 million. In addition, the Pecos channel (from the basins to Ellsworth Road) is estimated to cost $13.6 million.

Keith Nath listed the following concerns for a southern alignment:

1. Adversely impacts properties adjacent to the airport and will likely hinder future expansion;
2. Changes the natural / historic drainage patterns;
3. Impacts development of the roadway system (Sossoman Road in particular);

4. Impacts the Rittenhouse Channel.

Tom Wolf asked WGA/Mesa whether their northern property was more valuable than the southern property. Keith Nath, Leo Huppert, and Art Allan all agreed that the land south of WGA is more valuable than the north (Ray Basin land).

The Pecos Basins will be located in Pinal County but are not currently programmed. The Ray Basin is located in Maricopa County, but is not funded either. Construction of the Ray Basin will eliminate the freeboard issue in the EMF. Construction of the Pecos Basins does not correct this issue.

Of the southern alignments, the COM is least opposed to Alternative S-5 because it places the smallest constraint on potential development and expansion of the light industrial properties and the airport. It was felt that Alternative S-1 had a significantly higher potential for environmental impacts and that land acquisition would be very time consuming. It is likely that Alternative S-1 would require additional aircraft crossings because of the planned development to the south of WGA. Alternative S-2 was not desirable because it tends to isolate the light industrial properties from WGA. It also has significant adverse impacts on the local roadway system (additional box culverts), and would require property acquisition from several landowners. Alternative S-3 requires acquiring land from GRIC, which could be difficult. Alternative S-4 only has merit if the Pecos Road alignment ended up on the ¼ section line; otherwise it would require land acquisition from a significant number of property owners.

For the northern alignments, Alternative N-1 was unanimously eliminated due to the high cost of the box culvert construction. Alternative N-2 utilizes the existing channel more than any of the other alignments. However, WGA prefers the N-3 alignment because it has the least impact on the proposed commercial terminal facility (COM yields to WGA's position). WGA stated that they favor the southern Alignment S-5, but are least opposed to the northern Alternative N-3 if a northern alignment is the most practical solution. If Alternative N-3 is selected, WGA intends to fill in the existing channel and use the land for a future commercial terminal facility.

In summary, the group narrowed the alternatives to three:

WGA: **N-3** or S-5

FCDMC: **S-1**, but could live with S-5

MCDOT: No Preference, wants the most preferred alignment by the stakeholders

COM: **N-3** or S-5

LED Module Specification
(City of Mesa)

Rev. April 20,2001

Purpose

The purpose of this specification is to provide the minimum performance requirements for 300 mm (12 inch) and 200 mm (8 inch) LED traffic signal modules, and 12-inch pedestrian signal modules (international symbol type). This specification refers to definitions and practices described under "Vehicle Traffic Control Signal Heads" (VTCSH) and "Pedestrian Traffic Control Signal Indications" (PTCSI) as published in the *Equipment and Materials Standards of the Institute of Transportation Engineers* (document ISBN 0-935403-16-7 may be purchased online from **www.ite.org** refer to item ST-017A).

Quantity

The quantities are stated as "or more." The vendor agrees to honor the price quoted for a one-year period from date of quotation. After the initial purchase of quantities stated additional quantities may be purchased on an "as needed" basis.

Definitions

The following definitions are in addition to the definitions in the VTCSH.

1. **Nominal Operating Voltage.** The AC RMS voltage, 117VAC, at which photometric performance and power consumption are specified.
   Chromaticity. The color of the light emitted by an LED signal module, specified as x-y chromaticity coordinates on the chromaticity diagram according to the 1931 Commission Internationale d'Eclairage (CIE) standard observer and coordinate system.
3. **Power Factor (PF).** PF equals Watts divided by volt-ampere (VA) or the ratio of power consumption in Watts to volt-amperes.
4. **Total Harmonic Distortion (THD).** THD is the ratio of the root-mean-square (RMS) value of the harmonics, to the amplitude of the fundamental component of the AC waveform.

General Description

Referenced vehicle type LED retrofit modules shall fit in all standard, incandescent vehicle traffic signal housings. These modules are to be used for the replacement of the reflector, socket, gasket, and lens assembly of an incandescent vehicle signal indication. Each retrofit module shall be complete, consisting of:

- A lens
- LED circuit board inclusive of all of the LEDs and required circuit components
- 36 inch 16 AWG wire leads with strain relief and **quick connect terminals**
- A rigid housing for protection in shipping, handling and installation
- A one-piece neoprene gasket.

Vehicle type LED retrofit modules covered by this specification include the following types:

- 200 mm (8 inch) Red
  200 mm (8 inch) Yellow
  200 mm (8 inch) Green

- 300 mm (12 inch) Red
  300 mm (12 inch) Yellow
- 300 mm (12 inch) Green
- 300 mm (12 inch) Red Arrow
- 300 mm (12 inch) Yellow Arrow
- 300 mm (12 inch) Green Arrow

Pedestrian Signal Module

The pedestrian LED traffic signal module shall be designed as a retrofit replacement for the message of a 400 mm (16 inch) by 450 mm (18-inch) pedestrian signal housing built to the PTCSI Standard. The "HAND" and "MAN" symbol shall be 300 mm (12 inches) in height, and conform to PTCSI Standards.
Pedestrian LED signal modules shall be designed so, that when operated over the specified ambient temperature and voltage range, the signal shall attract the attention of, and be readable to, a viewer (both night and day) at all distances from 3 meters to 60 meters (9.8 feet to 196.9 feet). The measured chromaticity coordinates of the LED pedestrian signal module shall conform to the chromaticity requirements of Section 5.3 and Figure C of the PTCSI standard.

The LED pedestrian signal module shall be man/hand overlay with outline figures for both the man and hand. Filled-in and/or side-by-side modules shall **NOT** be used.

The LED pedestrian signal module shall conform to all other specifications in this document, where applicable.

The LED signal module shall be rated for use in the ambient operating temperature range, measured at the exposed rear of the module, of –40°C to +74°C (-40°F to +165°F).

The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991, Section 4.7.2.1 and 4.7.3.2, for Type 4 enclosures to protect all internal LED, electronic, and electronic components.

The LED signal module lens shall be UV stabilized and scratch resistant.

Construction

The external lens surface for <u>all</u> vehicle signals shall be smooth, with no raised features, so as to minimize the collection of dirt, diesel smoke, and other particulate contaminates, and to facilitate periodic cleaning. External lens facets are not allowed. The LED signal module lens shall be UV stabilized and scratch resistant.

The LEDs shall be mounted and soldered to a printed circuit board. The LED signal module shall be watertight when properly mounted in an installed traffic signal housing. The LED signal module shall utilize the same mounting hardware used to secure the incandescent lens and gasket assembly and only require a screwdriver or standard installation tool to complete the mounting into an existing traffic signal housing built to the VTCSH Standard. Unit shall connect to existing electrical wiring utilizing **quick connect terminals.**

The LED signal module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply for the LED signal module shall be an integral part of the module. The LED signal module assembly shall weigh less than 5 pounds.

The assembly and manufacturing process for the LED signal module shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from gh winds and other sources.

When necessary, modules shall have a prominent and permanent vertical indexing indicator, i.e., UP ARROW or the word UP or *TOP,* for correct indexing and orientation inside signal housing.
Each individual LED signal module shall be identified for Warranty purposes and clearly marked with:

- Manufacturer's name
- Date of manufacture.
- Unit serial number.
- Nominal operating voltage
- Power consumption in Watts

Environmental
The LED signal module shall operate over the temperature range of -40°C to +74°C (-40°F to +165°F). The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991, Section 4.7.2.1 and 4.7.3.2, for Type 4 enclosures to protect all internal LED, electronic, and electronic components.

Electrical - Input
LED signal modules shall operate from a 60 +/-3 cycle AC line power over a voltage range from 80 VAC RMS to 135 VAC RMS. The control circuitry shall prevent current flow through the LEDs in the off state to avoid any false indication as may be perceived by the human eye. The LED traffic signal module shall be operationally compatible with NEMA TS - 1 and NEMA TS - 2 *conflict monitoring* parameters.

Green LED signals shall not illuminate for input voltages below 35 VAC RMS and shall illuminate for all input voltages higher than 45 VAC RMS (voltage shall be regulated above 80 VAC RMS). This requirement is so that a green indication will not illuminate due to a "floating" or high-impedance neutral connection.

All wiring and terminal blocks shall meet the requirements of Section 13.02 of the VTCSH standard. Two secured, color coded, 914 mm (36 in) long 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +105°C (+221°F), are to be provided for electrical connection.

The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.6, NEMA Standard TS-2, 1992.

The individual LED light sources shall be wired so that a catastrophic failure of one LED light source will result in the loss of not more than 5 percent of the signal module light output. One LED failure in an LED Signal Module will not affect any other LEDs. In case of a failure of one LED, only one LED will be lost and not an entire string or module.

Power factor shall be 90% or greater, at nominal rated voltage, at 25°C (77°F), after 60 minutes of operation.

tal harmonic distortion induced into an AC power line by an LED signal module, operated at nominal operating voltage, with a power consumption equal to or greater than 15 watts at 25^{0}C (77^{0}F) shall not exceed

20 percent. Total harmonic distortion induced into an AC power line by an LED signal module, operated at nominal operating voltage, with a power consumption less than 15 watts at 25°C (77°F') shall not exceed 40 percent.

The LED signal and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, subpart B, Section 15 regulations concerning the emission of electronic noise.

Optical - Output

The light intensity and distribution from LED signal modules shall as a minimum, meet the current ITE and CAL TRANS standards and measurement criteria for vehicle traffic control, even after a 30 minute warm up of continuous operation. Test data to verify the performance as meeting the ITE intensity requirements at +74°C (+165°F) shall be supplied from either of the following (or another certified **independent** test lab):

Lighting Sciences
7630 East Evans Road
Scottsdale, AZ 85260

ETL Testing Laboratories
3933 US Route 11
Cortland, NY 13045-0950

The light output of all LED vehicle signal modules shall also meet *ITE* specifications for chromaticity.

Fluctuations in line voltage over the range of 80 VAC to 135 VAC shall not affect luminous intensity by more than +/- 10 percent.

LED traffic signals shall be temperature compensated so as to maintain intensity at elevated temperatures. LED traffic signal shall be tested and documented by CAL TRANS as being in compliance with CAL TRANS intensity standards at elevated temperatures.

The LEDs shall not exhibit degradation of more than 30% of their initial light intensity following accelerated life testing (operating at +85°C (+185°F) and 85% humidity, for 1000 hours). AlGaAs technology is not acceptable.

Warranty

All LED traffic signal modules supplied shall be warranted for 5 years against manufacturing defects.

LED traffic signal modules shall be performance warranted to be in compliance with ITE and CAL TRANS minimum intensity standards, at +74°C (+165°F), after a period of three (3) years, measured at 117 volts AC.

Failures due to acts of God, abuse, and accidents are excluded from warranty coverage.

Vendor expressly warrants that all goods furnished shall conform to all specifications and appropriate standards, will be new, and will be free from defects in material or workmanship. Vendor warrants that all such goods will conform to any statements made on the containers or labels or advertisements for such goods and that any goods will be adequately contained, packaged, marked and labeled. Vendor warrants that all goods furnished will be

merchantable, and will be safe and appropriate for the purpose for which goods of that kind are normally used. Vendor knows or has reason to know the particular purpose for which City intends to use the goods, Vendor rrants that such goods will be fit for such particular purpose. Vendor's warranty shall run to City, its successors, and assigns. Vendor agrees to replace or correct defects of any goods not conforming to the foregoing warranty promptly, without expense to City, when notified of such nonconformity by City, provided City elects to provide Vendor with the opportunity to do so. In the event of failure of Vendor to correct defects in or replace nonconforming goods promptly, City, after reasonable notice to Vendor, may make such corrections or replace such goods and charge Vendor for the cost incurred by City in doing so

Ellsworth March Core Team Meeting

ATTENDEES:	Dave DeWeese - MCDOT Chris Hassert – MCDOT Bobbie Ohler - FCDMC David Degerness - FCDMC Paul Stears - FCDMC Rick Counts - Harris Cattle Co. Kelly Jensen - City of Mesa	Brian Fry - Dibble & Associates Dan Frank - Dibble & Associates Scott Klinger - GM Tom Wolf - CH2M Hill Tricia Brown - CH2M Hill Ginny Schoonaert - CH2M Hill
COPIES:	Mitchell Foy - City of Mesa Art Allan - WGA Jeff Englemann - Premier	Rick Campbell - Premier Eden Britt – CH2M Hill
FROM:	Ginny Schoonaert	
DATE:	March 21, 2001	

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The Ellsworth Core Team Meeting was held March 20, 2001, at CH2M HILL's Phoenix office. Tom Wolf gave a project status and schedule update. The primary purpose of the meeting was to discuss the initial draft of the Channel Evaluation Report, which had been sent out prior to the meeting.

ACTION ITEMS:

1. Dave Degerness will run the FCDMC HEC-RAS model to determine the affects to the EMF under various scenarios including elimination of both of the Pecos Basins and the Ray Basin. Completion by 3/21/2001

2. Bobbie Ohler will confer with FCDMC Management on freeboard requirements for the PLF and the EMF. Completion by 03/21/2001.

3. Bobbie Ohler will confer with FCDMC Management on their consideration of moving the Pecos Basins funding up in lieu of the Ray Basin. Completion by 03/22/2001.

4. Kelly Jensen will investigate the status of City of Mesa annexation of the GM property. Completion by 03/23/2001.

5. Kelly Jensen will find out the City of Mesa's stand on the use and maintenance of soil-cement lining.

6. CH2M HILL will compile comments on the three preliminary draft reports and incorporate them prior to distribution of the Draft Report. Cost estimates for all 11

alternatives will be revised in accordance with comments received during the review period. Cost estimates will be completed by 04/03/2001.

7. CH2M HILL will revise Alternative S-1 to eliminate the concrete box culvert near Power Road. The alternate segment to the north of the existing buildings will be used for this alternative in leau of the existing Pecos Road alignment.

8. CH2M HILL will contact WGA to determine if they have concern regarding making revisions to Alternatives S-1, S-2, and S-3 by following the Pecos Road section line west of Ellsworth Road and through the southeast portion of WGA property. These alternatives would no longer follow the southern WGA property. Completion by distribution of Draft Report.

MEETING SUMMARY

Tom opened the meeting by allowing each stakeholder to discuss questions and/or concerns that came from review of the Initial Draft Channel Evaluation Report.

Dave DeWeese's major concern was "do we need the Ray Basin".

Bobbie Ohler questioned the earth channel in Alternatives N-2 and N-3 along WGA property. [*This question also applies to Alternative N-4*]. She stated that WGA would agree to a concrete lined channel.

Rick Counts feels Alternative N-2 looks good for the property owners to the south. He also stated that the Mesa City Council recently approved the Pecos Road plan at the quarter mile alignment. This may have an impact on our decisions.

Scott Klinger stated that GM is not interested in the floodway on their property. The southern two-thirds of their property might be vacated by this time next year. They would have no problem with a channel on the east side of Ellsworth if they were going to stay there, but they are in the process of preparing a master plan for the property and their Real Estate Division will make no decisions on property until it is completed. The City of Mesa annex of the GM property has been delayed by recent offers from developers.

Bobbie Ohler would like to see the costs for removal of the concrete rubble included in Alternatives N-2 and N-4 as "Other Costs".

Kelly Jensen stated that the City of Mesa prefers Alternative N-2. He questioned whether the 30% contingency includes construction management. Tom indicated that it is.

Bobbie Ohler questioned the power line relocation costs included in Alternative S-1. She also asked about including grade control structure costs in the estimates.

Tom Wolf stated that the PLF reconstruction costs assumed one side would be widened. Bobbie added that we would need to include right-of-way costs for the PLF reconstruction also.

Comment by Art Allan (which had been e-mailed to Tom), that both WGA and GM disagree that significant flow comes around the GM berms along Ellsworth. Bobbie would like to look at this more closely. There are no berms on the east side of the GM property and any

flow entering from Pinal County crosses the GM property. None of these flows are routed around it.

Dave Degerness feels we have to go with the existing hydraulic models for this area. Some assumptions need to be made for the model, and FCDMC will continue using what they have. Scott Klinger said that their records show the last historic flood in the area was reported in 1954 and those flows can be expected.

Dave DeWeese said that their environmental group does not feel that the archaelogical sites are going to sway the decision of an alternative. They feel that any of the proposed alignments have an equal potential to impact archaeological sites. Rick Counts seconded that the archaeology should not be a deal breaker.

Bobbie felt the reports were good, but they need some fine tuning.

Tom Wolf stated that the team is considering potential use of an engineered soil cement that could be used in as a channel lining to reduce excavation costs as well as right-of-way costs. The main concern that Bobbie had with this was the City of Mesa's agreement to maintain the channel. She said FCDMC would support a soil cement option if the City of Mesa agrees to maintain it. The stakeholders were asked to state their preferred alternative(s) based on the current information. It is recognized that additional hydrologic and cost information is needed to finalize the decision. Current preferences are:

Chris Hassert - N-2 or N-3

Art Allan – N-3

Bobbie Ohler – N-2, N-3, N-4, S-1, S-2

Dave DeWeese – N-2, N-3, S-1, S-2

Kelley Jensen – N-2

Paul Stears – S-1

The next meeting will be held at WGA on Tuesday, April 3rd.

Attachment 1

Summary of Questions and Concerns from Stakeholders

Questions	Concerns
Do we need Ray Basin?	GM not interested in the channel on their property. Could slow down project. (R/W acquisition) Available for sale March, 2002.
Should we consider concrete? (soil cement)	Concrete Removal should be listed as separate What does WGA R/W cost? Cost.
(north and south)	Annexation of GM could delay decisions regarding the project.
	Address PLF reconstruction in more detail.
	Cost grade control structures.
	Include WGA R/W in "other cost" category . (Also PLF R/W)
	Include costs for WUS (Trade-offs with COE)
	Consider alternate route for S-1 outlet (in lieu of CBC)
	Consider Pecos Section Line at WGA SE corner (refinement)

Modifications to DCR CAD Master Files

TO: Project File

FROM: Amy Jones

DATE: February 21, 2001

Background

For the final design of Ellsworth Road, the control information was surveyed by Project Engineering Consultants (PEC). The new control information surveyed by PEC varies slightly in comparison to the survey from Collins Pina used in the DCR. It was determined that the PEC survey will be used for the control information. For use in the final design project, the DCR CAD survey, utility and property line master files will be adjusted to match the PEC control.

Survey Adjustments

Chuck Gardiner at PEC researched the differences between the new survey and the Collins Pina survey. He discovered that the Collins Pina survey is on grid coordinates, not on ground coordinates. In addition to this, a slight rotation of the Collins Pina survey is necessary for the two surveys to match.

To match the two surveys, Chuck outlined the following steps (see attached email for further detail):

1. Move the Collins Pina survey based files 56.87479639m on a bearing of N-42-21-44.4901-E from Point 33,
2. Rotate the files 0-00-01.2508" in a clockwise direction around new Point 33,
3. Apply a scale factor of 1.0001499280 to the files from new Point 33.

Chuck determined that these adjustments would provide a reasonably close match of the two surveys.

Action Taken

Based on the steps outlined by Chuck, I corrected files 147674ut.mst, 147647pl.mst, 4000.dgn and 147647ex.mst. (File 147647ex.mst contains the Mesquite Canyon Development information.) To correct the DCR master files, I attached the DCR files (one at a time) to my scratch file as reference files and moved, rotated and scaled the reference files.

In my scratch file, I placed a line at the calculated distance and angle from point 33 using AcuDraw and polar coordinates. I then moved the reference files based on that line.

I rotated each file about the new point 33; however, Microstation would not allow the files to be rotated at exactly 1.2508" about the adjusted point 33. The angle of rotation for the four files varied but was always within 0.05" of the desired angle of rotation.

Once the reference files were rotated, I scaled them about the new point 33 using a scale factor of 1.000150. Microstation was limited in the accuracy and only allowed carrying out the scale factor to six decimal places.

After completing the adjustments, the reference files were copied into my scratch file and were then transferred to the appropriate permanent MCDOT master file. The final MCDOT master files are as follows:

4000.dgn and 147647ex.mst=48927surRF.dgn

147647ut.mst=68927utlRF.dgn

147647pl.mst=68927rowRF.dgn

To complete the adjustments, I corrected the section line in file 48927surRf.dgn so that it reflects the PEC survey information and I deleted any old section line information in all of the final MCDOT files.

-----Original Message-----
From: Chuck Gardiner [mailto:cgardiner@az.rmci.net]
Sent: February 19, 2001 4:25 PM
To: Brown, Tricia/PHX
Subject: Ellsworth Road

Tricia,

Okay, hold on....this may get a little confusing.....

1. Upon further investigation, it appears that Collins Pina data is on grid coordinates and not on ground coordinates. Even so, there is still a slight rotation factor that needs to be accounted for. So, we'll use the brass cap at Ellsworth Road and Guadalupe Road (I've also added 90000 to Collins Pina points so that I'd make sure that there was no confusion on whose point was whose).

PEC Pt# 402	Collins Pina Pt# 90033
Northing 263070.831	Northing 263028.806
Easting 239509.190	Easting 239470.866

2. First step is the translation -
Move the Collins Pina file 56.87479639m on a bearing of N 42-21-44.4901 E

3. Second step is the rotation -
After moving the file, rotate the Collins Pina file 0-00-01.2508" in a clockwise direction around Point 90033 (which should now have the same coordinates as PEC Pt 402)

4. Third step is to apply a scale factor -
Apply a scale factor to the entire Collins Pina file. The scale factor is 1.0001499280. Apply this from point 90033.

5. That's really about it. This should leave the Collins Pina file reasonably close.

Let me know if you have any problems. I can have our CADD operator perform this really quick if need be (we've had a number of jobs in the last year that we've done for ADOT that were done on a local coordinate system, which was no problem whatsoever.....until ADOT R/W got involved and decided that everything had to be on ADOT coordinates. Our CADD operator gained a great deal of experience moving files following the steps outlined above, except that she didn't have to worry about applying a scale factor).

Chuck

LED Module Specification
(City of Mesa)

Rev. April 20,2001

Purpose

The purpose of this specification is to provide the minimum performance requirements for 300 mm (12 inch) and 200 mm (8 inch) LED traffic signal modules, and 12-inch pedestrian signal modules (international symbol type). This specification refers to definitions and practices described under "Vehicle Traffic Control Signal Heads" (VTCSH) and "Pedestrian Traffic Control Signal Indications" (PTCSI) as published in the *Equipment and Materials Standards of the Institute of Transportation Engineers* (document ISBN 0-935403-16-7 may be purchased online from **www.ite.org** refer to item ST-017A).

Quantity

The quantities are stated as "or more." The vendor agrees to honor the price quoted for a one-year period from date of quotation. After the initial purchase of quantities stated additional quantities may be purchased on an "as needed" basis.

Definitions

The following definitions are in addition to the definitions in the VTCSH.

1. **Nominal Operating Voltage**. The AC RMS voltage, 117VAC, at which photometric performance and power consumption are specified.
2. **Chromaticity**. The color of the light emitted by an LED signal module, specified as x-y chromaticity coordinates on the chromaticity diagram according to the 1931 Commission Internationale d'Eclairage (CIE) standard observer and coordinate system.
3. **Power Factor (PF)**. PF equals Watts divided by volt-ampere (VA) or the ratio of power consumption in Watts to volt-amperes.
4. **Total Harmonic Distortion (THD)**. THD is the ratio of the root-mean-square (RMS) value of the harmonics, to the amplitude of the fundamental component of the AC waveform.

General Description

Referenced vehicle type LED retrofit modules shall fit in all standard, incandescent vehicle traffic signal housings. These modules are to be used for the replacement of the reflector, socket, gasket, and lens assembly of an incandescent vehicle signal indication. Each retrofit module shall be complete, consisting of:

- A lens
- LED circuit board inclusive of all of the LEDs and required circuit components
- 36 inch 16 AWG wire leads with strain relief and **quick connect terminals**
- A rigid housing for protection in shipping, handling and installation
- A one-piece neoprene gasket.

Vehicle type LED retrofit modules covered by this specification include the following types:

- 200 mm (8 inch) Red
  200 mm (8 inch) Yellow
- 200 mm (8 inch) Green

- 300 mm (12 inch) Red
  300 mm (12 inch) Yellow
- 300 mm (12 inch) Green
- 300 mm (12 inch) Red Arrow
- 300 mm (12 inch) Yellow Arrow
- 300 mm (12 inch) Green Arrow

Pedestrian Signal Module

The pedestrian LED traffic signal module shall be designed as a retrofit replacement for the message of a 400 mm (16 inch) by 450 mm (18-inch) pedestrian signal housing built to the PTCSI Standard. The "HAND" and "MAN" symbol shall be 300 mm (12 inches) in height, and conform to PTCSI Standards.
Pedestrian LED signal modules shall be designed so, that when operated over the specified ambient temperature and voltage range, the signal shall attract the attention of, and be readable to, a viewer (both night and day) at all distances from 3 meters to 60 meters (9.8 feet to 196.9 feet). The measured chromaticity coordinates of the LED pedestrian signal module shall conform to the chromaticity requirements of Section 5.3 and Figure C of the PTCSI standard.

The LED pedestrian signal module shall be man/hand overlay with outline figures for both the man and hand. Filled-in and/or side-by-side modules shall **NOT** be used.

The LED pedestrian signal module shall conform to all other specifications in this document, where applicable.

The LED signal module shall be rated for use in the ambient operating temperature range, measured at the exposed rear of the module, of –40°C to +74°C (-40°F to +165°F).

The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991, Section 4.7.2.1 and 4.7.3.2, for Type 4 enclosures to protect all internal LED, electronic, and electronic components.

The LED signal module lens shall be UV stabilized and scratch resistant.

Construction

The external lens surface for all vehicle signals shall be smooth, with no raised features, so as to minimize the collection of dirt, diesel smoke, and other particulate contaminates, and to facilitate periodic cleaning. External lens facets are not allowed. The LED signal module lens shall be UV stabilized and scratch resistant.

The LEDs shall be mounted and soldered to a printed circuit board. The LED signal module shall be watertight when properly mounted in an installed traffic signal housing. The LED signal module shall utilize the same mounting hardware used to secure the incandescent lens and gasket assembly and only require a screwdriver or standard installation tool to complete the mounting into an existing traffic signal housing built to the VTCSH Standard. Unit shall connect to existing electrical wiring utilizing **quick connect terminals.**

The LED signal module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply for the LED signal module shall be an integral part of the module. The LED signal module assembly shall weigh less than 5 pounds.

The assembly and manufacturing process for the LED signal module shall be designed to assure all internal ˜ ED and electronic components are adequately supported to withstand mechanical shock and vibration from .igh winds and other sources.

When necessary, modules shall have a prominent and permanent vertical indexing indicator, i.e., UP ARROW or the word UP or *TOP,* for correct indexing and orientation inside signal housing.
Each individual LED signal module shall be identified for Warranty purposes and clearly marked with:

- Manufacturer's name
- Date of manufacture.
- Unit serial number.
- Nominal operating voltage
- Power consumption in Watts

Environmental
The LED signal module shall operate over the temperature range of -40°C to +74°C (-40°F to +165°F). The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991, Section 4.7.2.l and 4.7.3.2, for Type 4 enclosures to protect all internal LED, electronic, and electronic components.

Electrical - Input
LED signal modules shall operate from a 60 +/-3 cycle AC line power over a voltage range from 80 VAC RMS ·o 135 VAC RMS. The control circuitry shall prevent current flow through the LEDs in the off state to avoid .ıy false indication as may be perceived by the human eye. The LED traffic signal module shall be operationally compatible with NEMA TS - 1 and NEMA TS - 2 *conflict monitoring* parameters.

Green LED signals shall not illuminate for input voltages below 35 VAC RMS and shall illuminate for all input voltages higher than 45 VAC RMS (voltage shall be regulated above 80 VAC RMS). This requirement is so that a green indication will not illuminate due to a "floating" or high-impedance neutral connection.

All wiring and terminal blocks shall meet the requirements of Section 13.02 of the VTCSH standard. Two secured, color coded, 914 mm (36 in) long 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +105°C (+221°F), are to be provided for electrical connection.

The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.6, NEMA Standard TS-2, 1992.

The individual LED light sources shall be wired so that a catastrophic failure of one LED light source will result in the loss of not more than 5 percent of the signal module light output. One LED failure in an LED Signal Module will not affect any other LEDs. In case of a failure of one LED, only one LED will be lost and not an entire string or module.

Power factor shall be 90% or greater, at nominal rated voltage, at 25°C (77°F), after 60 minutes of operation.

›tal harmonic distortion induced into an AC power line by an LED signal module, operated at nominal operating voltage, with a power consumption equal to or greater than 15 watts at 25^{0}C (77^{0}F) shall not exceed

20 percent. Total harmonic distortion induced into an AC power line by an LED signal module, operated at nominal operating voltage, with a power consumption less than 15 watts at 25°C (77°F') shall not exceed 40 percent.

The LED signal and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, subpart B, Section 15 regulations concerning the emission of electronic noise.

Optical - Output

The light intensity and distribution from LED signal modules shall as a minimum, meet the current ITE and CAL TRANS standards and measurement criteria for vehicle traffic control, even after a 30 minute warm up of continuous operation. Test data to verify the performance as meeting the ITE intensity requirements at +74°C (+165°F) shall be supplied from either of the following (or another certified **independent** test lab):

Lighting Sciences
7630 East Evans Road
Scottsdale, AZ 85260

ETL Testing Laboratories
3933 US Route 11
Cortland, NY 13045-0950

The light output of all LED vehicle signal modules shall also meet *ITE* specifications for chromaticity.

Fluctuations in line voltage over the range of 80 VAC to 135 VAC shall not affect luminous intensity by more than +/- 10 percent.

LED traffic signals shall be temperature compensated so as to maintain intensity at elevated temperatures. LED traffic signal shall be tested and documented by CAL TRANS as being in compliance with CAL TRANS intensity standards at elevated temperatures.

The LEDs shall not exhibit degradation of more than 30% of their initial light intensity following accelerated life testing (operating at +85°C (+185°F) and 85% humidity, for 1000 hours). AlGaAs technology is not acceptable.

Warranty

All LED traffic signal modules supplied shall be warranted for 5 years against manufacturing defects.

LED traffic signal modules shall be performance warranted to be in compliance with ITE and CAL TRANS minimum intensity standards, at +74°C (+165°F), after a period of three (3) years, measured at 117 volts AC.

Failures due to acts of God, abuse, and accidents are excluded from warranty coverage.

Vendor expressly warrants that all goods furnished shall conform to all specifications and appropriate standards, will be new, and will be free from defects in material or workmanship. Vendor warrants that all such goods will conform to any statements made on the containers or labels or advertisements for such goods and that any goods will be adequately contained, packaged, marked and labeled. Vendor warrants that all goods furnished will be

merchantable, and will be safe and appropriate for the purpose for which goods of that kind are normally used. Vendor knows or has reason to know the particular purpose for which City intends to use the goods, Vendor warrants that such goods will be fit for such particular purpose. Vendor's warranty shall run to City, its successors, and assigns. Vendor agrees to replace or correct defects of any goods not conforming to the foregoing warranty promptly, without expense to City, when notified of such nonconformity by City, provided City elects to provide Vendor with the opportunity to do so. In the event of failure of Vendor to correct defects in or replace nonconforming goods promptly, City, after reasonable notice to Vendor, may make such corrections or replace such goods and charge Vendor for the cost incurred by City in doing so

Ellsworth January Core Team Meeting

ATTENDEES:

Dave DeWeese - MCDOT
Bobbie Ohler - FCDMC
Art Allan - WGA
Rick Counts - Harris Cattle Co.
Scott Klinger - GM
Dan Mullen - GM
Fred Rustam - City of Mesa
Rick Campbell - Premier
Jeff Engelmann - Premier
Dan Frank - Dibble & Associates
Brian Fry - Dibble & Associates
Eden Britt - CH2M Hill
Tricia Brown - CH2M Hill
Tom Wolf - CH2M HILL
Ginny Schoonaert - CH2M Hill

COPIES: Chris Hassert - MCDOT
Mike Cline - WGA
Mitchell Foy - City of Mesa
Kelly Jensen - City of Mesa

FROM: Ginny Schoonaert

DATE: January 30, 2001

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made differ materially from your understanding please contact me at (480) 966-8188.

The Ellsworth Core Team Meeting was held on January 30, 2001, at CH2M HILL's office. Tom Wolf gave a brief project update. The primary purpose of this meeting was to present the channel alignment alternatives to the Core Team for review and discussion. Copies of the exhibits had been provided to each team member prior to the meeting.

Eden Britt provided an update on the environmental tasks. EcoPlan has begun the archaeological data collection and the Waters of the U.S. Delineations have been completed by Dibble and Associates. We have received a letter from the US Fish and Wildlife Service concurring that there are no endangered species in the area.

The topic of the dip and wash crossing north of Elliot Road was discussed. Brian Fry reported that the Elliot Road channel design project (by Wood-Patel) has been completed, and should be built by the time the Ellsworth Road project begins construction. The proposed cast in place pipe includes a 60-inch stub out to accommodate flow from the north (east side of Ellsworth). However, Brian will need to look at the hydraulics. It is intended that the Ellsworth design project will divert flow in a small channel from the wash crossing to the Elliot channel. Brian indicated that the existing wash north of Elliot may need to be maintained as a natural drainage if it is part of the jurisdictional waters. If so, a low flow culvert could be designed, with the more significant flows diverted to the Elliot channel. [NOTE: Subsequent to the meeting, it was determined that the wash crossing north of Elliot is not tributary to the EMF (and Colorado River), so it may not be necessary to maintain it. Eden and Brian will verify.]

Mesquite Canyon pipes under Ellsworth Road have already been constructed.

The Value Engineering Study was briefly discussed. Dave DeWeese is still debating whether the meeting should be held during the first part of March or at the 40% submittal. Dave suggested the following be included as part of the VE team: a representative from FCDMC, Bud Black with MCDOT, CH2M HILL's QC team Joe DiVito and Tony Bokich, the Project Manager from MCDOT Dave DeWeese, and a representative from the City of Mesa. The design team will be available during the VE Study to provide technical overviews and information.

Tricia Brown discussed the 10 channel alignment alternatives that had been developed to date. Preliminary costs were compiled and presented for Alternatives N-2, N-3, S-2, S-3, S-4, S-5, S-6, and Split-1. N-1 was determined to be a fatal flaw because of profile issues at the Powerline Floodway (PLF). Dave DeWeese commented that the PLF could be reconstructed to accommodate a lower channel profile from the south. Another issue with this alignment is that the Mesa Airpark has been platted and may be in the process of being sold. Obtaining right-of-way from them would be difficult and costly.

Alternative S-1 was determined to be a fatal flaw due to the right-of-way, archeological, and environmental issues associated with the alignment adjacent to the GRIC trust land. Right-of-way concerns included getting right-of-way from the GRIC or ASU. The likelihood of working with ASU appears more realistic. MCDOT will investigate the acquisition process. Environmental concerns include the City of Mesa Wastewater Treatment Plant, the Kinder-Morgan fuel tank, potential relocation of miscellaneous buildings and structures (possible historic or asbestos), an inactive Air Force landfill, and a Power Road crossing to reach the Rittenhouse Channel. Finally, the entire area is known to have a significant amount of archeological sites. Ecoplan's report should confirm this. Therefore, costs were not compiled for either Alternatives N-1 and S-1.

A revised Alternative N-1 exhibit and an Evaluation Summary Sheet were passed out. The Evaluation Summary Sheet included preliminary costs for the remaining alternatives. Costs included crossings along Ellsworth Road, three proposed crossings for WGA access points, and two proposed crossings at approximately 1-mile segments to provide access to adjacent properties. Tricia discussed each alternative and stated that the major cost of each alternative is for excavation. During discussion of the alternatives, the following comments were made by core team members:

- **Alternative N-3** follows the existing northern channel. Art Allan would like to see landscape on only one side of the channel. Brian Fry said that a 600-foot minimum radius would be required at the bends of channels **N-2** and **N-3**. A question was raised whether there is adequate right-of-way to accommodate the radius.

- Art Allan asked why **Alternatives N-2** and **N-3** do not assume right-of-way costs for WGA property. The IGA among MCDOT, the City of Mesa and FCDMC states that the City of Mesa will incur any costs for WGA right-of-way and it will not be charged to the project.

- Art Allan suggested that a concrete channel could be used for **Alternative N-2** once the channel is off of Ellsworth Road. If the concrete channel were used, WGA would landscape one side of the channel.

- Art Allan asked if the **Alternative N-3** channel could curve to the north sooner and match the PLF at the existing concrete channel. This alternative will be re-evaluated with the minimum radius for an earthen channel and a concrete channel.
- **S-1 Alternative** was determined to be a fatal flaw. It was recommended that a soil earthen channel could be used as opposed to a concrete channel. The channel alignment could be on WGA land north of the Pecos alignment. There is some concern over getting right-of-way from ASU in a timely manner. Bobbie Ohler will check with John Palmeri to confirm what would be involved. Dave also wanted to check with John before agreeing that the alternative should be considered a fatal flaw.
- Bobbie Ohler raised a question concerning an alignment on GM property. This goes back to a DCR alternative that would require the relocation of GM berms. Bobbie felt that the report should be complete and we should cost out every alternative, and keep this in since it is not fatally flawed. Therefore, new **Alternative N-4** will be included with the draft report similar to N-3, but will be considered on the east side of Ellsworth Road (on GM property requiring relocation of the berms).
- Bobbie Ohler and Dave DeWeese presented some new information based on recent FCDMC modeling in the area. The model shows that if the Ellsworth Road flows go north to the East Maricopa Floodway (EMF) there is insufficient capacity and flooding will occur at the EMF. Based on this information, FCDMC feels that a Pecos Road alignment would be favorable since this would negate the need for construction of the Ray Road Basin. WGA does not favor the Ray Road Basin due to its proximity to the airport's operations.
- Three landscape schemes were developed with varying densities. Preliminary costs at this point assumed medium density throughout the length of the alignments. Medium density landscaping is approximately $43,500 per acre and low density landscaping is around $38,000 per acre. **Alternatives S-2 through S-6** will be evaluated assuming a low-density landscape scheme where possible. It is expected that this will also decrease the size of the channel.
- **Alternative S-3** is the alignment presented in the WGA Master Plan.
- Rick Counts said that the ½-mile Pecos Road alignment has the support of the private developers and the Pecos Road committee (special interest), and is gaining acceptance by the City of Mesa. It is a strong possibility that City of Mesa will formerly adopt the ½-mile alignment.
- According to Rick Counts, **Alternative S-5**, which follows the ½-mile Pecos Alignment, is the preferred southern alignment by developers. A Master Plan is currently being developed for industrial/commercial properties that may incorporate access to WGA from the south.
- Rick Counts stated that the landowners along Pecos may require severance as part of their right-of-way negotiations if access is impacted.
- Dan Frank indicated that there are jurisdictional waters in the vicinity of **Alternative S-6**, but feels that the channel could be routed to avoid them.

- Bobbie Ohler mentioned that the right-of-way needed for **Alternative Split-1** would likely be greater than the other alignments. The northern channel will follow the existing drainage channel and would not have a right-of-way cost associated with it since it is on WGA property. Any costs required for right-of-way from WGA would be the responsibility of the City of Mesa per the IGA. The southern split will require approximately the same right-of-way as any of the southern alignments.
- Eden Britt asked about the potential for hazardous waste in the existing channel to the north. Art Allan indicated that the Air Force has done considerable testing in that area and has not found hazardous waste. He said that there is a significant amount of debris and concrete that will need to be hauled out of the channel. The concrete could be crushed and used as a resource such as base course for local roads.
- There was discussion regarding the capacity of the PLF with additional flows from Ellsworth Road. The scope of this project includes evaluating impacts to the PLF and preparing preliminary costs. The cost of increasing the capacity of the PLF should be included in the costs for the northern alignments.
- There was some discussion regarding what is expected as part of the design. Tom Wolf (and Dave DeWeese concurred) that the scope of work was based on the recommended plan shown in the DCR, and that the design scope would be reviewed once a preferred alignment is selected.

Conclusion

Alternatives N-1 and S-1 are assumed to be fatal flaws and will not be considered further in the evaluation. However, the status of Alternative S-1 may change if MCDOT determines that acquiring right-of-way from ASU will not cause significant delay to the project.

Alternatives N-2 and N-3 will be developed with a concrete and/or soil cement channel where it parts from Ellsworth Road across WGA property. Alternative N-3 will be routed to match the PLF at its existing concrete channel.

Alternatives S-2 through S-6 will be developed assuming low density landscaping instead of medium density.

The pros and cons of each alignment will be addressed with the next submittal, which will include the archaeological review. Eden Britt indicated that a field walk may be necessary once we get the results of the record search. Bobbie Ohler mentioned that they could use FCDMC on-call consultants to get the field walks completed so this project stays on schedule.

Dave DeWeese would like the evaluation to include a closed conduit pipeline along with the earthen, concrete, and soil cement channels.

Dave DeWeese posed the question of an on-site retention basin on the GM property. Scott Klinger indicated that in the past 25 years they have not seen the flows that are equated to a 100-year storm in that area. Scott does not think that GM would be willing to construct a retention basin to hold flows that they have not experienced. This is in light of the fact that GM is reducing their operations and is looking at selling the majority of their property.

Brian Fry pointed out that there are regional impacts that affect the area, not simply a localized basin on the GM property.

Unit costs for each of the channel sections (closed conduit, earthen channel with 6:1 and 4:1 slopes, and concrete channel with 2:1 slopes) will be developed. Engineering judgment and hydraulic feasibility will be utilized to select the preferred channel section for each alignment segment.

Tom Wolf said that the draft channel alignment report, with a preferred alignment, will be presented at the next core meeting. Preferably, consensus on the preferred alignment will be reached among the core team at the next meeting.

Rick Campbell presented the landscape schemes that he developed. He also presented sketches depicting the channel section and plan view for each of three plant densities.

Ellsworth Road CADD Meeting

ATTENDEES: Amy Jones, CH2M
Tricia Brown, CH2M
Kevin Wallin, Premier
Rick Campbell, Premier
Brent James, Dibble

COPIES: File

FROM: Tricia Brown

DATE: January 20, 2001

This meeting was held to coordinate the plan set production between CH2M HILL, Premier, and Dibble. Amy presented an overview of the FTP site, its structure, update frequency, and e-mail notifications. The structure was handed out to everyone (see attached).

The NDM system was explained for informational purposes and for discussion of potential issues between subs. Amy will be providing a list of the project logicals we are using to Dibble and Premier. They plan to set up their file structures similar to ours.

Amy will provide a key map to Dibble so their storm drain plans are cut the same way as the roadway/paving plans. Dibble will be responsible for cutting their own sheets to match the way CH2M HILL's are cut. Tricia will get a contact at MCDOT and find out about the landscape details/standards that MCDOT requires. [*Since the meeting, we have found out our contact is Abe Arollo 602-506-5469. MCDOT does not have any landscape details or standards. The landscape plan set will be prepared according to City of Mesa standards. This information has been forwarded to Rick Campbell at Premier.*]

Premier and Dibble will provide a sample sheet of each plan type they are preparing. These sample sheets are due to Amy Jones by January 24, 2001. Amy will compile the sample sheets and confirm that scales, etc. are appropriate.

The following points of contact will be used when corresponding about CADD issues:

Premier: Kevin Wallin, cc: Rick Campbell

Dibble: Brian Fry, Dan Frank, and Brent James

CH2M HILL Amy Jones

The next CADD meeting is tentatively scheduled for the beginning of April. This will get the group together again before the 40% plans are submitted.

Ellsworth Road Final Design
CAD Standards Meeting
January 17, 2001

FTP Site Organization

- General Information Directory Contents
- Consultant Specific Directory Contents
- Updating Files
  - Schedule
  - Notifications

CH2M HILL File Management Process Overview

- NDM
- Project Logicals

Topics for Discussion

- Key Map and Cut Sheet Production
  - Saving Full Path
- Use of Aerial Photos
- Primary Contacts

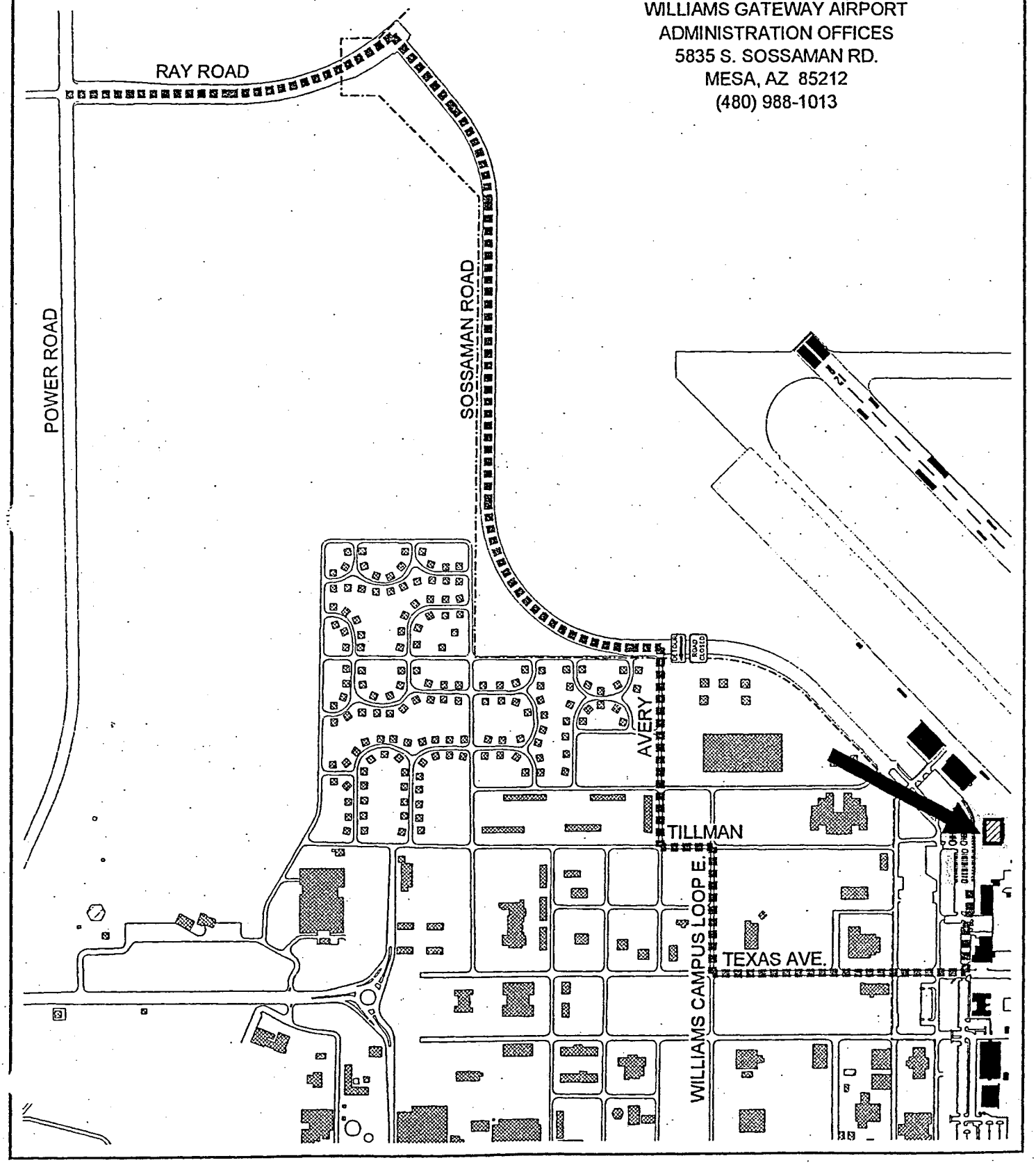
Open Discussion

CH2MHILL

WILLIAMS GATEWAY AIRPORT

DETOUR STREET MAP

WILLIAMS GATEWAY AIRPORT
ADMINISTRATION OFFICES
5835 S. SOSSAMAN RD.
MESA, AZ 85212
(480) 988-1013



Ellsworth Road 2nd Core Team Meeting - WGA Field Review - Revision

ATTENDEES:

Dave DeWeese /MCDOT
Chris Hassert /MCDOT
Bobbie Ohler /FCDMC
Valerie Swick /FCDMC
Dave Degerness /FCDMC
Kelly Jensen /City of Mesa
Mitchell Foy /City of Mesa
Art Allan /WGA
Mike Cline /WGA
Fred Ringlero / GRIC
Dan Mullen /GM
Rick Counts /CSC Counts
Tricia Brown /CH2M
Tom Wolf /CH2M
Eden Britt /CH2M
Brian Fry /Dibble & Assoc
Dan Frank /Dibble & Assoc
Rick Campbell /Premier

FROM: Tom Wolf

DATE: January 8, 2001

Please be advised of the following correction to the Stakeholder Meeting Minutes dated December 23, 2000.

Revision to Page 2, Number 6:

The City of Mesa's WWTP is still in service but will be taken out of service sometime this year once the new lift station is put into service. The City of Mesa is still waiting for SRP and Southwest Gas to supply service connections for the lift station, but this should be completed within a couple of months. The closure of the WWTP will then proceed.

Ellsworth Road 2nd Core Team Meeting - WGA Field Review

ATTENDEES:

Dave DeWeese / MCDOT
Chris Hassert / MCDOT
Bobbie Ohler / FCDMC
Valerie Swick / FCDMC
Dave Degerness / FCDMC
Kelly Jensen / City of Mesa
Mitchell Foy / City of Mesa
Art Allan / WGA
Mike Cline / WGA
Fred Ringlero / GRIC
Dan Mullen / GM
Rick Counts / CSC Counts
Tricia Brown / CH2M
Tom Wolf / CH2M
Eden Britt / CH2M
Brian Fry / Dibble & Assoc
Dan Frank / Dibble & Assoc
Rick Campbell / Premier

FROM: Tom Wolf

DATE: December 23, 2000

These minutes reflect the content of the subject meeting to the best of our understanding. Should the ideas expressed, actions to be taken, or any other notation made, differ materially from your understanding, please contact me at (480) 966-8188.

GENERAL

A field review meeting was conducted December 20, 2000, at Williams Gateway Airport (WGA) to review the issues and constraints of the north and south channel alignment corridors. The meeting consisted of the site visit followed by a general assembly to discuss the issues and constraints observed, as well as an initial discussion of the proposed channel landscaping schemes.

ACTION ITEMS

1. Eden Britt will contact Art Allan for access permit prior to field investigations for environmental evaluation.

2. Tricia Brown will provide prints of the WGA aerial photos to Dave DeWeese and a copy of the CDs to Kelly Jensen. Tricia will also return the CDs to Art Allen's attention at WGA.

3. Dibble and CH2M HILL will review existing survey data along the Powerline Floodway (PLF).

4. Premier will meet with Trish Shaffstall in mid-January to discuss concept alternatives for the channel landscaping.

SUMMARY

WGA hosted the field visit by providing the transportation. The north alignment corridor was reviewed first, with stops at the PLF (at the confluence of the existing channel across WGA), and a brief stop along the existing channel to the west of Ellsworth Road. The following issues/constraints were noted:

1. At the confluence of the existing channel and PLF, it appears that there is sufficient depth to accommodate the grade of a north alignment. The DCR recommended that the north channel alignment outlet to the PLF within the concrete section, east of the confluence. Survey and as-built information need to be reviewed to verify that outletting at this location would be possible.

2. Grade control structures along the PLF are approximately 24-inches high with minimal scouring observed. Signs of water in the PLF were observed no higher than roughly one-quarter of the channel depth.

3. Concrete rubble is used extensively as bank protection along the existing channel through the WGA property. Native grasses and weeds occur sporadically within the channel.

4. At its crossing with the existing channel, the access road is equipped with seven 60-inch diameter corrugated metal pipes with shotcrete inlets/outlets. Art Allen indicated that this was a temporary construction crossing.

The south alignment corridor was then visited with stops near the intersection of the Pecos - Sossaman alignments and at the Rittenhouse Channel – Power Road intersection. The following issues/constraints were noted and/or discussed:

1. There are numerous archaeological sites along the entire south side of the WGA property and in the Gila River Indian Community tribal trust land.

2. The US Weather Service Doppler radar station is located on the west side of Sossaman, one-quarter mile south of the current Pecos Road alignment.

3. There are overhead power lines (SRP) along the west side of Sossaman, south of Pecos, and along Pecos, from Sossaman to Power Road.

4. The fuel storage tank on Pecos, east of Power Road, belongs to Kinder-Morgan, and is no longer in service. A 10-inch fuel line extends from the tank to Power Road. When the Rittenhouse Channel was constructed, the fuel line was cut off from the south.

5. There is a water line, apparent from visible fire hydrants, in Pecos Road from the fuel storage tank to Power Road.

6. The existing wastewater treatment plant (WWTP) at Power Road and Pecos is no longer in service. Kelly Jensen indicated that there are old mercury seals in the trickling filters that need to be removed. A lift station will replace the WWTP, at its current location, will discharge into a 21-inch sewer line in Power Road.

7. Concrete rubble has been used as fill material in portions of the WGA property north of Pecos Road, between Hawes and Sossaman. There is also a closed Air Force landfill located south of the treatment plant and the fuel storage tank.

8. The Rittenhouse Channel has a series of grade control structures, which also protrude into the channel section, similar to that of a weir. East of Power Road, the channel flows into a settling basin approximately three acres in size. There is a 6-cell concrete box culvert (each cell is approximately 8-feet wide) under Power Road. Two of the cells accommodate low flows from the settling basin.

9. The City of Mesa has approved an alignment for Pecos Road from Ellsworth Road to just east of Sossaman. This approved alignment is roughly ¼-mile south of the Pecos section line. The Power Road Corridor Study was recently completed for MCDOT (Mike Smith P.M.) and presents three alternative alignments for Pecos Road between Sossaman and Power.

The field tour was concluded and attendees regrouped in WGA's Board Room for follow-on discussions. Rick Counts pointed out that Harris Cattle Company and Circle G properties are interested in a Pecos Road alignment that would be ½-mile south of the section line instead of the ¼-mile alignment approved by the City of Mesa.

Discussions were held regarding the Ellsworth Road channel section and general appearance. Rick Campbell presented photos of landscaped channels throughout the Valley and offered initial concepts to be considered by the team.

MCDOT

Ellsworth Road Final Design
Guadalupe Road to Germann Road

PROJECT INSTRUCTIONS

MCDOT Work Order Number: 68927

CH2M HILL Project Numbers:

161888.ED.01 - Project Management and Coordination	Tasks 1,6,7,8
161888.ED.02 - Preliminary Channel Evaluation	Task 2
161888.ED.03 - Drainage - Roadway and Channel Design	Tasks 3.2,3.10,5.5,5.11
161888.ED.04 - Geotechnical Investigation	Tasks 3.9,5.6
161888.ED.05 - Landscape Design	Task 4
161888.ED.06 - Survey and Mapping	Task 5.7
161888.ED.07 - Utilities	General Scope
161888.ED.08 - Roadway	Tasks 3.1,3.3 - 3.8

Project Overview

Maricopa County Department of Transportation (MCDOT) has entered into agreements with both the Flood Control District (FCDMC) and the City of Mesa to jointly fund the design and construction of the proposed Ellsworth Road and Drainage Channel improvements. This project is being administered by MCDOT.

The project consists of two primary work efforts:

- Drainage Channel Evaluation
- Ellsworth Road and Channel Final Design

Drainage Channel Evaluation. A preliminary engineering and alignment evaluation will be conducted to select a preferred alignment for the Ellsworth drainage channel outlet. The outlet extends from Ellsworth Road, near Pecos Road, to the East Maricopa Floodway (EMF). The evaluation will identify alignment and cross section alternatives in two possible corridors (north and south of Williams Gateway Airport [WGA]). Environmental and economic impacts will be assessed and evaluation criteria established for determination of the preferred alternative. This alternative evaluation effort is expected to be performed within the first four months of the project. Several meetings with the agencies and stakeholders are expected and will result in roughly a 100-page document.

Ellsworth Road and Channel Final Design. Upon selection of the drainage channel alignment, final design of the roadway and channel will be conducted. The design includes improvements to Ellsworth Road from an existing two-lane rural roadway to a four-lane and six-lane urban roadway with raised median and signalized intersections. The roadway project limits extend from Germann Road to Guadalupe Road; the majority of which is within Mesa City limits.

The Ellsworth Road Corridor Study was completed in December 1997, and the DCR was completed in October 1999. Both studies will be used as the basis for channel alignment selection and final design of the roadway. The Ellsworth Road DCR study shows the limits of both the four-lane and six-lane sections.

WGA has recently prepared a concept master plan of the airport facility, showing future commercial development and terminal facilities on the east side of the airport. Additionally, WGA completed the overlay and extension of its center runway in late 1999. The extension of the runway towards Ellsworth Road and construction of a 50:1 glide slope creates minimum clearance over Ellsworth Road at Pecos Road. The planned expansions of WGA are very important and will have significant impact to the channel alignment selection as well as the roadway design. Right-of-way will be required from WGA.

Ellsworth Road fronts the General Motors (GM) Proving Grounds from Pecos Road to Elliot Road, a distance of four miles. The latest, but unconfirmed, information is that GM intends to sell the property by 2002. This could have a significant impact on the design of Ellsworth Road, but is contingent upon the City of Mesa's position regarding future development plans for the property. Discussions with the City of Mesa will have to take place in the near future to determine our approach to the design of Ellsworth Road with respect to the GM property.

Final design and preparation of construction documents (PS&E) is expected to be completed in approximately 12 months from MCDOT;s acceptance of the channel evaluation study. Plans will be prepared in metric format following MCDOT standards, and using a combination of MCDOT and City of Mesa design criteria (defined in the DCR, but needs to be reviewed). The plans will consist of approximately 300 drawings and 150 sheets of cross sections.

Team Organization

The project team is shown in the organization chart presented in Figure 1. Key project staff and subconsultants have been identified and are named. Some additional staff may be assigned to work on specific elements during the project with the approval of the Project Manager or Task Leads. Task leaders will be responsible for their respective scope, schedule, and budget, including staff assignment and subconsultant oversight.

The relationships of the funding agencies and project stakeholders are presented in Figure 2.

Figure 1. Project Team Organization Chart

Figure 2. Ellsworth Road Stakeholders

Task Descriptions

The following describes general task assignments for the project team. However, each project team member is expected to carefully review the contract Scope of Work, and discuss the scope, schedule, and budget with the task lead and PM to obtain a full understanding of the work involved. The contract Scope of Work consists of a General portion and a Detailed portion, both of which are included as Attachment A.

01 Project Management and Coordination

Task Lead; Tom Wolf. This task consists of the overall management and coordination of the project to ensure the expectations of the client are met. The management of project scope, schedule, and budget will be conducted and reported on a regular basis. In addition, this task includes project startup, project closeout, organization and management of project files, scheduling, monthly invoicing and reporting, staff meetings, and client meetings.

Quality control and quality assurance will also be managed as part of Task 1. **Joe DiVito** will be responsible for disseminating calculations, plans, etc. for appropriate reviews as needed during the design review process. A copy of the Project Quality Plan is included as Attachment B.

Meeting minutes, graphics, progress reporting and coordination will be included as part of this task. Project Assistant, **Ginny Schoonaert**, will attend staff meetings, compile, and distribute meeting minutes to the project team, maintain project files, and assist in the invoicing process. Additional coordination and tasks will be performed at the direction of the PM and Task Leads.

Tom Wolf, Tricia Brown, and **Brian Fry,** will attend and participate in the Value Engineering program conducted by MCDOT.

02 Preliminary Channel Evaluation

Task Lead; Tricia Brown. **Tricia Brown** will be responsible for the daily oversight and coordination of the Pre-Design Alternatives Analysis study and report. She will be the focal point for coordinating the efforts among the disciplines, including environmental, drainage (Dibble), Landscaping (Premier) and site civil.

Up to ten alternatives will be developed and analyzed. The two corridors are identified as the South Perimeter corridor along the south side of WGA, and the North Perimeter corridor which is on the east and north sides of WGA. Channel types will consist of earthen, concrete, and closed conduit (pipe).

CH2M HILL will lead in the evaluation study and preparation of the report. Tasks include environmental reviews, alternative development, evaluation criteria,

alternative selection process, conducting meetings, and report preparation. **Dibble and Associates** (Dibble) will assist by providing hydrologic and hydraulic analyses as defined in their Scope of Work. **Dibble** will also assist in other defined efforts such as development of the alternatives, scour analyses, effects of landscaping in channel, channel costs and right-of-way determination. **Premier Engineering** (Premier) will provide initial landscaping concepts to be considered with the channel alternatives, and refine the landscaping concepts for the preferred channel alternative. Concepts will be for a basic landscape plan and two enhanced plans. Costs of the landscaping options will also be provided.

Meetings identified for the study effort include a field meeting to identify channel corridors, a meeting to discuss preliminary findings and landscaping alternatives, and a meeting to discuss hydrology results and to finalize evaluation criteria. **Dibble, Premier** and **CH2M HILL** will have representatives in attendance at each meeting.

Tricia Brown will provide coordination with **Dibble** to determine right-of-way acquisition needs for each viable alternative. This will include identifying current ownership and cost estimates per acre of land based on available data.

Eden Britt will be responsible for the preparation of an Environmental Overview discussing known hazardous materials, cultural resources, and biological species in the project area.

Eden Britt will be responsible for preparing the 404 permit application and coordinating with MCDOT during the submittal process. MCDOT is responsible for submitting the 404 permit to the Army Corps of Engineers.

Tricia Brown will lead in identifying requirements and costs for any permits necessary to construct each of the viable alternatives.

03 Drainage – Roadway and Channel Design

Task Lead; Brian Fry / Dibble. **Brian Fry** will be responsible for the overall roadway and channel drainage designs. The DCR proposes the use of a storm drain system to collect runoff within the right-of-way and outlet flows to the proposed flood control channel selected in Task 2. Drainage plans will be prepared using metric units. The Drainage Report is to be prepared with metric units as well as English units in parentheses.

Tom Wolf, Tricia Brown, and Brian Fry will coordinate with the stakeholders and each other to keep current on issues and developments that may affect final design of Ellsworth Road and the channel. **Tricia Brown** will be responsible for obtaining as-built drawings from Scott Vogel relating to the Elliot Road drainage features and design. These drawings will be incorporated into the final design.

Deliverables provided by **Dibble** include storm drain plans, profiles and details, culvert schedules, flood control channel plans and profiles, culvert crossings, channel typical sections, channel details, and channel cross-sections.

File transfer and coordination between CH2M HILL and its subconsultants is discussed in a later section.

04 Geotechnical Investigation

Task Lead; Dave Allard. **Dave Allard** will be responsible for overseeing the geotechnical investigation and pavement designs. **Speedie and Associates** will conduct the field investigation and prepare a report summarizing their findings.

The geotechnical investigation will be conducted to determine the existing pavement section, subgrade conditions, and characteristics of borrow material. Four pavement sections are to be developed and costed for review as part of the Value Engineering Study. A recommendation for a Superpave mixture design and a pavement structural design based on current ADT and Year 2020 ADT, both provided by MCDOT, will be included.

Additional items included in this task are approximately 34 borings and laboratory testing along the proposed roadway alignment; additional investigations along the proposed flood control channel; and up to six laboratory corrosion tests including measurement of chlorides and sulfates.

The Geotechnical Investigation is to begin as soon as possible. However, the project status and issues are to be reviewed with the project team before lab testing begins to optimize the benefits of the lab tests for the pavement designs.

05 Landscape Design

Task Lead; Jeff Engelmann/ Premier. **Premier** will be responsible for developing the conceptual landscape plan (in Task 02 above) and the final construction plans, specifications, and estimates for landscaping and irrigation along Ellsworth Road and the Ellsworth Road Flood Control Channel. The raised median throughout the project area will receive no landscaping treatment. However, the raised median will be equipped with pipe sleeves for future irrigation /utility needs.

Premier will make a presentation of their plan to address details of the landscape features, hydraulic performance of the channel, and to receive comments and direction from the stakeholders prior to beginning the final design to avoid unnecessary rework.

Deliverables that are included in this task include channel landscaping plans and the irrigation plans for both the roadway (back of curb) and the channel. **Premier** will be required to coordinate with **CH2M HILL** and **Dibble** during the landscape design and preparation of PS&Es.

File transfer and coordination between **CH2M HILL** and its subconsultants is discussed in a later section.

06 Survey and Mapping

Task Lead; Larry Maldonado / Project Engineering Consultants (PEC). **PEC** will be responsible for the coordination, development, and delivery of the aerial mapping. **PEC** will set the survey control based on Collins-Pina survey monumentation presented in the Corridor Study and DCR. **PEC** will meet with **Tricia Brown** and **Tom Wolf** prior to performing field work to review existing survey information and to identify other survey data that may need to be obtained.

The aerial photography and mapping of the project area will be flown by **Kenney Aerial Mapping**. Low level aerial photography will be taken for mapping the project and use in the final design of the road and channel. High level color photography will be taken for delineation of jurisdictional waters. Delineation will be performed by **Dibble**. Mapping of the roadway is to begin as soon as possible. Mapping of the channel will depend on the selection of the final alignment.

Additional field surveys may be necessary once the channel alignment is determined. Coordination with **CH2M HILL** is very important to maximize the benefit of the field survey efforts.

07 Utilities

Task Lead; Tricia Brown. This task includes researching and updating the existing utility inventory of the project area. **Mario Brown** will be responsible for utility research, obtaining available utility maps, and a field reconnaissance of above ground utilities. Tasks include submitting plans to affected utility companies for their review. The **MCDOT Utility Coordinator** will track the utility company comments and coordinate with **CH2M HILL**.

Where utility relocations are deemed necessary, the **MCDOT Utility Coordinator** will be responsible for contacting the utility company and coordinating the process.

MCDOT will provide pothole information where elevations of existing utilities are necessary to prevent conflicts with proposed design. **The TBE Group, Inc.** will provide additional underground utility locating services that are necessary and identified by **CH2M HILL**.

Deliverables included in this task are utility relocation plan sheets with associated cost estimates and existing utility locations on the plan and profile sheets. **Mario Brown** will coordinate all known utility locations with **Laren Livingston** for inclusion in the roadway design plans. Plan and profile sheets will include the type, size, location and elevation of the utilities.

08 Roadway

Task Lead; Tricia Brown. The existing 28-foot asphalt concrete roadway will be reconstructed to a four-lane rural principal arterial roadway with a raised median, except that a 47-foot half width urban principal arterial will be constructed between Pecos Road and Elliot Road (eastern half) and from Pecos Road to the future Ray Road alignment (western half).

Tricia Brown will be the task leader and responsible for overall preparation of the roadway plans and coordination with the other disciplines. **Mario Brown** and **Laren Livingston** are the design engineers and will produce the roadway design deliverables. These deliverables include typical sections, summary/quantity sheets, earthwork summary, roadway plans and profiles, roadway details, access drive plans and profiles, and roadway cross sections. **Amy Jones** and **Anne Gibbons** will provide technical assistance during plan preparation. Definition of their involvement will be made later.

Mike Kies will act as task leader for the traffic portion of the project. **Mike** and **Christine Warren** are responsible for preparation of the intersection layout details, signing and striping sheets, and traffic control. **Christine** will prepare the traffic drawings under Mike's oversight. **Amy Jones** and **Anne Gibbons** will provide technical assistance during plan preparation. Definition of their involvement will be made later.

Street lighting and signalization will be designed by **Scott Asher** and **Christine Warren**. **Scott** will perform the lighting and electrical designs. **Christine** will obtain City of Mesa requirements and provide the daily coordination with **Scott**, so that his effort can be minimized. **Christine** will prepare the lighting and signal drawings under Scott's oversight. Lighting is required for six major intersections. A Lighting Analysis Report will be prepared to document pole spacing, heights, and lighting levels for the typical street section (ultimate condition) and the section under the WGA glide slope. Signalization is required for three intersections; Germann, Ray, and Elliot.

Mario Brown will be responsible for maintaining the design calculations notebook. All calculations shall be provided to **Mario** for inclusion at the 100% submittal. The design notebook will be divided into the major disciplines. **Tricia Brown** will provide a list of calculations that are to be documented and included in the calculations notebook.

Tricia Brown will be responsible for preparing the final cost estimate and special provisions as well as compiling the 100% final PS&E submittal. **Willie Paiz** will assist in developing cost estimates. Quantity estimates will be provided by the respective design engineers in each discipline. This will be detailed by Tricia in a later memo.

Electronic File Coordination

Coordination of electronic files between project team members and subconsultants will be managed by **Laren Livingston**. A secure FTP site will be established for this project and user instructions and privileges (access rights) will be distributed once it is up and running. All communication, questions, coordination shall be through **Laren Livingston** to prevent confusion and / or loss of design changes, etc.

The following items shall be adhered to by the entire project team to ensure that standards, seed files, design changes, etc. are consistent. An expanded explanation will be provided in the forthcoming instructions on the use of the FTP site.

- Use **MCDOT** CADD standards (http://www.mcdot.maricopa.gov/FCG).
- All team members will be responsible for ensuring that they are using the current **MCDOT** seed files, resource files, cell libraries, etc.
- Any deviation from the **MCDOT** CADD standards shall be approved by **CH2M HILL** and additional level assignments shall be communicated to **CH2M HILL** and other members of the team that may use the affected file.
- Tie drainage channel stationing to roadway stationing; channel stationing shall be labeled in such a way as to be easily distinguished from roadway stationing.
- Drainage plan sheets will be cut separately from roadway sheets, but where possible will have the same match lines as the roadway plan sheets.
- **CH2M HILL** will create a project folder on the company's FTP site (ftp.ch2m.com), which will allow members of the team to pull and place files. The user name and password needed to access the site will be distributed after the project folder has been created. When a significant change has been made to a file that may affect another team member's work, the owner of the file shall notify the affected team members. This procedure should help to ensure that all members of the team are working with files that contain pertinent updates.
- The project sheet borders will be created by **CH2M HILL** and will be available on the FTP site.

Managing Change

This project is subject to a variety of uncertainties and dynamic conditions. Reacting to 'what-if' scenarios, or difficulties and/or delays in reaching consensus on alternative selection are just two ways in which the project can quickly get out of hand. While negative change may threaten the balance of scope, cost or schedule, positive change can enhance value and/or save money. Therefore, success in project execution requires a systematic, proactive approach to controlling potential changes. Open communication at all levels is critical to ensure that the manner in which we deal with change is effective.

Types of change to be considered include:

- *Scope* - The tasks to be performed, the interdependencies between them, or the method by which the tasks are executed;
- *Time* - The amount of time needed to execute the work or task;
- *Cost* - The expenditure required to complete the work;
- *Quality* - The accuracy of performance and outcome of tasks. Meeting MCDOT's expectations and needs; and
- *Personnel* - The types and amount of expertise needed to perform a task.

To maintain an effective balance among these factors, it is necessary for the entire project team to be sensitive toward potential change issues, and to bring them to the team's attention as soon as possible. This is best accomplished by frequently reviewing and reporting progress and future task execution. The **PM** will perform a routine, proactive monitoring of the project workplan by comparing current task execution to the originally planned scope, budget, schedule, and resources. This will be done through our regular project meetings. Adjustments that are made will be brought to **MCDOT's** attention with one or more proposed alternatives for dealing with the change.

Managing change will be the **PM**s responsibility, but requires timely, accurate input from all team members, including subconsultants and **MCDOT**. Changes will be tracked and monitored using a simple spreadsheet/log model in conjunction with a Change Notification Memorandum. This memorandum will present a summary of each change (description, background, originator, etc.), its effects on the project scope, schedule, and budget, and the Consultant's recommendations as to its benefit/appropriateness. Acknowledgement by **MCDOT** will be requested prior to reacting to such change conditions. An example of the Change Notification Memorandum is under development.

Issue Resolution Process

Issue is identified and presented to CORE Team	⇨	**Recommendations** made to Funding Partners by Consultant	⇨	**Decision** made by Funding Partners. Escalation if required	⇨	**Direction** provided to Consultant by MCDOT

- **Issues** may be raised by any of the **CORE Team** members. They should be presented with an explanation of the concern, and a proposed course of action. Issues raised in a formalized manner can be properly documented and tracked by the Consultant.

- **Recommendations** will be made by the Consultant, and will address the impacts to the project. Consultant will advise **MCDOT** of any change in design contract (scope, schedule or budget) as a result of implementing the proposed course of action.
- **Decisions** will often times be made through discussion with the Funding Partners. This can be accomplished in separate forum, by e-mail, telephone, or other method, and should be lead by **MCDOT**. It is very important that decisions are made in a timely manner, and an escalation process should be defined, naming individuals and time commitments for making decisions.
- **Direction** will be given to the Consultant by **MCDOT**.

Project Team

MCDOT

Dave DeWeese, Project Manager / (602/506-8626)
daviddeweese@mail.maricopa.gov
Chris Hassert, Assistant Project Manager / (602/506-6167)
chrishassert@mail.maricopa.gov
Renate Lewis, Contract Administrator / (602/506-8647)

CH2M HILL (480/966-8188)

Tom Wolf, Project Manager
[Cell: 602-885-0523]
twolf@ch2m.com
Tricia Brown, Task Leader/ Roadway Design
tbrown3@ch2m.com
Laren Livingston, Project Engineer
llivings@ch2m.com
Mario Brown, Design Engineer
mbrown3@ch2m.com
Mike Kies, Task Leader / Traffic
mkies@ch2m.com
Scott Asher, Design / Lighting & Signals
sasher@ch2m.com
Christine Warren, Project Engineer
cwarren@ch2m.com
Amy Jones, Design Engineer
ajones1@ch2m.com
Eden Britt, Task Leader / Environmental
ebritt@ch2m.com
Dave Allard, Task Leader / Geotechnical
dallard@ch2m.com
Ginny Schoonaert, Administrative Assistant

gschoona@ch2m.com
Anne Gibbons, CAD Technician
mgibbon1@ch2m.com
Ryan Mack, Project Accounting

Dibble & Associates (602/957-1155)

Brian Fry, Project Manager (Drainage)
bfry@dibblecorp.com

Premier Engineering (602/829-6000)

Jeff Engelmann, RLA (Landscape Architect)
jengelmann@pre-engr.com

Project Engineering Consultants (602-906-1901)

Larry Maldonado, Project Manager (Survey)
larry@pecaz.com

TBE Group, Inc. (602/749-8550)

Dave Huscher, Utility Location
dhuscher@tbegrp.com

A comprehensive listing of other project contacts (including agency representatives) is maintained and kept in the project files (P:\161888\PM\Correspondence\Contacts).

Communications and Record Keeping

Email

MCDOT, CH2M HILL and their **subconsultants** utilize e-mail and its use is encouraged for daily communication. However, e-mails should only be prepared and sent by the task leaders or the PM. Other task leaders should be copied as appropriate (when in doubt copy the other task leaders). The PM is to be copied on all e-mail correspondence between MCDOT and the Project Team.

E-mail should not take the place of written correspondence when addressing contractual matters.

Project Files

Project Files will be set up electronically and in hard copy. The electronic files will be set up in the same manner as the paper files.

Electronic project file folders are currently set up and are listed below. Task Leaders have the prerogative and are encouraged to set up sub-folders as necessary for their individual Tasks. This however, should be coordinated with the project assistant and PM just to maintain the overall project organization.

P:\161888\

PM - Project Management
- Agreement (SSB)
- Correspondence
- Invoices
- Meetings
- Quality Control
- Subconsultants

CH - Channel Alignment Study
DR - Drainage
GT - Geotechnical Investigation
LS - Landscape
RD - Roadway Design
SM - Survey and Mapping
UT - Utilities

A paper copy of all final deliverables and calculations will be produced. The project files will be located in the transportation group's project shelf. Filing will be done by the **project assistant** or task leader after the PM has reviewed the material.

Records of pertinent telephone conversations are to be prepared immediately following the conversation and maintained in the project file.

Schedule

The attached project schedule was submitted as part of the proposal and will be updated as needed. The project schedule is included as Attachment 3.

Budget (labor hours)

Labor and expense budgets (CH2M HILL costs) are located in the project file and should be reviewed by the task leads.

Invoices

Invoices must be promptly and accurately submitted to expedite the approval process. **CH2M HILL** will submit monthly invoices to **MCDOT** by the 10th of each month for the previous calendar month's work. **Subconsultant** invoices are to be submitted to the address shown in the subconsultant agreement, attention Kim Russart, and must be received by the 5th of each month to ensure they are included in the current billing cycle.

A separate meeting will be scheduled in December 2000 to discuss the specific invoicing process and **MCDOT** requirements. Attachment D presents a sample invoice that is currently under development and review. When approved, an electronic copy will be provided to assist subconsultants in the preparation of their invoices.

ATTACHMENT A

CONTRACT SCOPE OF WORK

ATTACHMENT B

PROJECT QUALITY PLAN

ATTACHMENT C

PROJECT SCHEDULE

ATTACHMENT D

EXAMPLE INVOICE

Sign In List
Core Team Ellsworth Road Project

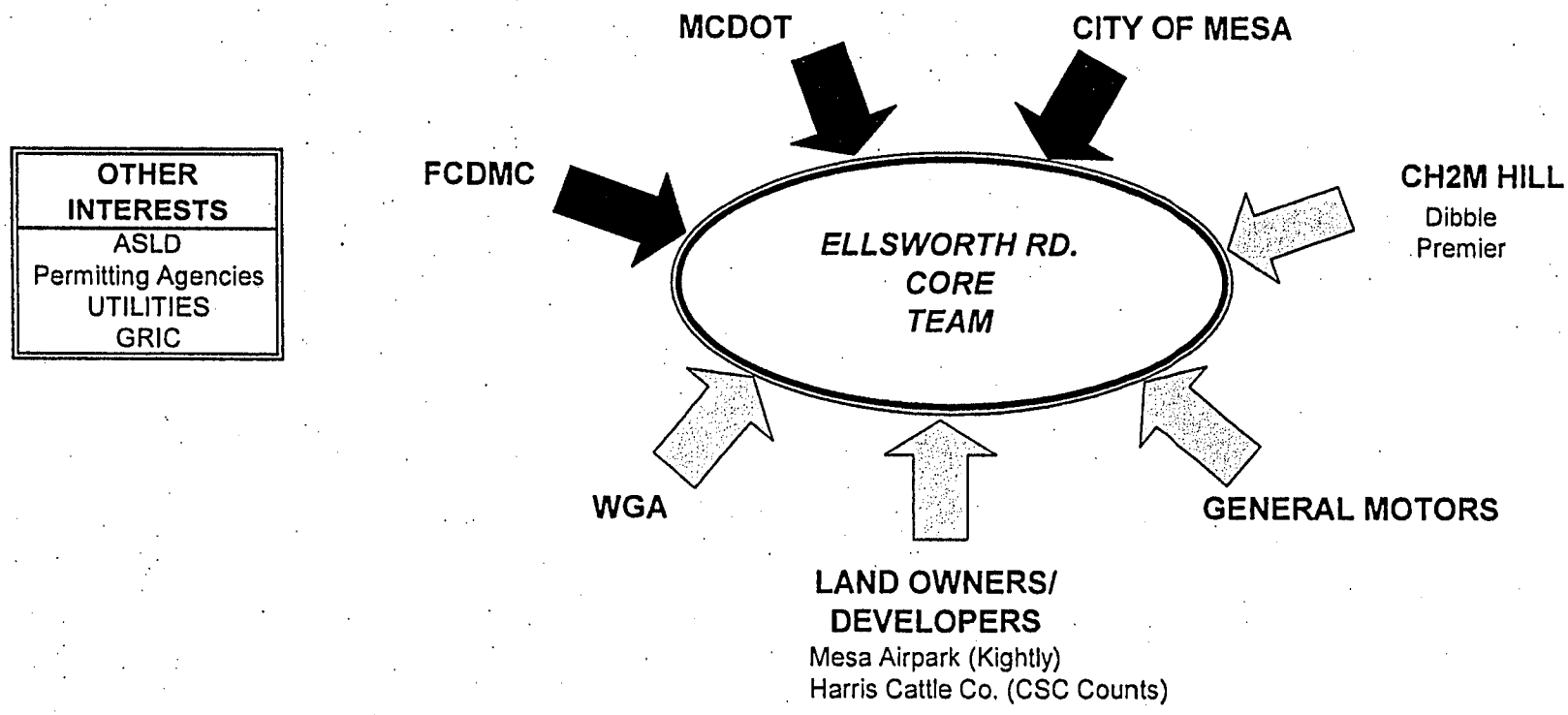
Final Design

Ellsworth Road - Germann Road to Guadalupe Road

Work Order #68927

Name	Company/Organization	Phone Number	Fax Number	E-Mail Address	In Attendence?
DeWeese, Dave	MCDOT	602-506-8626	602-506-5969	daviddeweese@mail.maricopa.gov	
Hassert, Chris	MCDOT - Technical	602-506-6167	602-506-5969	chrishassert@mail.maricopa.gov	
Swart, Nicolaas	MCDOT - Traffic	602-506-0599	602-506-8758	nicolaasswart@mail.maricopa.gov	
Rose, John	MCDOT - Survey				
Phillips, Joe	MCDOT - Geotechnical	602-506-1317	602-506-7239	jphillips@mail.maricopa.gov	
Palmeri, John	MCDOT - ROW				
Sutton, Olin	MCDOT - Utilities	602-506-5992	602-506-2818	olinsutton@mail.maricopa.gov	
McMullen, Kelly	MCDOT - Environmental	602-506-8091	602-506-4882	kellymcmullen@mail.maricopa.gov	
Crowe, Roberta	MCDOT - Public Involvement				
Ohler, Bobbie	FCDMC	602-506-2943	602-506-8561	bao@mail.maricopa.gov	
Jensen, Kelly	City of Mesa	480-644-4254	480-644-3992	kelly-jensen@ci.mesa.az.us	
Kramer, Jeff	City of Mesa	480-644-5586	480-644-3992		
Foy, Mitchell	City of Mesa	480-644-3556	480-644-3130	mitchell-foy@ci.mesa.az.us	
Cline, Mike	Williams Gateway Airport	480-988-1013	480-988-2315	mcline@flywga.org	
Klinger, Scott	GM Proving Grounds	480-827-5109	480-827-5965	scott.klinger@gm.com	
Mullen, Dan	GM Proving Grounds	480-827-5130	480-827-5905	daniel.mullen@gm.com	
Counts, Rick	Harris Cattle Co.	602-955-7097	602-955-7169	scienceaz@aol.com	
Hulme, Lenny	City of Mesa	480-644-3121	480-644-3909	lenny-hulme@ci.mesa.az.us	
ank, Dan	Dibble & Associates	602-957-1155	602-957-2838	dfrank@dibblecorp.com	
Engelmann, Jeff	Premier Engineering	480-829-6000	480-829-6016	jengelmann@pre-engr.com	
Campbell, Rick	Premier Engineering	480-829-6000	480-829-6016	rcampbell@pre-engr.com	
Allan, Art	Williams Gateway Airport				
Wolf, Tom	CH2M Hill	480-377-6205	480-966-9450	twolf@ch2m.com	
Brown, Tricia	CH2M Hill	480-377-6225	480-966-9450	tbrown3@ch2m.com	
Schoonaert, Ginny	CH2M Hill	480-377-6281	480-966-9450	gschoona@ch2m.com	
Degennes, Dave	FCDMC - Hydraulics				
Lopez, Michael	FCDMC - Engineering				
Stevens, Bob	FCDMC				
Vogel, Scott	FCDMC				
Hanson, Bill	City of Mesa				
Sunstair, Dan	City of Mesa				

Figure 1 - ELLSWORTH ROAD STAKEHOLDERS



Ellsworth Road Project Team Kick Off Meeting

ATTENDEES:

Rick Campbell (Premier), Jeff Engelmann (Premier), Mike Kies, Dan Frank (Dibble), Brian Fry (Dibble), Laren Livingston, Mario Brown, Tricia Brown, David Allard, Chuck Gardiner (PEC), Chris Hassert (MCDOT), Eden Britt, Christine Warren, Willie Paiz, Travis Bix (TBE), Tom Wolf

INVITED BUT NOT IN ATTENDANCE:

Amy Jones, Dave Huscher (TBE), Dave DeWeese (MCDOT), Larry Maldonado (PEC), Anne Gibbons, Scott Asher

FROM:

Ginny Schoonaert

DATE:

November 29, 2000

Attendees introduced themselves. Tom Wolf identified project team members not in attendance. They include Scott Asher/DEN who will be coordinating lighting and signal design with Christine Warren, and Ryan Mack/BOI who is the Project Accountant.

Tom Wolf gave a brief overview of the project and identified the project team. This final design project is preceded by a Corridor Study and DCR along Ellsworth Road from Baseline Road to Germann Road. The limits of this project extend from Guadalupe to Germann Roads along Ellsworth Road.

Project Instructions were distributed and reviewed. Tom stated that the success of this project relies heavily on team members recognizing their roles and maintaining open communication. The project team is a group of very qualified people who are expected to take responsibility for their tasks.

This project will be completed in two phases. The first phase is an evaluation of the Ellsworth Road drainage channel, which includes looking at 10 different alternatives, varying in horizontal alignment and channel type. The second phase is the final design of the roadway, which includes plan preparation, cost estimates, and special provisions.

MCDOT, FCDMC, and City of Mesa are funding stakeholders in this project. Non-funding stakeholders include General Motors Desert Proving Grounds (GM), Williams Gateway Airport (WGA), Harris Cattle Co (Harris), and Mesa Air Park.

Discussion was held regarding the closing and pending sale of the GM property along the eastern portion of Ellsworth Road. GM representatives indicated that their operations would cease in December 2002. Pending sales of the land are undetermined and may consist of the sale of specific parcels, not necessarily the entire property.

Flooding conditions along Elliot Road and at the GM property were mentioned. GM indicated that they currently have a large retention basin in the center of their plant that collects flows from the east.

WGA plans to extend their north runway 550 feet. Lighting this area within the height limits of 15 feet will be a challenging part of this project. This could have serious impacts to

Ellsworth Road. The project will also include signalized intersections at Germann, Elliot and Ray Roads.

There are several issues to be addressed by the Core Team before major design decisions can be made. Building consensus among the Core Team during the initial stages of design will prevent rework and keep the project on schedule and budget.

The geotechnical field work should get started right away. Soil borings along Ellsworth Road will be used to determine the pavement, which is to be presented at the VE study scheduled in February.

Jeff Engelmann/Premier suggested contacting WGA to get their input on the channels and if they will be turf or not. Most preferable would be desert for low maintenance.

PEC will do the survey and aerial mapping. This should take about a week and a half. They need to contact GM and WGA for permission to set panels. This should all be done sometime in December.

Eden Britt stated that the environmental effort will be executed in two parts; the initial assessment and the 404 Permit application. The Permit application won't be submitted until design plans are at the 70% level.

The COM needs to be contacted to find out their requirements for light poles. A question was raised about the location, either in the median or on the roadside.

CH2M HILL will go through existing utility information collected during preparation of the DCR and make sure it is complete. Premier Engineering will need information of existing utilities and the proposed locations of light poles, etc. early on in the design process.

Joe DiVito will be coordinating the quality control reviews. He will need to identify individual reviewers for the various disciplines. Tom will discuss the QC review effort further with Joe.

There will be monthly project team meetings. There will also be 12 Core Team meetings including FCDMC and COM. Ultimately there will be meetings every other week.

Laren Livingston discussed the process that will be used to maintain uniformity of design files between team members. Laren will be the point of contact among team members for sharing, revising, updating electronic files. This will prevent confusion and provide a focal point for everyone to coordinate their work products.

Scope changes need to be managed properly. Anything that changes from the scope should be tracked. As part of this process, it is proposed that change notification memorandums be written and signed by MCDOT. This will allow the project team to track changes and document scope creep.

Daily correspondence should be done by e-mail. E-mails pertaining to design issues, project decisions, etc. will be printed out, and a hard copy will go into the project files. E-mails to MCDOT or e-mails relating to scope will be copied to Tom Wolf. Any letters or hard correspondence going to MCDOT will be reviewed and signed by Tom Wolf.

Tom Wolf requested that the sub-consultants provide a monthly progress report with their invoices. These progress reports will be incorporated into his monthly progress reports that go to MCDOT. The subs reports can be sent directly to Tom via e-mail.

Archiving of files should be done as each task is closed. Original calculations shall be forwarded to Mario Brown for inclusion in the calculation notebook.

Sub-consultant agreements will be sent out as soon as Tom Wolf gets the Notice to Proceed from MCDOT.

Gregg A. Creaser, P.E.
Brett P. Creaser, P.E.
Donald L. Cornelison, P.E.
Steven A. Griess, P.E.
Timothy J. Rheinschmidt, R.G.
Keith R. Gravel, P.E.

August 3, 2001

Mr. David Allard
CH2M HILL
1620 W. Fountainhead Parkway Suite 550
Tempe, AZ 85282-1843

RE: Project No. 010034SA
Supplemental Drainage Channel
Ellsworth Road
Germann to ½ Mile N. of Elliot
Mesa, AZ

Dear David:

As requested, Speedie & Associates conducted a supplementary investigation of a portion of the subject site along the proposed drainage channel. The purpose of this investigation was to provide additional information for the referenced project, No. 010034SA. This letter report presents our findings.

On June 6, 2001, seven (7) soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with truck-mounted CME 55 drill rig utilizing 7-inch diameter hollow stem flight augers. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location.

As the logs indicate, subsoil conditions consist of interbedded composites of clays, silts and sands with subordinate amounts of gravel and with varying degrees of calcareous cementation to depths of up to 6.4 meters (21 feet) below existing grade. Standard Penetration Test values generally range from 4 to 50+ blows per 300mm (foot), generally increasing with depth. No groundwater was encountered during this investigation. Based on visual and tactile observation, the soils were in a 'dry' state at the time of investigation.

Laboratory testing indicates in-situ dry densities of the upper soils ranging from 1430 to 1795 kg/m^3 (89 to 112 pcf) at 3.3 to 7.5 percent moisture, at the time of investigation. Liquid limits of the clays are in the 20 to 33 percent range with plasticity indices ranging from 3 to 17 percent. The upper clayey soils exhibit volume increase due to wetting of approximately 0.6 percent when re-compacted to moistures and densities normally expected during construction. Undisturbed samples displayed compression during increasing loading up to a load of 53 kPa (1,100 psf) and additional compression after inundation. Direct shear testing indicated cohesion of 65 kPa (1350 psf) and a friction angle of 27 degrees.

The data presented herein is based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

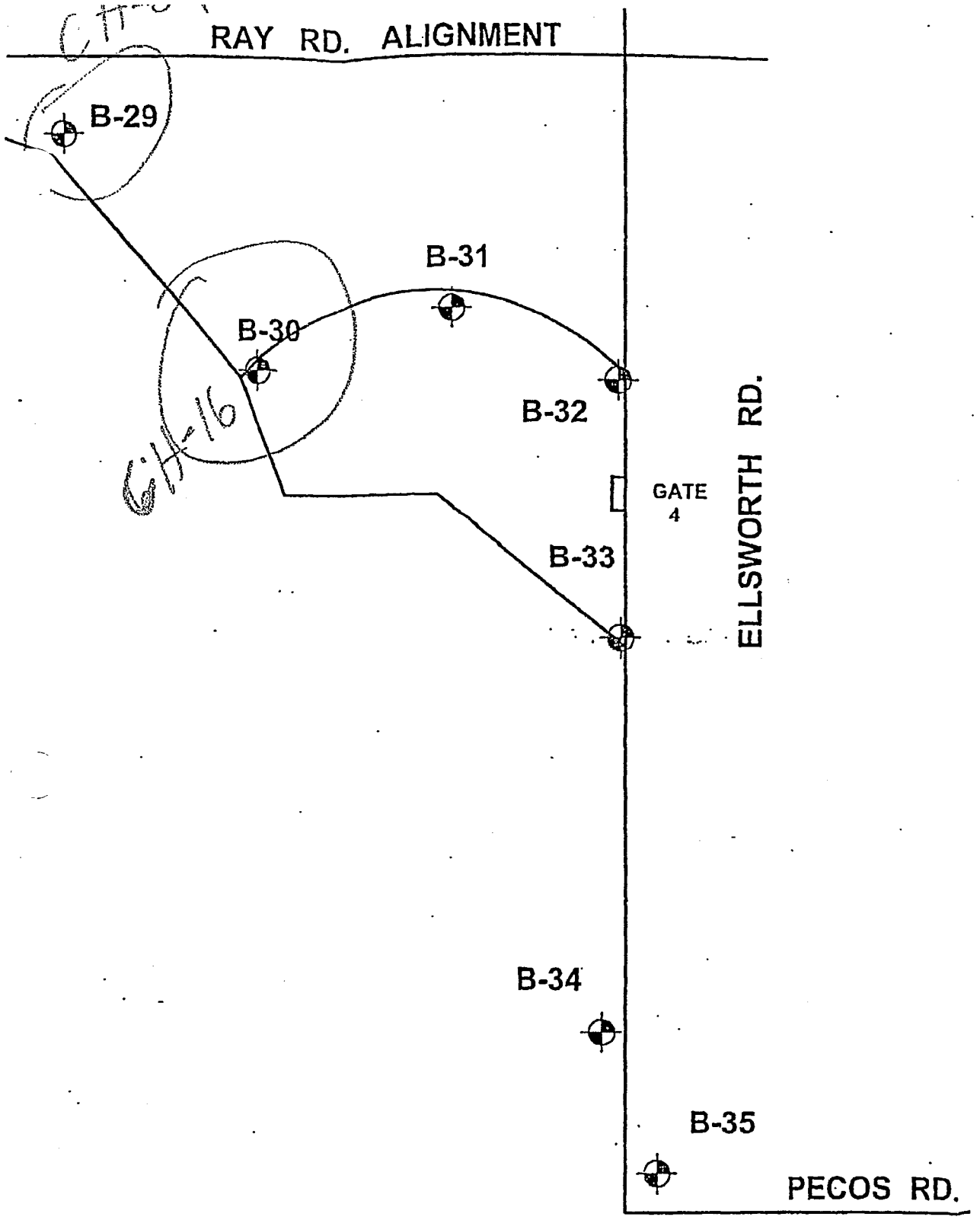
Respectfully submitted,
SPEEDIE & ASSOCIATES

Timothy J. Rheinschmidt, R.G.

Gregg A. Creaser, P.E.

Attachments: Boring Logs, Boring Location Plan,
Tabulation of Test Data, Moisture-Density Relations,
Consolidation Tests, Shear Test Diagram and Swell Test Data

FILE: DEPT_5\2001\RPTS\010034SA\010034SA.LtrRpt



BORING LOCATIO

MARICOPA COUNTY DOT
ELLSWORTH RD.,GERMANN ELLIOT
MESA, ARIZONA

DR: CMW	CHK: TR	REV:	DATE: 07/23/01

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm
0	Medium Dense to Very Dense Light Brown CLAYEY SAND (SC-Dry) with Gravel, Trace Silt, and Weak Calcareous Cementation	S-1	0.76	NT	NT	
1		RS-2	1.68	NT	NT	50/6"
2						
3		RS-3	3.35	NT	NT	
4		RS-4	4.88	NT	NT	
4.88	End of Boring					
5						
6						
7						
8						
9						
10						

Penetration Resistance scale: 0 – 25

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-29

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

_METRIC SPE 10034SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0 – 25 – 50)
0	Firm Light Brown SANDY SILT (ML-Dry) with Trace Clay and Trace Gravel	S-1	0.76	NT	NT	
0.91	Loose Light Brown SILTY SAND (SM-Dry) with Trace Clay and Trace to Little Gravel	S-2	1.98	NT	NT	
2.44	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Silt, Trace to Little Gravel and Moderate Calcareous Cementation, Interbedded with Sandy Clay	BS-3	3.05	NT	NT	
		RS-4	3.20	NT	NT	50/6"
4.88	End of Boring	RS-5	4.88	NT	NT	50/6"

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-30

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

_METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0 – 25)
0	Stiff Light Brown SANDY SILT (ML-Dry) with Trace Clay and Trace Gravel	S-1	0.76	NT	NT	
0.91	Very Loose Light Brown SILTY SAND/CLAYEY SAND (SC/SM-Dry) with Trace Clay and Trace Gravel	BS-2	1.52	NT	NT	
		S-3	1.98	NT	NT	
2.44	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Silt, Trace Gravel and Moderate Calcareous Cementation	RS-4	3.23	7.5	1589.0	50/7"
4.66	End of Boring	S-5	4.66	NT	NT	50/4"

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-31

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0 – 25 – 50)
0	Firm Light Brown SANDY SILT (ML-Dry) with Trace Clay and Trace Gravel	S-1	0.76	NT	NT	
1	1.07					
	Loose to Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Silt and Trace to Little Gravel	BS-2	1.52	NT	NT	
2		S-3	1.98	NT	NT	
3	3.35	RS-4	3.35	3.3	1792.5	
	Layer of Sandy Clay 3.66					
4	Hard Brown SANDY SILT/SILTY SAND (ML/SM-Dry) with Trace Clay, Trace Gravel and Moderate Calcareous Cementation	S-5	4.72	NT	NT	50/6"
5						
6	Interbedded with Sandy Clay 6.40	S-6	6.40	NT	NT	50/6"
	End of Boring					
7						
8						
9						
10						

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-32

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

_METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0–25)
0	Stiff Light Brown SANDY CLAY (CL-Dry) with Trace Silt, Trace Gravel and Weak Calcareous Cementation	S-1	0.76	NT	NT	
1.22	Medium Dense Light Brown SILTY SAND (SM-Dry) with Trace Clay and Trace Gravel	S-2	1.98	NT	NT	
3.96		RS-3	3.35	4.1	1707.6	
4.72	Hard Brown SANDY SILT (ML-Dry) with Trace Clay and Moderate to Strong Calcareous Cementation	S-4	4.72	NT	NT	50/6"
	End of Boring					

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-33

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meter	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%	In-place Dry Densit (kg/cu m)	Penetration Resistance Blows per 300mm
0	Stiff to Hard Light Brown SANDY SILT (ML-Dry) with Trace to Little Clay		S-1	0.76	NT	NT	
1							
2			S-2	1.98	NT	NT	
3	Moderate to Strong Calcareous Cementation	3.32	RS-3	3.32	NT	NT	50/10"
	End of Boring						
4							
5							
7							
8							
9							
10							

Penetration Resistance: 0 25 50

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-35

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meter	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%	In-place Dry Densi (kg/cu m	Penetration Resistance Blows per 300mm (0 – 25 – 50)
0	Stiff Light Brown SANDY CLAY (CL-Dry)	S-1	0.76	NT	NT	
1	1.07 Stiff to Very Stiff Light Brown SANDY SILT (ML-Dry) with Trace to Little Clay Weak to Strong Calcareous Cementation	RS-2	1.83	6.2	1432.1	
2						
3	Trace Gravel 3.14 End of Boring	S-3	3.14	NT	NT	50/4"
4						
5						
6						
7						
8						
9						
10						

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-34

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

_METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP (m)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Kilograms Per Cubic Meter)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			R VALUE at 300 PSI	CORRELATED R VALUE	pH	RESISTIVITY (Ohm-Centimeters)	% SULFATE (SO4)	% CHOLRIDE (CL)	UNIFIED SOIL CLASSIFICATION
						0.075mm SIEVE	0.425mm SIEVE	2.00mm SIEVE	4.750mm SIEVE	75.00mm SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX							
B-29	RS-3	RING	3.35	NT	NT	12	28	67	86	100	28	15	13	NT	51	NT	NT	NT	NT	SW-SC
B-30	BS-3	BULK	3.05	NT	NT	18	30	53	71	100	20	17	3	NT	70	NT	NT	NT	NT	SM
B-31	BS-2	BULK	1.52	NT	NT	33	50	69	80	100	20	15	5	NT	52	NT	NT	NT	NT	SC-SM
B-31	RS-4	RING	3.23	7.5	1589.0	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-32	RS-4	RING	3.35	3.3	1792.5	19	31	55	67	100	33	16	17	NT	40	NT	NT	NT	NT	SC
B-33	RS-3	RING	3.35	4.1	1707.6	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-34	S-1	SPT	0.76	NT	NT	81	99	100	100	100	28	16	12	NT	20	NT	NT	NT	NT	CL
B-34	RS-2	RING	1.83	6.2	1432.1	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	

Sieve analysis results do not include material greater than 75mm. Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

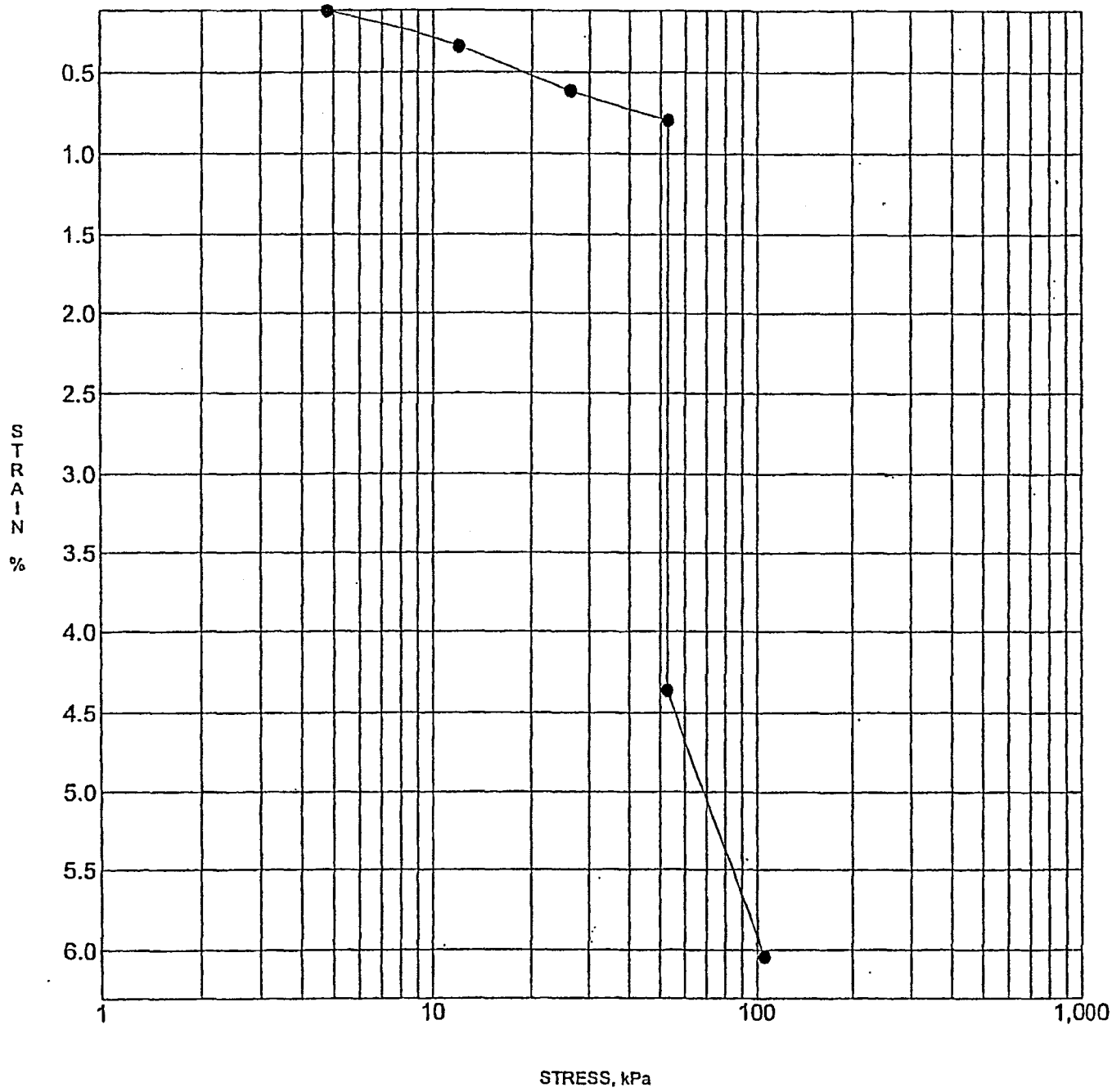
NT=Not Tested

Sheet 1 of 1

Ellsworth Road
Germann to 1/2 Mile N/o Elliot
Mesa, Arizona
Project No. 010034SA

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST



BORING B-29

SAMPLE No. RS-3

Sample inundated at end of test at 53 kPa

PROJECT Ellsworth Road - Germann to 1/2 Mile N/o Elliot

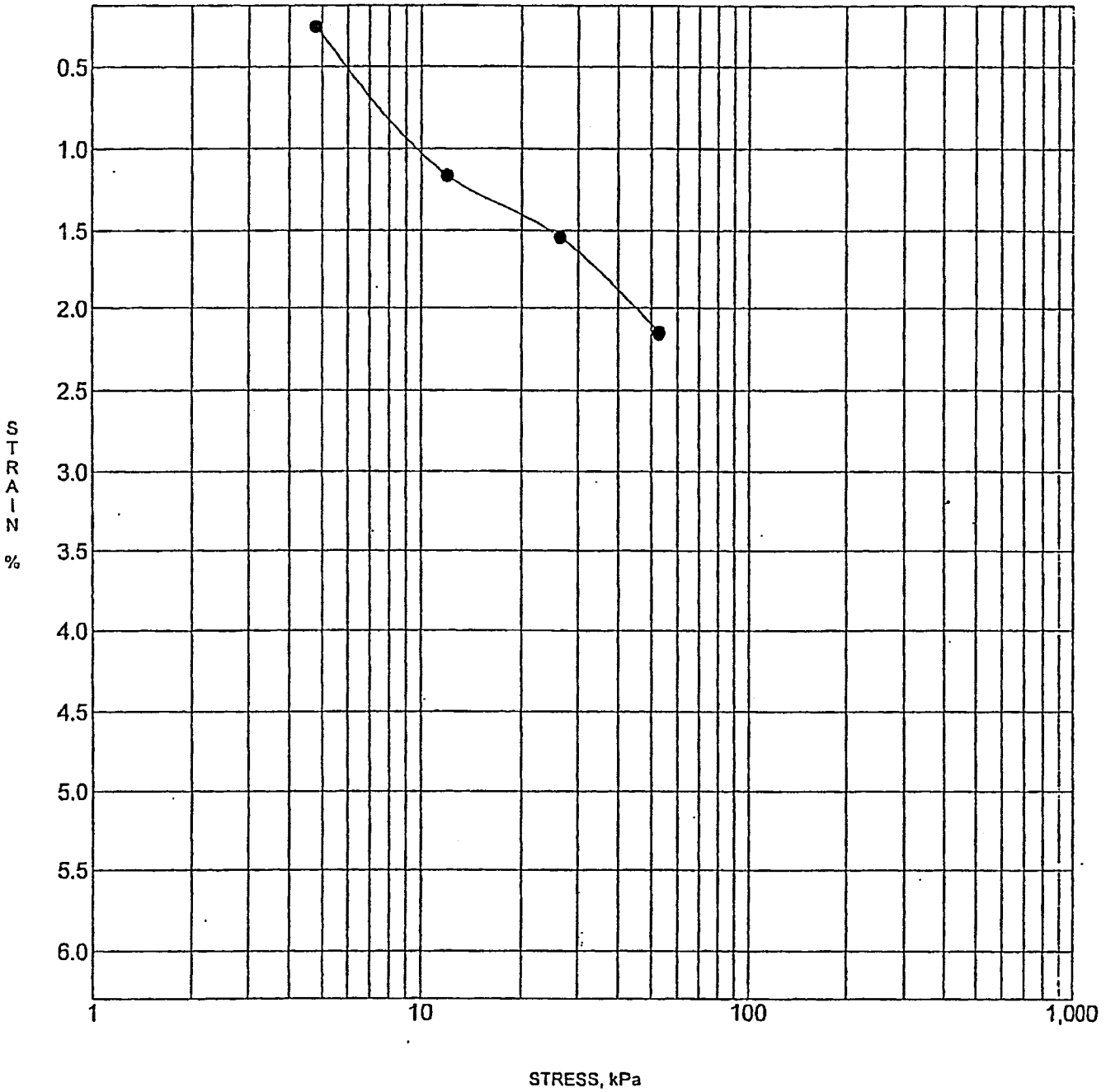
JOB NO. 010034SA

DATE 6/21/01

SPEEDIE AND ASSOCIATES

METRIC GEOTECH IDATION 010034SA.GPJ GENGEO.GDT 8/2/01

CONSOLIDATION TEST



BORING B-34

SAMPLE No. RS-2

Sample inundated at end of test at 53 kPa

PROJECT Ellsworth Road - Germann to 1/2 Mile N/o Elliot

JOB NO. 010034SA

DATE 6/21/01

SPEEDIE AND ASSOCIATES

METRIC GEOTECH CONSOLIDATION 010034SA.GPJ GENGEO.GDT 8/2/01

MOISTURE-DENSITY RELATIONS

PROJECT: Ellsworth Road — PROJECT NO.: 010034SA

LOCATION: Germann to 1/2 Mile N/o Elliot — DATE: 8/21/01

BORING NO.: B-30 SAMPLE NO.: BS-3 SAMPLE DEPTH: 3.05 (m) LABORATORY NO.: F7547

METHOD OF COMPACTION: D698A

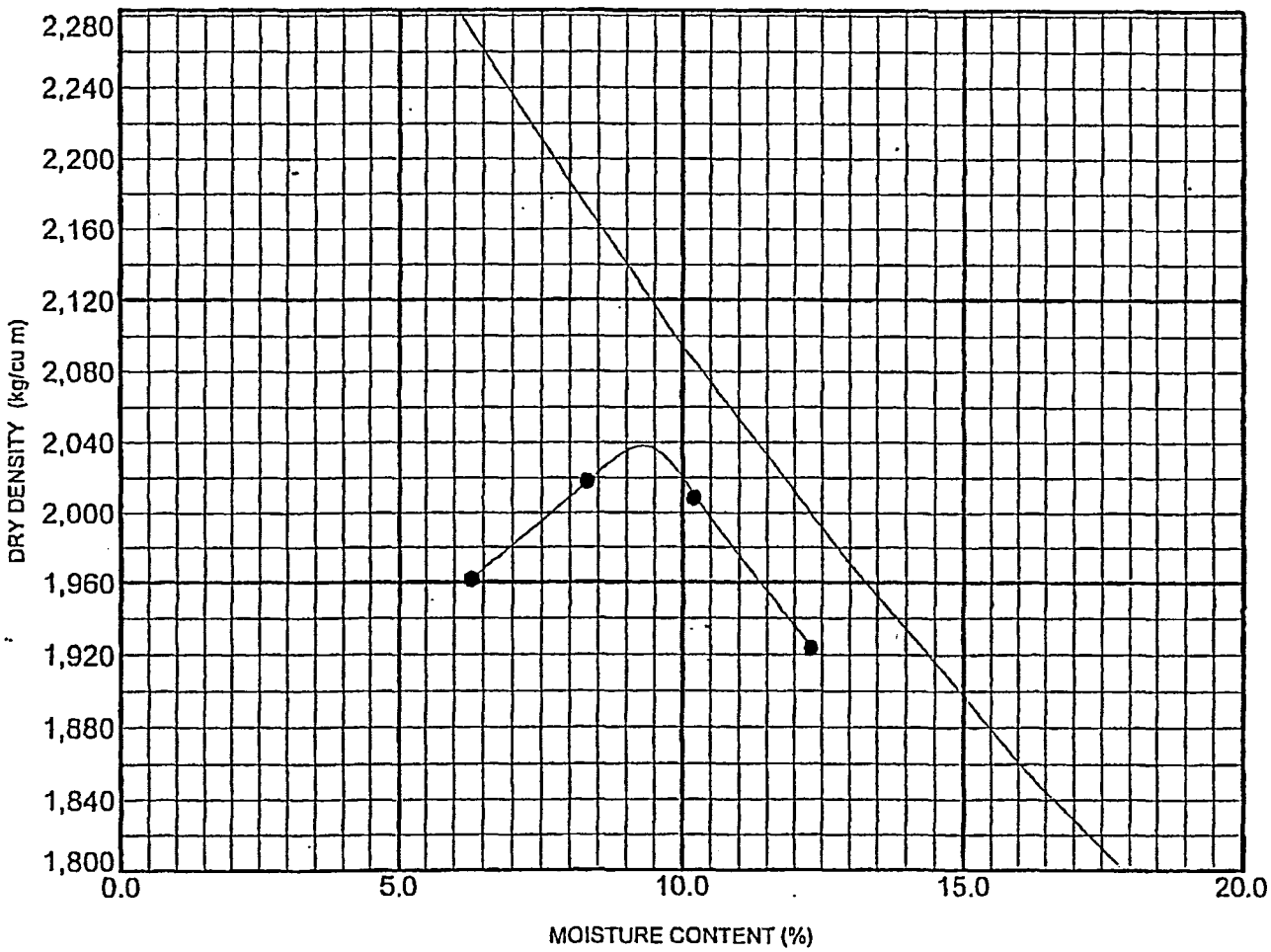
LIQUID LIMIT: 20 PLASTIC LIMIT: 17 PLASTICITY INDEX: 3

CLASSIFICATION: SM ASTM SOIL DESCRIPTION: SILTY SAND with GRAVEL

MAXIMUM DRY DENSITY: 127.1 PCF

(SI) MAXIMUM DRY DENSITY: 2036.0 kg/cu m

OPTIMUM MOISTURE CONTENT: 9.2%



SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Ellsworth Road — PROJECT NO.: 010034SA

LOCATION: Germann to 1/2 Mile N/o Elliot — DATE: 6/21/01

BORING NO.: B-31 SAMPLE NO.: BS-2 SAMPLE DEPTH: 1.52 (m) — LABORATORY NO.: F7552

METHOD OF COMPACTION: D698A

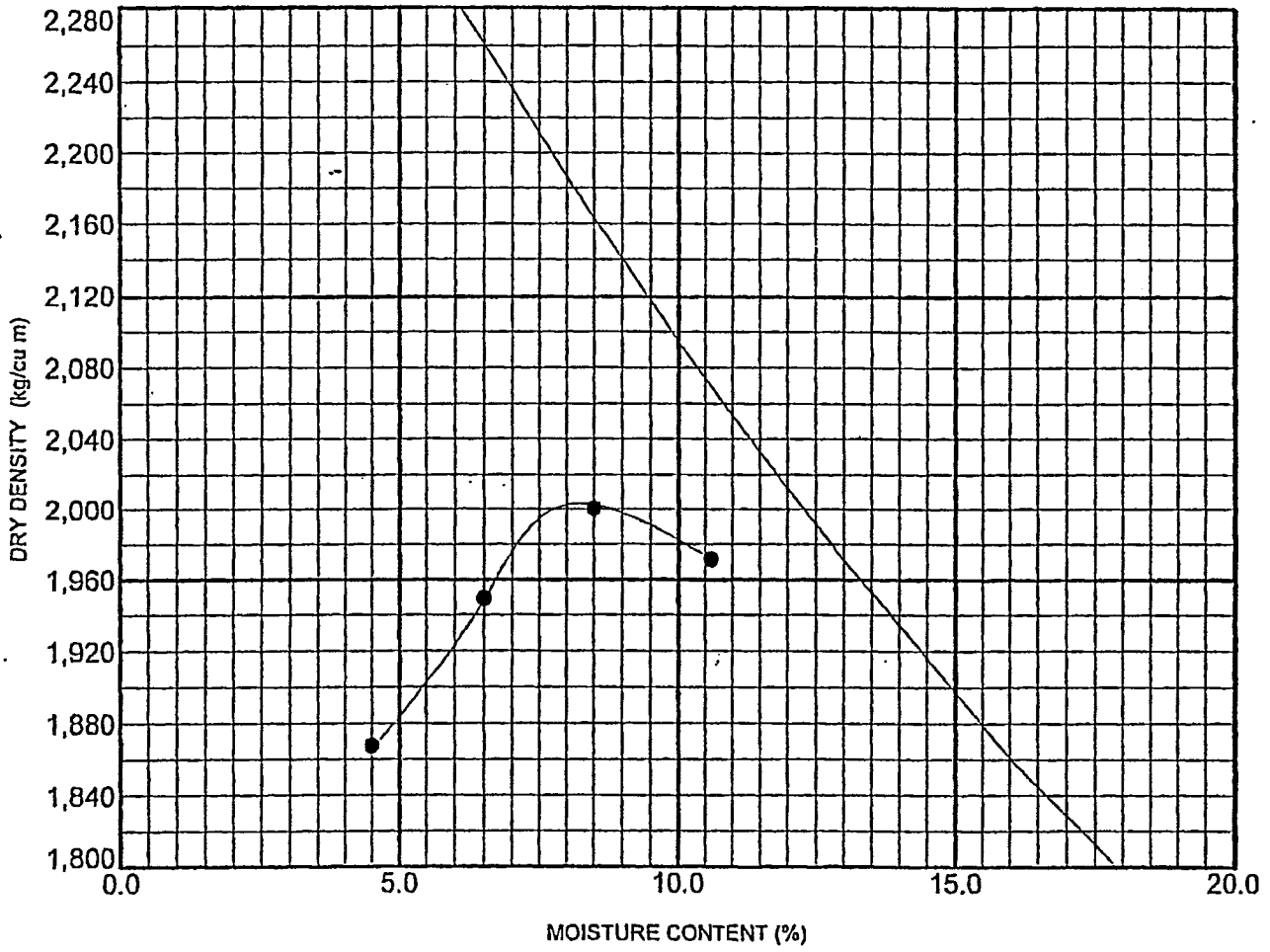
LIQUID LIMIT: 20 PLASTIC LIMIT: 15 PLASTICITY INDEX: 5

CLASSIFICATION: SC-SM ASTM SOIL DESCRIPTION: SILTY, CLAYEY SAND with GRAVEL

MAXIMUM DRY DENSITY: 125.0 PCF

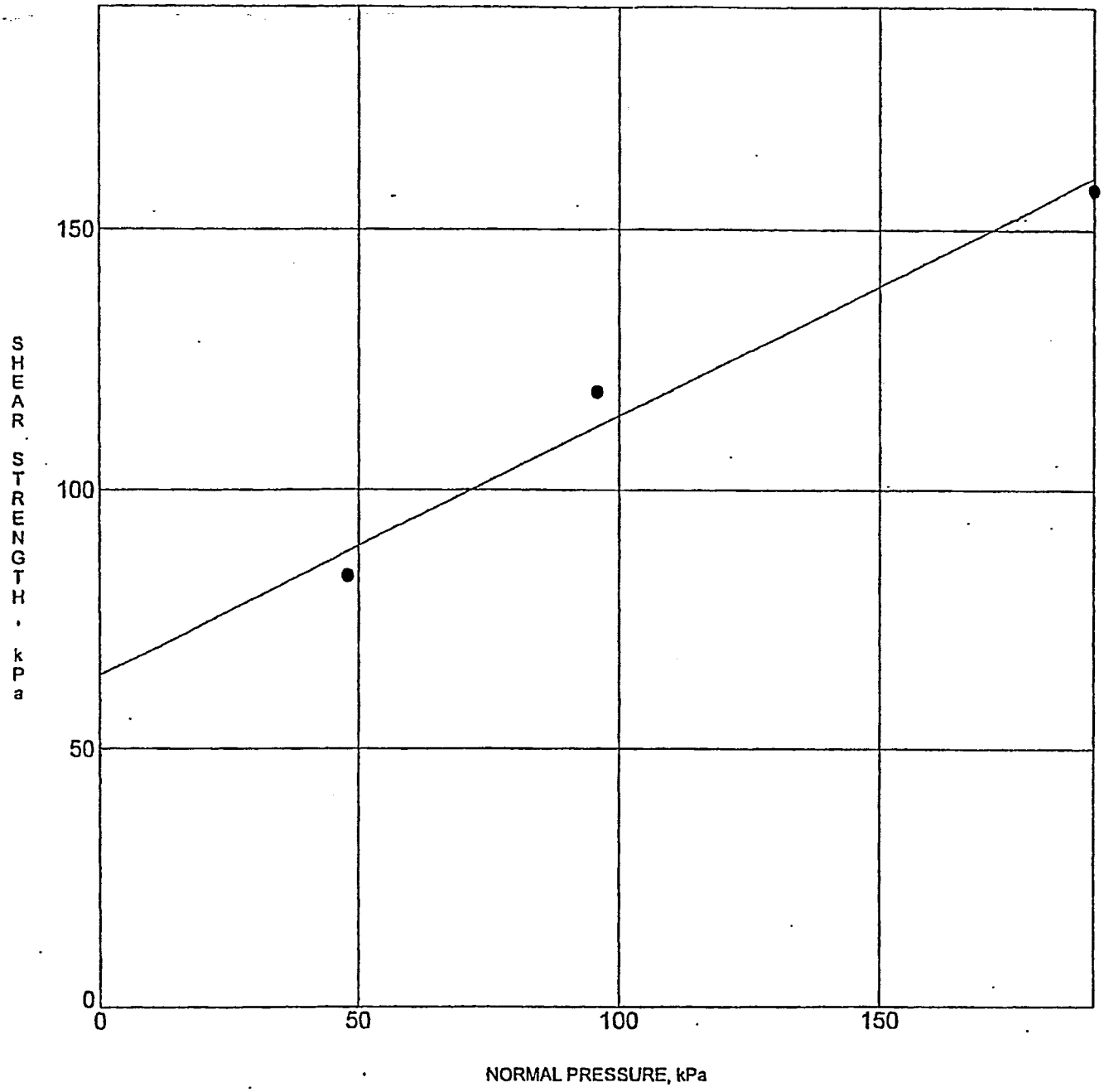
(SI) MAXIMUM DRY DENSITY: 2002.3 kg/cu m

OPTIMUM MOISTURE CONTENT: 8.0%



SPEEDIE AND ASSOCIATES

SHEAR TEST DIAGRAM



Specimen Identification		Cohesion, kPa	Friction Angle	DD kg/cu m	MC%
● B-34	5.0	64.6	27.0	1492.9	6.9

PROJECT Ellsworth Road - Germann to 1/2 Mile N/o Elliot

JOB NO. 010034SA
DATE 6/21/01

SPEEDIE AND ASSOCIATES

METRIC DIRECT S 10034SA.GPJ 8/2/01

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, (m)	MAXIMUM DRY DENSITY (kg/cu m)	OPTIMUM MOISTURE CONTENT (%)	REMOLDED DRY DENSITY (kg/cu m)	INITIAL MOISTURE CONTENT (%)	PERCENT COMPACTION	FINAL MOISTURE CONTENT (%)	CONFINING LOAD (kPa)	TOTAL SWELL (%)
B-31, BS-2	1.5	2002.3	8.0	1902.4	6.4	95.0	12.1	4.79	0.6

Ellsworth Road
Germann to 1/2 Mile N/o Elliot
Mesa, Arizona
Project No. 010034SA

SPEEDIE AND ASSOCIATES

APPENDIX B

Design Rainfall Data

- **Precipitation Based on Isopluvials**
- **Rainfall Data Using FCDMC's DDMSW**

PRECIPITATION DEPTHS

Return Period	Precipitation Depth (in.)	
	6-hr	24-hr
2-year	1.1	1.3
100-year	3.0	3.6

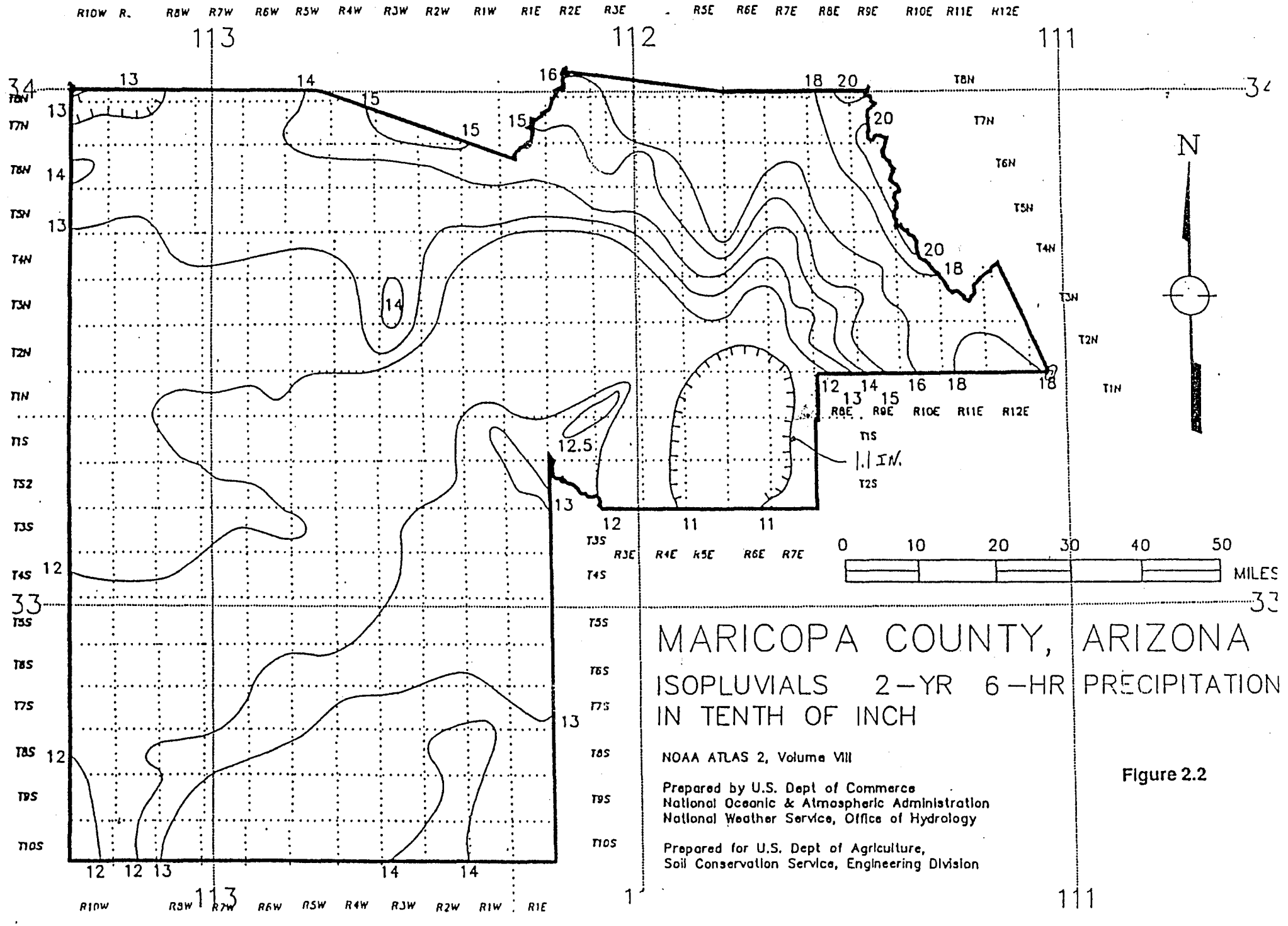
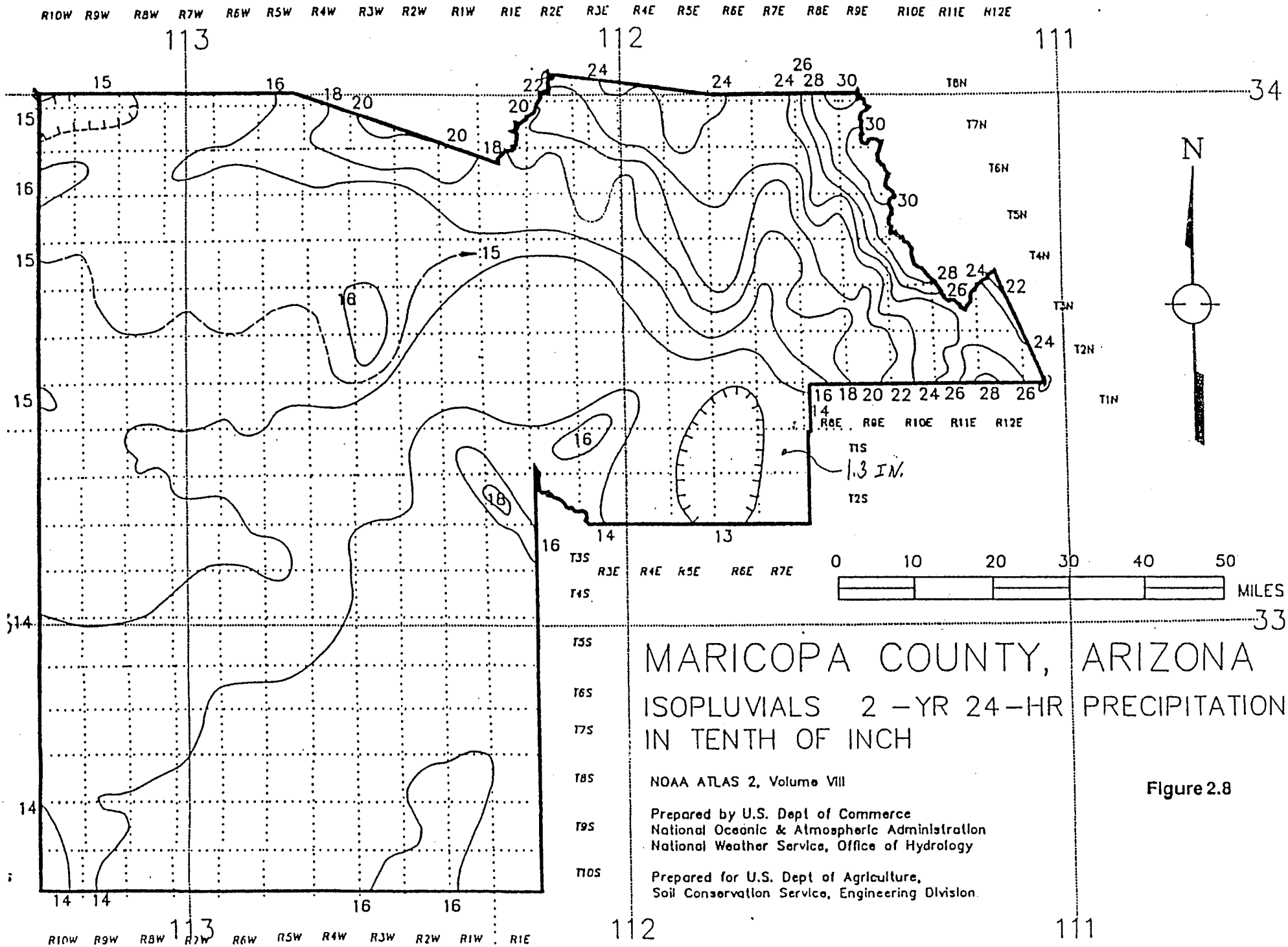

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 2-YR 6-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILES
1.1 IN.

Figure 2.2



MARICOPA COUNTY, ARIZONA

ISOPLUVIALS 2 –YR 24–HR PRECIPITATION IN TENTH OF INCH

NOAA ATLAS 2, Volume VIII

Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division

Figure 2.8

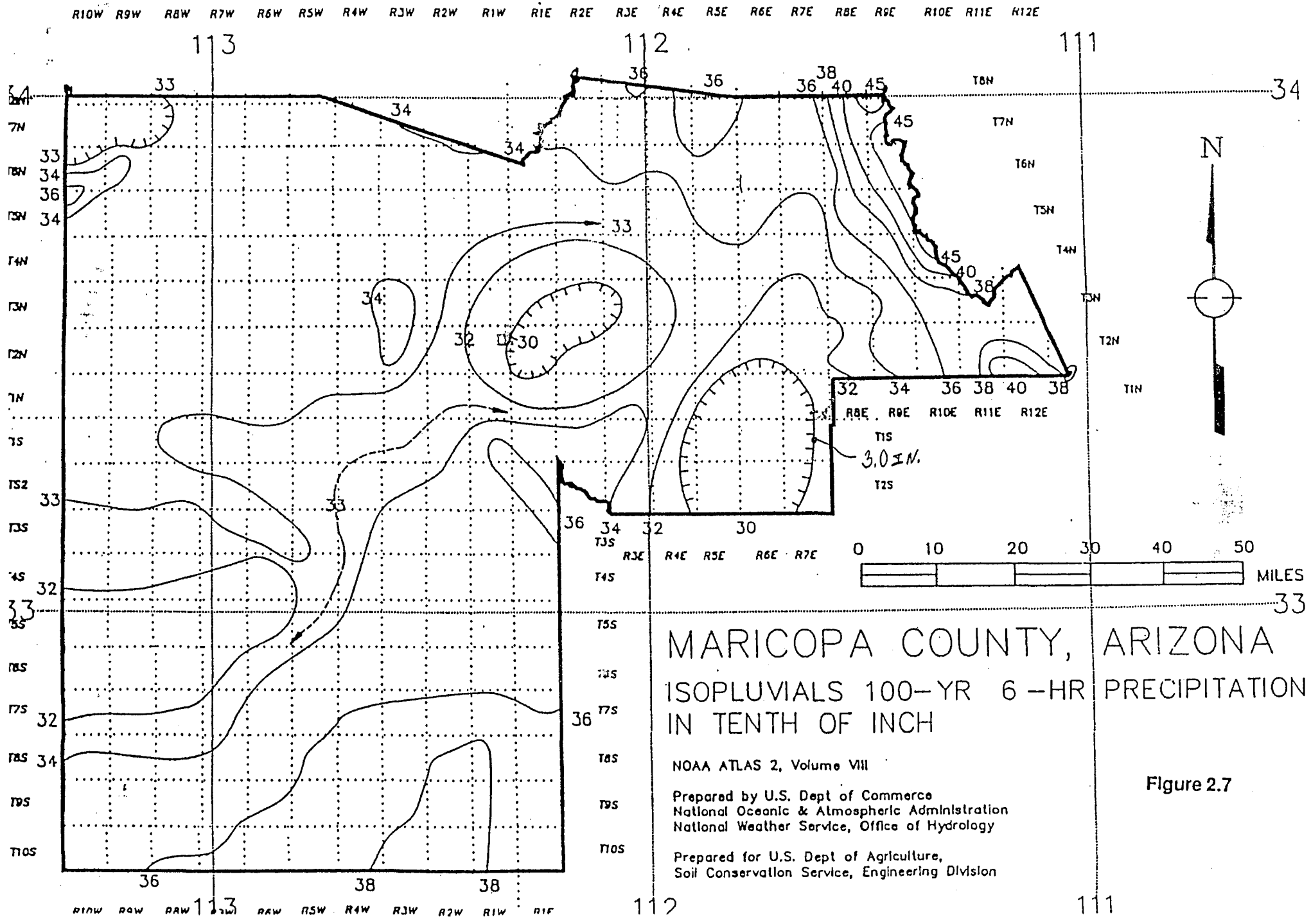

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 100-YR 6-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILES
3.0 IN.
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N
T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
113 112 111
34 33 32 30 36 38 40 45

Figure 2.7

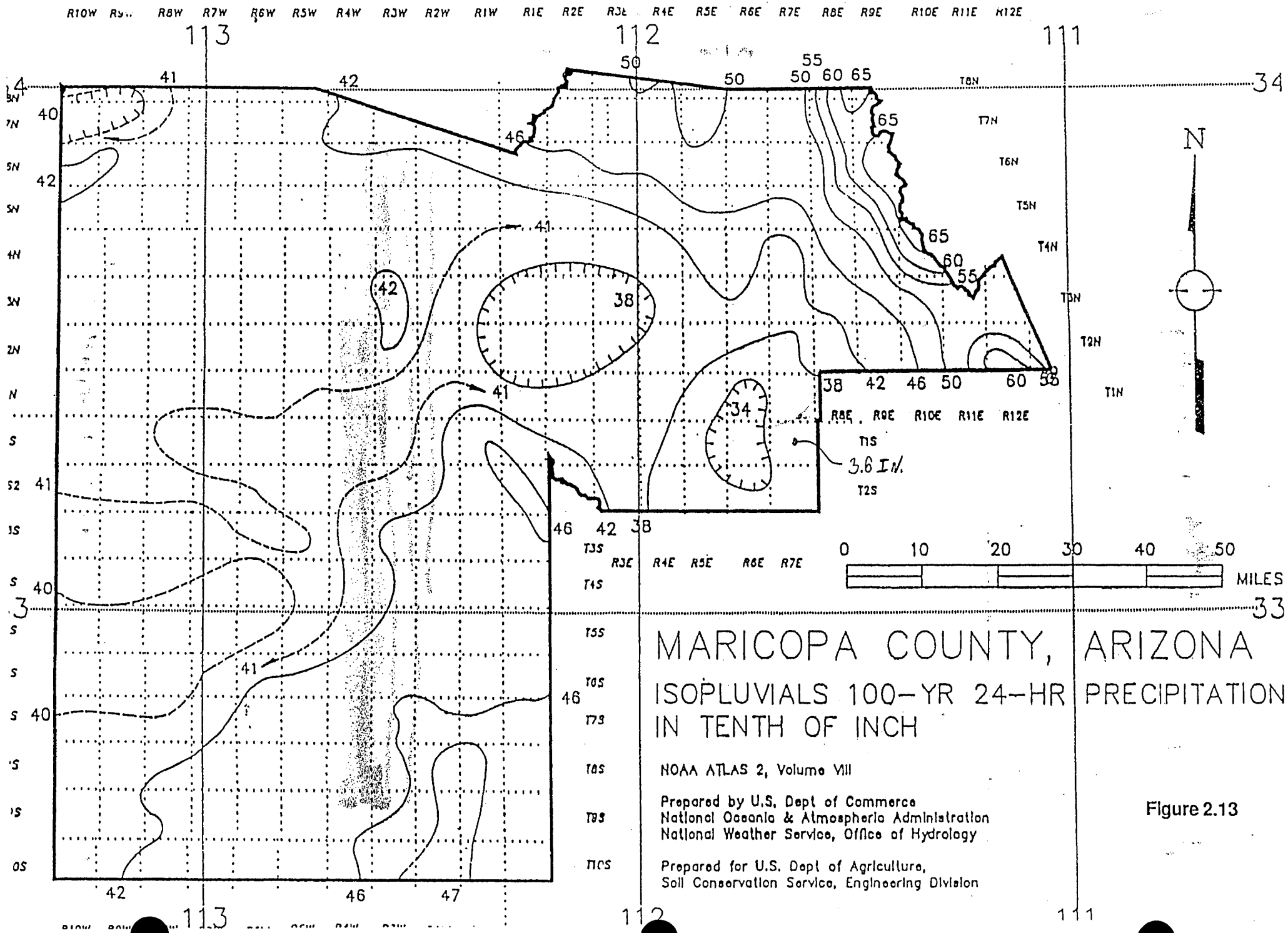

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 100-YR 24-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILES
3.6 IN.
113
112
111
34
33

Figure 2.13

AMEC Infrastructure {Phoenix}
100 - Ellsworth Road
Rainfall Data

Primary Zone Number:	7	Latitude:	0.0	Elevation:	0
Short Duration Zone Number:	8	Longitude:	0.0		

	Point Values (in)					
Duration	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
5 MIN	0.29	0.40	0.47	0.56	0.64	0.71
10 MIN	0.44	0.60	0.71	0.86	0.98	1.10
15 MIN	0.54	0.75	0.90	1.10	1.25	1.41
30 MIN	0.71	1.01	1.21	1.48	1.69	1.91
1 HOUR	0.87	1.25	1.50	1.85	2.12	2.38
2 HOUR	0.95	1.36	1.63	2.01	2.30	2.59
3 HOUR	1.00	1.43	1.72	2.12	2.43	2.73
6 HOUR	1.10	1.58	1.89	2.33	2.67	3.00
12 HOUR	1.20	1.73	2.08	2.56	2.93	3.30
24 HOUR	1.30	1.88	2.26	2.79	3.20	3.60

RAINFALL INTENSITY TABLE		
	Rainfall Intensity (in/hr)	
Tc	i10	i100
5	**5.64**	**8.52**
6	5.36	8.14
7	5.09	7.75
8	4.81	7.37
9	4.54	6.98
10	**4.26**	**6.60**
11	4.13	6.41
12	4.00	6.22
13	3.86	6.02
14	3.73	5.83
15	**3.60**	**5.64**
16	3.52	5.52
17	3.44	5.40
18	3.36	5.28
19	3.29	5.15
20	3.21	5.03
21	3.13	4.91
22	3.05	4.79
23	2.97	4.67
24	2.89	4.55
25	2.81	4.43
26	2.73	4.31
27	2.66	4.18
28	2.58	4.06
29	2.50	3.94
30	**2.42**	**3.82**

APPENDIX C

Soil Data

amec

Geotechnical Services
Drainage Channel Improvements
MCDOT Project No. 68927
Ellsworth Road
Germann to Guadalupe Roads
Mesa, Arizona

Submitted to:

AMEC Infrastructure, Inc.
Phoenix, Arizona

Registered Professional Engineer (Civil)
CERTIFICATE NO.
39281
ERIK H.
SKULSTAD
Date Signed 12/17/04
ARIZONA, U.S.A.

Submitted by:

AMEC Earth & Environmental, Inc.
Phoenix, Arizona

17 December, 2004

AMEC Job No. 4-117-001068

amec

17 December, 2004
AMEC Job No. 4-117-001068

Gregory Holverson, P.E.
AMEC Infrastructure, Inc.
2001 West Camelback Road
Suite 300
Phoenix, Arizona 85034

Dear Mr. Holverson:

Re: Geotechnical Services
Drainage Channel Improvements
MCDOT Project No. 68927
Ellsworth Road, Germann to Guadalupe Roads
Mesa, Arizona

Submitted herein is our Geotechnical Investigation Report for the above referenced project. Included are the results of test drilling and laboratory analysis, and recommended criteria for embankment protection.

Should you have any questions concerning the recommendations presented in this report, please do not hesitate in contacting the undersigned.

Respectfully submitted,

AMEC Earth & Environmental, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 39281 ERIK H. SKULSTAD Date Signed 12/17/04 ARIZONA, U.S.A.

Erik H. Skulstad, P.E.
Geotechnical Engineer

Reviewed by:

Registered Professional Engineer (Civil) CERTIFICATE NO. 13872 LAWRENCE A. HANSEN Date Signed 12/17/04 ARIZONA, U.S.A.

Lawrence A. Hansen, Ph.D., P.E.
Senior Vice President

G:\Engineering Department\2004 Projects\4-117-001068 Ellsworth Road\Drainage Channel Improvements doc

c: Addressee (3)

AMEC Earth & Environmental, Inc.
1405 West Auto Driv
Tempe, Arizona 85284-1016
Tel +1 (480) 940-2320
Fax +1 (480) 785-0970 www.amec.com

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 PROJECT DESCRIPTION 1

3.0 INVESTIGATION 1
- 3.1 REVIEW OF EXISTING DATA 1
- 3.2 SUBSURFACE EXPLORATION 1
- 3.3 SEDIMENT TRANSPORT SAMPLING 2
- 3.4 LABORATORY TESTING 2

4.0 SITE CONDITIONS AND GEOTECHNICAL PROFILE 2
- 4.1 SITE CONDITIONS 2
- 4.2 GEOTECHNICAL PROFILE 2
- 4.3 GROUNDWATER AND SOIL MOISTURE CONDITIONS 3

5.0 DISCUSSION AND RECOMMENDATIONS 3
- 5.1 DISCUSSION 3
- 5.2 EMBANKMENT CONSTRUCTION 3
- 5.3 SUBGRADE PREPARATION 4
- 5.4 STABILITY 4
- 5.5 ESTIMATED SETTLEMENT 4
- 5.6 EROSION CONTROL 5
  - 5.6.1 Erosion Control or Embankment Protection Systems 5

REFERENCES 7

LIST OF APPENDICES

Appendix A – Field Investigation
Appendix B – Laboratory Test Results

Erik H Skulstad

Registered Professional Engineer (Civil)
CERTIFICATE NO. 39281
ERIK H. SKULSTAD
Date Signed 12/17/04
ARIZONA, U.S.A.

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation performed by AMEC Earth & Environmental, Inc. (AMEC) of the site of the proposed improvements to an existing drainage channel for the Ellsworth Road Improvement project. This information was used to provide preliminary criteria for the design of an earthen embankment and to prepare recommendations related to site grading, excavation and other aspects of the project where soil properties or behavior should be considered.

2.0 PROJECT DESCRIPTION

Details of the project were provided to us by Gregory Holverson, P.E. of AMEC Infrastructure, Inc. It is understood that a flood control channel is planned along Ellsworth Road extending from Germann Road to Guadalupe Road. This channel segment will be a part of the Ellsworth Open Channel component of the East Mesa Area Drainage Master Plan, which is about 3 miles in length. We understand the current configuration to vary from approximately 10 feet to 70 feet at the bottom of the drainage channel and to be of varying depth. However, we understand the side slopes to be on the order of a 4H:1V (horizontal to vertical) slope. A portion of the drainage is expected to be coincident with existing berms surrounding the GM Test Track, located along the east side of Ellsworth Road.

3.0 INVESTIGATION

3.1 Review of Existing Data

A review of geotechnical data generated by Speedie and Associates (Speedie) for their preliminary investigation were reviewed (Speedie Project No. 010034SA, dated August 3, 2001). Results of their investigation have been referenced herein to provide additional data.

3.2 Subsurface Exploration

Three test borings were advanced to a depth of 15 feet below existing site grades. The borings were advanced using a CME-75 drill rig equipped with a 6 5/8-inch O.D. hollow stem auger. Standard penetration testing and sampling was performed at selected intervals in the boring. The soils encountered during drilling were continuously examined, visually classified and logged.

Two hand samples of near-surface soils were collected along the east side of Ellsworth Road north of Pecos Road.

Results of the field investigation are presented in Appendix A, including a site plan showing the boring and hand sample locations and logs of the borings. The field investigation was supervised by Mark Keyes, P.G. of this firm.

3.3 Sediment Transport Sampling

Two in situ particle counts, each consisting of measuring the diameter of 100 surface particles spaced at intervals of 1 foot, were performed in general conformance with Kellerhals and Bray (1971)[1]. The results of the counts are presented in Appendix B. Locations of the particle counts were taken at hand sample locations and are presented on Figure 1.

The purpose of the sampling was to develop surficial gradation curves for the drainage channel within the project limits. Coarse particle gradation curves were developed for use in sediment transport analysis.

3.4 Laboratory Testing

The moisture content of selected samples recovered from the borings was determined. The results of these tests are shown on the boring log. Grain-size analysis and Atterberg limits (plasticity index) tests were performed on selected samples. Results of these tests are presented in Appendix B.

4.0 SITE CONDITIONS AND GEOTECHNICAL PROFILE

4.1 Site Conditions

The existing channel bottom is generally flat with little to moderate vegetation. The side slopes of the channel vary in condition and slope. In several areas along the alignment of the channel dumping of construction debris and other materials has occurred, and in some areas it appears that this material (e.g., broken concrete and rubble) has been used as fill material to create the slopes.

4.2 Geotechnical Profile

The soils encountered at the site consist predominantly of fine-grained soils, including clayey sand, silty sand, and sand with silt and varying amounts of gravel. These soils extend from the existing ground surface to the full depths of investigation. The soils are generally firm to hard, are weakly to moderately lime cemented, and exhibit low to medium plasticity.

[1]. References are listed at the end of this report.

Silty clay soils of low to medium plasticity were encountered in the near-surface soils in Test Boring 1 and below a depth of about 13 feet in Test Boring 3. These soils were weakly to moderately lime cemented and exhibited low to medium plasticity.

4.3 Groundwater and Soil Moisture Conditions

Soil moisture contents were generally moderate. Laboratory moisture contents varied from 6 to 12 percent, and no free groundwater was encountered in the boring.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 Discussion

It is understood that approximately 3 miles of drainage improvements are planned as part of the Ellsworth Roadway project. Issues regarding the construction, subgrade preparation, stability, and settlement of the embankment are discussed in the following sections.

Discussions with Robert Davies, P.E., of AMEC Infrastructure, Inc. indicated that the average main channel velocities during flood events might exceed the permissible velocity, resulting in erosion of the existing embankments. Therefore, erosion control measures must be taken to increase the permissible velocities. Erosion control measures examined as a part of this project include vegetation, riprap and gabions. These measures are discussed in Section 5.6 of this report.

5.2 Embankment Construction

A homogeneous embankment material is recommended for the earthen berm. All embankment material should be free of vegetation, debris and other deleterious material. The embankment should be constructed of material meeting the following gradation requirements as determined by ASTM D422:

Sieve Size (square openings)	Percent Passing by Weight
1 ½ inch	100
No. 4	85-95
No. 200	>50

The plasticity index of the fraction of material passing the no. 40 sieve should be between 10 and 15 when tested by ASTM D4318.

All embankment material should be placed in loose lifts having a maximum thickness of 8 inches, then compacted to a dry density of at least 95 percent of maximum dry density, as determined by ASTM D698. The placement moisture content should be within 2 percent of optimum moisture content.

5.3 Subgrade Preparation

All vegetation and debris should be removed from areas designated for embankment fill.

Because of the presence of a loose surficial soil strata, it is recommended that the upper 2.5 feet of existing native soils be overexcavated beneath the footprint of the embankment and replaced with material meeting the requirements for embankment material. Based on the boring log and test data, it appears that the native soils in the upper 2.5 feet can be used as embankment fill, or stockpiled for possible use as topsoil plating.

The exposed surface should be scarified in the upper six inches, brought to within 2 percent of optimum moisture content and compacted to at least 95 percent of maximum dry density as determined by ASTM D698.

During compaction of the ground surface, a representative of the geotechnical engineer should be present to observe for any loose or soft zones. If loose or soft zones are encountered, they should be removed at the discretion of the geotechnical engineer.

5.4 Stability

A preliminary assessment of stability for the proposed embankment geometry was not performed. The proposed embankment has a 4H:1V slope and is founded on firm to very firm soils. Due to the relative flatness of the slope and the firmness of the foundation soils no stability calculations were performed. It is the experience of this firm that for slopes of this flatness with firm foundation soils, stability is not an issue and is anticipated to meet or exceed FEMA requirements.

5.5 Estimated Settlement

The native soils below the embankment are very firm to hard and are weakly to moderately lime cemented. Based on this information and the height of the proposed embankment a preliminary estimate of settlement is less than 2 inches.

5.6 Erosion Control

It is required that the embankment materials resist erosion. The erosion potential of soil is determined by a relationship between soil type and permissible velocity. Based on data provided by Robert Davies, P.E. of AMEC Infrastructure, the average main channel velocity for sections adjacent to the embankment will be on the order of 3.0 to 5.5 feet per second (fps) with a maximum velocity of about 6 fps.

The recommended embankment material has a maximum permissible velocity of 5 to 6 fps (Arizona Department of Transportation (ADOT), 1995; Maccaferri, 1989), which matches the maximum average channel velocity. Therefore, erosion control measures (also identified as embankment protection systems) should be examined to increase the maximum permissible velocity in the higher velocity sections.

5.6.1 Erosion Control or Embankment Protection Systems

There are several embankment protection options available to prevent erosion for the proposed channel slope configuration. Protection systems considered for use this project include vegetation, riprap and gabions.

5.6.1.1 Vegetation

The establishment of grass on embankment surfaces is the most common form of slope protection against surface erosion. The increase in permissible velocities is dependent on the slope of the channel and the type of grass used. Along the channel alignment the maximum channel slope is approximately 0.25 percent. Schwab, et al. (1981) and the Flood Control District of Maricopa County (FCDMC) (1996) present tables for maximum permissible velocities for vegetated channels as a function of the vegetation used. For a channel with a 0.25 percent slope lined with Bermuda grass the maximum permissible average velocity of water within the drainage channel is on the order of 4.5 to 6.0 fps.

When using vegetated cover there are three important things to consider. First, it is important to select vegetation with a shallow root structure. Deep-rooted plants such as trees can provide a conduit for flow, which results in an increased risk of piping. Secondly, grass surfacing of an embankment requires regular maintenance, which includes irrigation, fertilizing, mowing and filling erosion spots. Thirdly, grass is usually only accepted where irrigation systems are provided.

5.6.1.2 Rock Liner

Rock mulch materials may be considered for use as the bank protection. The gradation and thickness of the rock mulch should be determined through hydraulic engineering analysis.

The surface preparation and placement of all materials should be in accordance with the Section 803-2.02 of the ADOT Standard Specifications (ADOT, 2000).

5.6.1.3 Riprap and Gabions

Riprap and gabions are effective and suitable methods for erosion protection for the embankment. Design for these options are not provided as a part of this report. Design procedures for riprap and gabions can be found in Soil Conservation Service (1976) and Maccaferri (1995), respectively. Based on criteria given by Maccaferri (1995), gabion or Reno mattresses that are about 6 inches thick filled with stone sizes of 3 to 4 inches would be sufficient to resist the maximum velocities. A geotextile fabric should be placed beneath the gabion or Reno mattress. Landscape rock can be placed on top of the gabion or Reno mattress to enhance the aesthetics of the earthen berm.

REFERENCES

Arizona Department of Transportation (ADOT), 1995, Erosion and Pollution Control Manual, p. 100.

Arizona Department of Transportation (ADOT), 2000, Standard Specifications for Road and Bridge Construction, p. 762.

Flood Control District of Maricopa County (FCDMC), 1996, Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics.

Kellerhals, R. and Bray, D.I., 1971, Sampling Procedures for Coarse Fluvial Sediments, Journal of the Hydraulics Division, ASCE, Vol. 97, No. HY8, August, p. 1165-1180.

Maccaferri ,1989, Maccaferri Gabions, Inc., Channeling Works (design guide), Bologna, Italy.

Maccaferri, 1995, Maccaferri Gabions, Inc., 1995, Retaining Structures (design guide), Bologna, Italy.

Schwab, G.O., Frevert, R.K., Edminster, T.W., and Barnes, K.K., 1981, Soil and Water Conservation Engineering, Third Edition, John Wiley & Sons, Inc., p 525.

Soil Conservation Service (SCS), 1976, Hydraulic Design of Riprap Gradient Control Structures. Technical Release No. 59, U.S. Department of Agriculture, p. 47.

Speedie and Associates (Speedie), 2001, Supplemental Drainage Channel Report: Ellsworth Road, Germann to ½ Mile North of Elliot Road, Mesa, Arizona, Speedie Project No. 010034SA.

APPENDIX A

FIELD INVESTIGATION

amec

TEST DRILLING EQUIPMENT & PROCEDURES

Description of Subsurface Exploration Methods

Auger Boring Drilling through overburden soils is performed with 6 5/8-inch O.D., 3 1/4-inch I.D. hollow stem auger or 4 1/2-inch solid stem continuous flight auger. Carbide insert teeth are normally used on bits so they can penetrate soft rock or very strongly cemented soils. A CME-75 truck-mounted drill rig is used to advance the auger. The drill rigs are powered with six-cylinder Cummins diesel engines capable of delivering about 11.4 kN-m torque to the drill spindle. The spindle is advanced with twin hydraulic rams capable of exerting 90 kN (20,000 pounds) downward force.

Generally, refusal to penetration of the auger is adopted as top of the SGC or "river-run" material or harder bedrock, which require other techniques for penetration. Grab samples or auger cuttings may be taken as necessary. Standard penetration tests or 2.42-inch diameter ring samples are taken in conjunction with the auger borings as needed, with the sampling interval and type being indicated on the boring logs.

Hammer Drill Drilling with the Hammer drill is accomplished with a Drill Systems AP-1000 drill rig advancing a double-walled drive casing with a link-belt 180 diesel pile driving hammer, having a rated energy of 8,100 foot-pounds per blow. Where noted on the boring log, the hammer is equipped with a supercharger which can boost the energy to approximately 12,000 foot-pounds per blow. The supercharger is used only in portions of the boring where blow counts are relatively high. Cuttings are removed with compressed air by a reverse circulation process, and are collected in a cyclone from which grab samples are obtained. The drive casing is either 9-inch O.D. by 6-inch I.D. or 6 5/8-inch O.D. by 4-inch I.D. and employs an expendable bit of slightly larger diameter than the O.D. of the casing. Hammer blows required to advance the drive casing are recorded in 1-foot increments, as noted on the boring logs. Standard penetration tests or 2.42-inch diameter ring samples taken are noted on the boring logs.

Core Boring Rock core samples are retrieved using a CME-75 drill rig, SAITECH GH 3 rig or Burley 2500, 4500 or 4000. The GH 3 is a portable hydraulic core drill. The GH 3 is powered by a Kohler two-cylinder 25-horsepower engine. The hydraulics motor which feeds a two-speed transmission and powers the BW spindle. This unit has a 3-foot stroke and is hand-fed with a 2,000 pound push-pull capability. The GH 3 has the capability of drilling with either B- or N-size core steel using standard or wireline systems. N-size core is the preferred size and it has a nominal O.D. of about 2 inches. The Burley 2500 and 4500 series are portable hydraulic core drills. The 4500 series is capable of a track-mounted or skid-type chassis. The Burley 2500 and 4500 series are powered by 44 and 75 HP power units, respectively, provide up to 2,000 foot-pounds (ft.-lbs.) of torque and in excess of 1,000 revolutions per minute (RPM) of spindle speed. Both rigs are capable of retrieving either N- or H-sized core using wireline systems. The N-size core has a nominal O.D. of about 2 inches and the H-size of about 2.4 inches. The Burley 4000 is a track-mounted core drill.

The CME-75 utilizes a wireline core drilling system that takes N-size cores. Using the NQ wireline system, core is recovered quickly by retrieving the core-laden inner tube through the drill string.

amec

TEST DRILLING EQUIPMENT & PROCEDURES (Cont.)

Sampling Procedures Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In many cases, 2-inch O.D., 1 3/8-inch I.D. samples are used to obtain the standard penetration resistance. "Undisturbed" samples of firmer soils are often obtained with 3-inch O.D. samples lined with 2.42-inch I.D. brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samples in 6-inch increments. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per 6 inches on the boring logs. "Undisturbed" sampling of softer soils is sometimes performed with thin walled Shelby tubes (ASTM D1587), pitcher samplers, Denison samplers or continuous CME samplers. Where samples of rock are required, they are obtained by NQ diamond core drilling (ASTM D2113). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Also, representative samples are obtained from the cuttings from the hammer and Schramm drill rig.

Boring Records Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares the boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the boring logs.

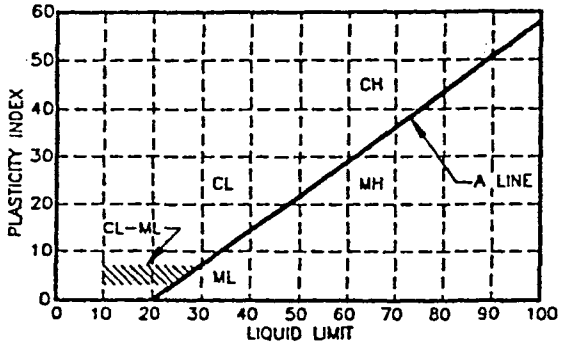
UNIFIED CLASSIFICATION SYSTEM FOR SOILS

Soils are visually classified by the Unified Soil Classification System on the boring logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System" ASTM Designation: D2487.

MAJOR DIVISION				GRAPH SYMBOL	GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)			GW	Well graded gravels, gravel-sand mixtures or sand-gravel-cobble mixtures.
					GP	poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)			SW	Well graded sands, gravelly sands.
					SP	Poorly graded sands, gravelly sands.
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS UNITS PLOT BELOW "A" LINE & HATCH ZONE ON PLASTICITY CHART	SILTS OF LOW PLASTICITY (Liquid Limit Less Than 50)			ML	Inorganic silts, clayey silts with slight plasticity.
		SILTS OF HIGH PLASTICITY (Liquid Limit More Than 50)			MH	Inorganic silts of high plasticity, silty soils, elastic silts.
	CLAYS UNITS PLOT ABOVE "A" LINE & HATCH ZONE ON PLASTICITY CHART	CLAYS OF LOW PLASTICITY (Liquid Limit Less Than 50)			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		CLAYS OF HIGH PLASTICITY (Liquid Limit More Than 50)			CH	Inorganic clays of high plasticity, fat clays, silty and sandy clays of high plasticity.

NOTE: Coarse-grained soils with between 5% & 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone on the plasticity chart to have dual symbol.

PLASTICITY CHART



DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Boulders	Above 300mm (12in.)
Cobbles	300mm to 75mm (12in. to 3in.)
Gravel	75mm (3in.) to No. 4 sieve
Coarse gravel	75mm to 19mm (3in. to 3/4in.)
Fine gravel	19mm (3/4in.) to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

amec

TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY, CONSISTENCY OR FIRMNESS OF SOILS

The terminology used on the boring logs to describe the relative density, consistency or firmness of soils relative to the standard penetration resistance is presented below. The standard penetration resistance (N) in blows per foot is obtained by the ASTM D1586 procedure using 2" O.D., 1 3/8" I.D. samplers.

1. Relative Density. Terms for description of relative density of cohesionless, uncemented sands and sand-gravel mixtures.

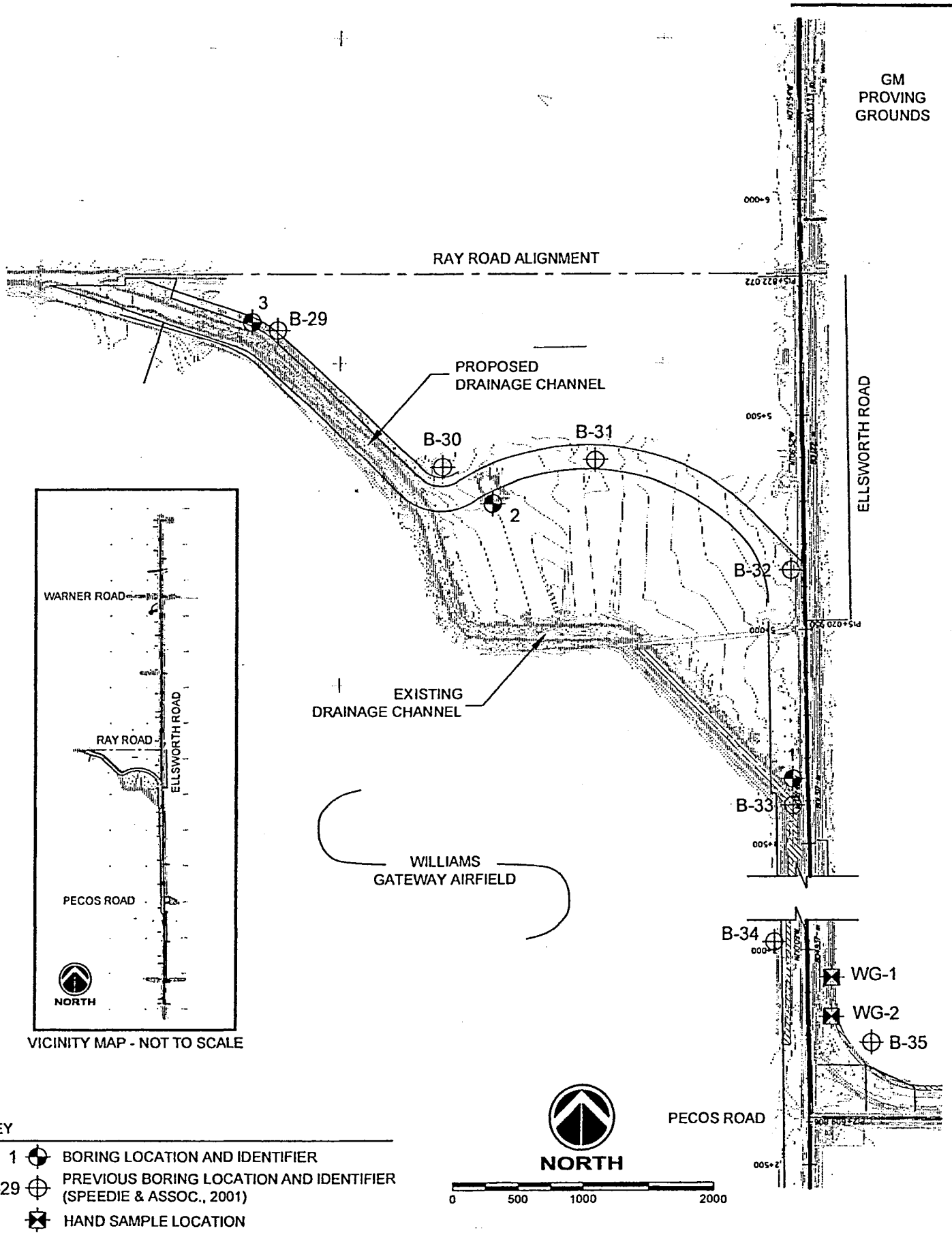
N	Relative Density
0-4	Very loose
5-10	Loose
11-30	Medium dense
31-50	Dense
50+	Very dense

2. Relative Consistency. Terms for description of clays which are saturated or near saturation.

N	Relative Consistency	Remarks
0-2	Very soft	Easily penetrated several inches with fist.
3-4	Soft	Easily penetrated several inches with thumb.
5-8	Medium stiff	Can be penetrated several inches with thumb with moderate effort.
9-15	Stiff	Readily indented with thumb, but penetrated only with great effort.
16-30	Very stiff	Readily indented with thumbnail.
30+	Hard	Indented only with difficulty by thumbnail.

3. Relative Firmness. Terms for description of partially saturated and/or cemented soils which commonly occur in the Southwest including clays, cemented granular materials, silts and silty and clayey granular soils.

N	Relative Firmness
0-4	Very soft
5-8	Soft
9-15	Moderately firm
16-30	Firm
31-50	Very firm
50+	Hard



VICINITY MAP - NOT TO SCALE

KEY

1 BORING LOCATION AND IDENTIFIER

B-29 PREVIOUS BORING LOCATION AND IDENTIFIER (SPEEDIE & ASSOC., 2001)

HAND SAMPLE LOCATION

JOB NO.	4-117-001068
DESIGN:	EHS
DRAWN:	GWH
DATE:	11/2004
SCALE:	1" = 1000'

SITE PLAN
SHOWING BORING LOCATIONS

ELLSWORTH ROAD
GERMANN ROAD TO GUADALUPE ROAD
MCDOT PROJECT NO. 68927

FIGURE
1

amec

PROJECT Ellsworth Rd - Germann Rd to Guadalupe Rd
MCDOT Project No. 68927

amec

JOB NO. 4-117-001068 **DATE** 11/17/04

LOCATION Existing Drainage Channel West of Ellsworth Rd
RIG TYPE CME-75
BORING TYPE 6 5/8" Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								CL	slightly moist hard	**SILTY CLAY,** some gravel & small cobbles on the ground surface, trace of fine grained sand, moderately lime cemented, low to medium plasticity, brown
				S	23-50/4"					
								ML	slightly moist hard	**SANDY SILT,** trace of clay, fine to medium grained sand, moderately lime cemented, low plasticity, brown
				S	49-50/3"		12			
								SM to ML	slightly moist to moist very firm	**SILTY SAND locally grading to SANDY SILT,** predominantly fine to medium grained, subangular to subrounded, weakly lime cemented in zones with some calcium carbonate filaments, nonplastic to low plasticity, brown
5				U	42					
								SM	slightly moist very firm	**SILTY SAND WITH GRAVEL,** fine grained, subrounded to subangular gravel, predominantly medium to coarse grained sand with thin fine grained zones, subangular to subrounded, weakly lime cemented in zones, weakly stratified, nonplastic, brown
10				S	17-19-17		6			
								CL	slightly moist hard	**SILTY CLAY,** moderately lime cemented, low to medium plasticity, brown
15				S	38-50/5"					
										Stopped Auger at 14'6" Sampler refused at 15'5"
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
C - 3" O.D. CME tube sample
NR - No Recovery

LOG OF TEST BORING NO. 1

PROJECT Ellsworth Rd - Germann Rd to Guadalupe Rd
MCDOT Project No. 68927

JOB NO. 4-117-001068 **DATE** 11/17/04

LOCATION Near Boring [illegible] East of Germann
West of Ellsworth Rd

RIG TYPE CME-75
BORING TYPE 6 5/8" Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM	slightly moist firm	**SILTY SAND,** some gravel & cobbles on the ground surface, predominantly fine grained sand, subangular to subrounded, weakly lime cemented, nonplastic, brown
				S	13-12-14					
				S	6-8-10			SC-SM	slightly moist firm to hard	**CLAYEY SILTY SAND WITH GRAVEL,** predominantly fine grained, subrounded to subangular gravel, predominantly medium grained, angular sand, weakly lime cemented, low plasticity, brown
5				S	9-10-11					
10				S	50/5"					note: some coarse grained gravel zones below 9'
								SP	slightly moist hard	**GRAVELLY SAND,** predominantly fine grained gravel & medium to coarse grained sand, subangular to subrounded, weakly lime cemented, nonplastic, brown
15				S	25-27-50/4"					
20										Stopped Auger at 14'6" Sampler refused at 15'10"
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE

A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
C - 3" O.D. CME tube sample
NR - No Recovery

LOG OF TEST BORING NO. 2

PROJECT Ellsworth Rd - Germann Rd to Guadalupe Rd
MCDOT Project No. 68927

JOB NO. 4-117-001068 **DATE** 11/17/04

LOCATION Near Boring B-20, Existing Channel
West of Ellsworth Rd
RIG TYPE CME-75
BORING TYPE 6 5/8" Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SC	slightly moist	**CLAYEY SAND WITH GRAVEL,** occasional small cobbles on the ground surface, well graded with some silt, subangular to subrounded, weakly lime cemented, low plasticity, brown
				S	5-7-9				firm	
				S	28-43-50/3"					note: predominantly medium to coarse grained sand with trace of clay below 2'6"
								SP	slightly moist	**SAND,** trace of silt, trace of fine grained gravel, predominantly medium to coarse grained, subangular to subrounded, nonplastic, brown
5				S	15-21-20				very firm	
								SM to ML	slightly moist	**SILTY SAND TO SANDY SILT,** well graded sand in zones with occasional gravel, weakly to moderately lime cemented, nonplastic, brown
10				U	100/9"				hard	
								CL	slightly moist	**SILTY CLAY,** weakly lime cemented with some irregular-shaped, gravel-sized calcium carbonate nodules, some black manganese-oxide staining, medium plasticity, brown
15				S	15-26-32		13		hard	
										Stopped Auger at 14'6" Stopped Sampler at 16'
20										
25										

GROUNDWATER

	DEPTH(ft)	HOUR	DATE
		none	

SAMPLE TYPE

A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
C - 3" O.D. CME tube sample
NR - No Recovery

LOG OF TEST BORING NO. 3

APPENDIX B

LABORATORY TEST RESULTS

amec

PROJECT:	ELLSWORTH ROAD-PHASE I IMPROVEMENTS (MCDOT PROJ. # 68927)	**JOB NO:**	4-117-001068
LOCATION:	ELLSWORTH ROAD-GERMANN ROAD TO GUADALUPE	**WORK ORDER NO:**	1
SAMPLE SOURCE:	SEE BELOW	**DATE ASSIGNED:**	11/22/04

MECHANICAL SIEVE ANALYSIS
GROUP SYMBOL, USCS (ASTM D-2487)

				Silt or	SAND								GRAVEL									COBBLES	
				Clay	Fine			Medium			Coarse		Fine				Coarse						
Location & Depth	USCS	LL	PI	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"	6"	Lab #
PERCENT PASSING BY WEIGHT																							
B-1 @ 2.5-3.2'	SM	33	1	44	56	63	66	69	74	78	80	86	89	94	96	100	100	100	100	100	100	100	2
B-1 @ 9.5-11.0'	SM	23	1	21	28	38	46	54	67	76	78	84	86	88	90	96	100	100	100	100	100	100	4
B-2 @ 4.5-6.0'	SC-SM	22	4	14	17	22	27	31	42	50	54	68	73	82	89	95	100	100	100	100	100	100	8
B-3 @ 0.5-2.0'	SC	35	16	22	27	36	41	46	57	65	67	77	81	88	93	96	100	100	100	100	100	100	11
B-3 @ 14.5-16.0'	CL	32	11	64	80	89	91	93	96	97	98	99	100	100	100	100	100	100	100	100	100	100	15
WG-1 @ 0.0-0.5'	CL	38	20	87	90	92	93	94	96	97	97	99	99	99	99	100	100	100	100	100	100	100	19
WG-2 @ 0.0-0.5'	SP	NV	NP	4.4	6	9	14	22	36	45	48	58	63	71	78	87	92	95	98	100	100	100	20

AASHTO R18

REVIEWED BY

amec

PROJECT:	ELLSWORTH ROAD-PHASE I IMPROVEMENTS (MCDOT PROJ. # 68927)	**JOB NO:**	4-117-001068
LOCATION:	ELLSWORTH ROAD-GERMANN ROAD TO GUADALUPE	**WORK ORDER NO:**	1
MATERIAL:	SOIL	**LAB NO:**	SEE BELOW
SAMPLE SOURCE:	SEE BELOW	**DATE ASSIGNED:**	11/22/04

MOISTURE CONTENT OF SOIL (ASTM D2216)

LAB #	BORING & DEPTH	WET WT. (gram)	DRY WT. (gram)	MOISTURE CONTENT
2	B-1 @ 2.5-3.2'	295.4	263.7	12.0%
4	B-1 @ 9.5-11.0'	344.0	324.9	5.9%
15	B-3 @ 14.5-16.0'	391.9	345.8	13.3%

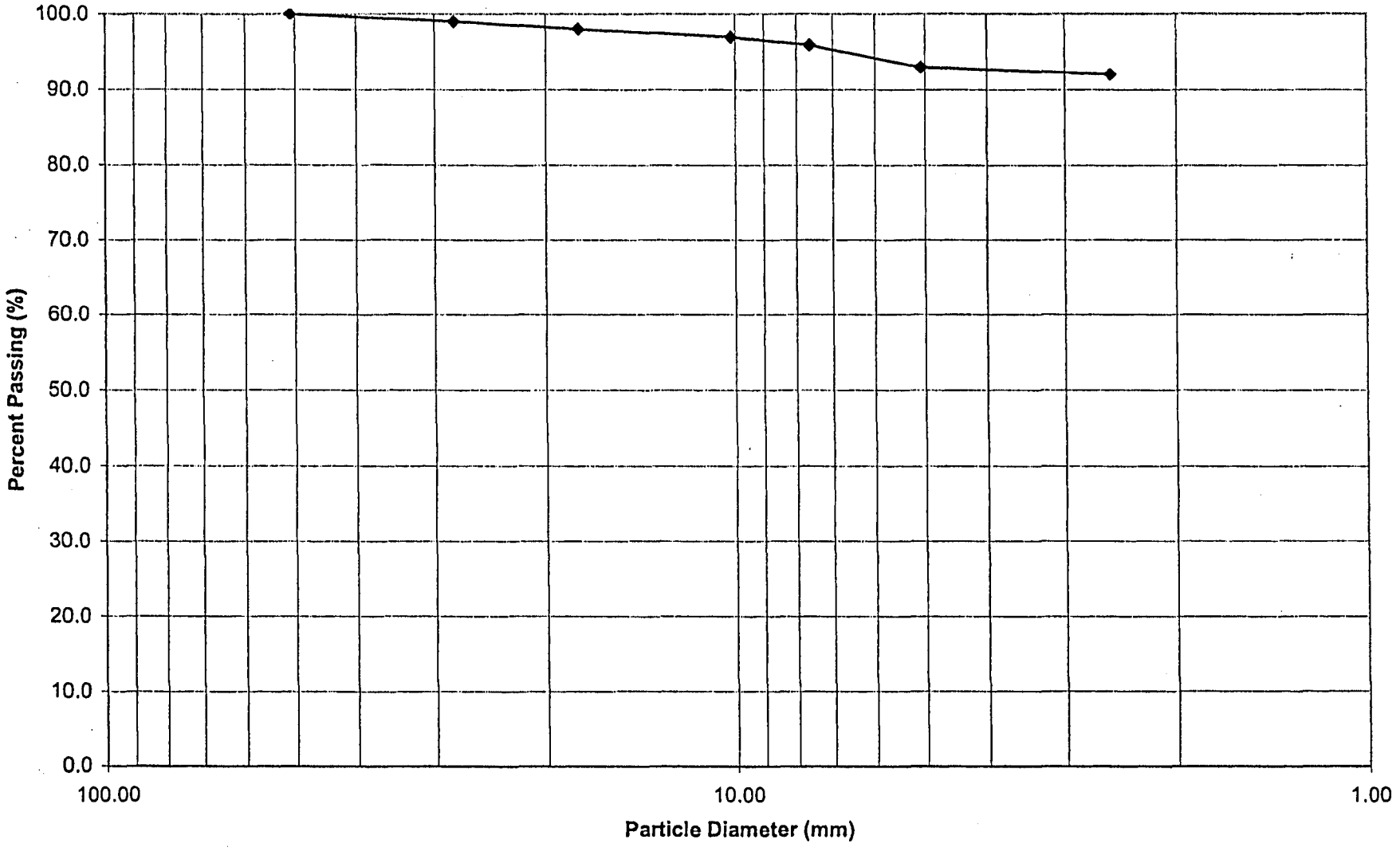
AASHTO R18

REVIEWED BY _____

Drainage C nel Improvements
MCDOT F t No. 68927
Ellsworth Road - Germann Rd to Guadalupe Rd
Mesa, Arizona
AMEC Job No. 4-117-001068

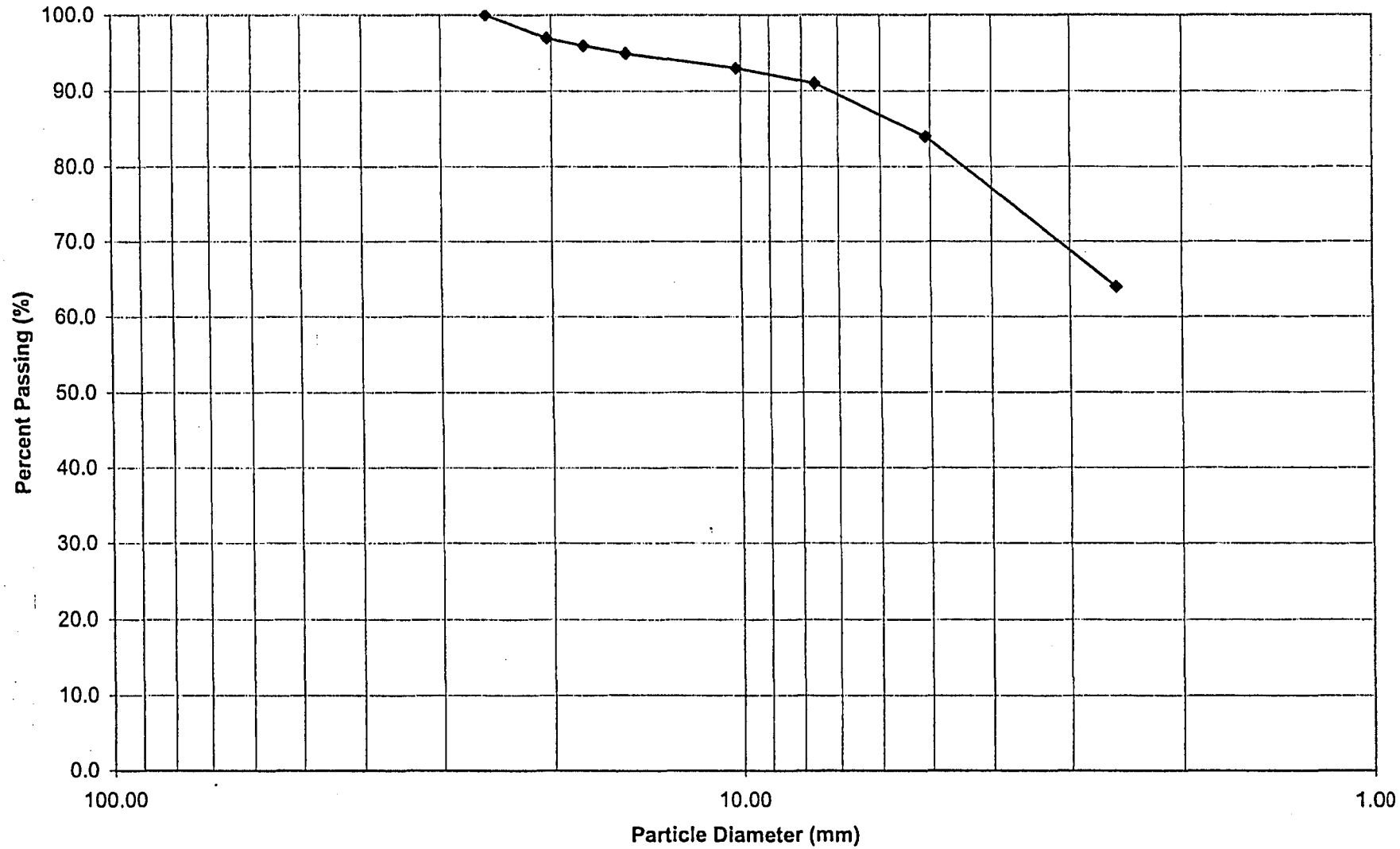
amec

WG-1: Ground Surface Grain-size Distribution



Drainage Channel Improvements
MCDOT Project No. 68927
Ellsworth Road - Germann Rd to Guadalupe Rd
Mesa, Arizona
AMEC Job No. 4-117-001068

WG-2: Ground Surface Grain-size Distribution



Gregg A. Creaser, P.E.
Brett P. Creaser, P.E.
Donald L. Cornelison, P.E.
Steven A. Griess, P.E.
Timothy J. Rheinschmidt, R.G.
Keith R. Gravel, P.E.

August 3, 2001

Mr. David Allard
CH2M HILL
1620 W. Fountainhead Parkway Suite 550
Tempe, AZ 85282-1843

RE: Project No. 010034SA
Supplemental Drainage Channel
Ellsworth Road
Germann to ½ Mile N. of Elliot
Mesa, AZ

Dear David:

As requested, Speedie & Associates conducted a supplementary investigation of a portion of the subject site along the proposed drainage channel. The purpose of this investigation was to provide additional information for the referenced project, No. 010034SA. This letter report presents our findings.

On June 6, 2001, seven (7) soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with truck-mounted CME 55 drill rig utilizing 7-inch diameter hollow stem flight augers. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location.

As the logs indicate, subsoil conditions consist of interbedded composites of clays, silts and sands with subordinate amounts of gravel and with varying degrees of calcareous cementation to depths of up to 6.4 meters (21 feet) below existing grade. Standard Penetration Test values generally range from 4 to 50+ blows per 300mm (foot), generally increasing with depth. No groundwater was encountered during this investigation. Based on visual and tactile observation, the soils were in a 'dry' state at the time of investigation.

Laboratory testing indicates in-situ dry densities of the upper soils ranging from 1430 to 1795 kg/m^3 (89 to 112 pcf) at 3.3 to 7.5 percent moisture, at the time of investigation. Liquid limits of the clays are in the 20 to 33 percent range with plasticity indices ranging from 3 to 17 percent. The upper clayey soils exhibit volume increase due to wetting of approximately 0.6 percent when re-compacted to moistures and densities normally expected during construction. Undisturbed samples displayed compression during increasing loading up to a load of 53 kPa (1,100 psf) and additional compression after inundation. Direct shear testing indicated cohesion of 65 kPa (1350 psf) and a friction angle of 27 degrees.

The data presented herein is based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

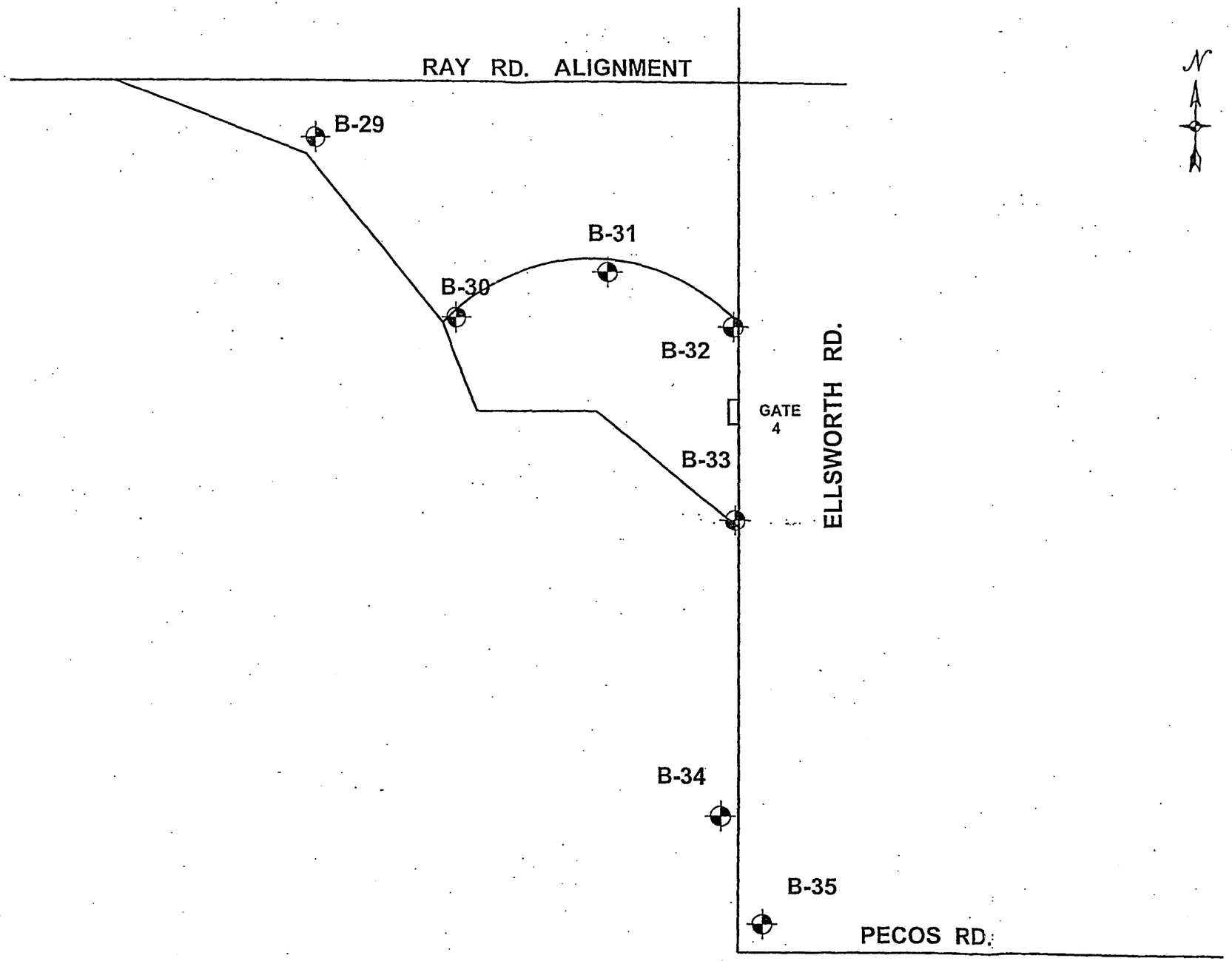
Respectfully submitted,
SPEEDIE & ASSOCIATES

Timothy J. Rheinschmidt, R.G.

Gregg A. Creaser, P.E.

Attachments: Boring Logs, Boring Location Plan,
Tabulation of Test Data, Moisture-Density Relations,
Consolidation Tests, Shear Test Diagram and Swell Test Data

FILE: DEPT_5\2001\RPTS\010034SA\010034SA.LtrRpt



⊕ – APPROXIMATE SOIL BORING LOCATIONS

BORING LOCATION PLAN

MARICOPA COUNTY DOT
ELLSWORTH RD.,GERMANN ELLIOT
MESA, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-8391

DR: CMW	CHK: TR	REV:	DATE: 07/23/01	Project No. 010034SA

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP (m)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Kilograms Per Cubic Meter)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			R VALUE at 300 PSI	CORRELATED R VALUE	pH	RESISTIVITY (Ohm-Centimeters)	% SULFATE (SO4)	% CHOLRIDE (CL)	UNIFIED SOIL CLASSIFICATION
						0.075mm SIEVE	0.425mm SIEVE	2.00mm SIEVE	4.750mm SIEVE	75.00mm SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX							
B-29	RS-3	RING	3.35	NT	NT	12	28	67	86	100	28	15	13	NT	51	NT	NT	NT	NT	SW-SC
B-30	BS-3	BULK	3.05	NT	NT	18	30	53	71	100	20	17	3	NT	70	NT	NT	NT	NT	SM
B-31	BS-2	BULK	1.52	NT	NT	33	50	69	80	100	20	15	5	NT	52	NT	NT	NT	NT	SC-SM
B-31	RS-4	RING	3.23	7.5	1589.0	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-32	RS-4	RING	3.35	3.3	1792.5	19	31	55	67	100	33	16	17	NT	40	NT	NT	NT	NT	SC
B-33	RS-3	RING	3.35	4.1	1707.6	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-34	S-1	SPT	0.76	NT	NT	81	99	100	100	100	28	16	12	NT	20	NT	NT	NT	NT	CL
B-34	RS-2	RING	1.83	6.2	1432.1	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	

Sieve analysis results do not include material greater than 75mm. Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested

Sheet 1 of 1

Ellsworth Road
Germann to 1/2 Mile N/o Elliot
Mesa, Arizona
Project No. 010034SA

SPEEDIE AND ASSOCIATES

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0–25)
0	Medium Dense to Very Dense Light Brown CLAYEY SAND (SC-Dry) with Gravel, Trace Silt, and Weak Calcareous Cementation	S-1	0.76	NT	NT	
1		RS-2	1.68	NT	NT	50/6"
2						
3		RS-3	3.35	NT	NT	
4						
4.88		RS-4	4.88	NT	NT	
5	End of Boring					
6						
7						
8						
9						
10						

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-29

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

_METRIC SPEEDIE 0034SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0 – 25 – 50)
0	Firm Light Brown SANDY SILT (ML-Dry) with Trace Clay and Trace Gravel	S-1	0.76	NT	NT	
0.91						
1	Loose Light Brown SILTY SAND (SM-Dry) with Trace Clay and Trace to Little Gravel	S-2	1.98	NT	NT	
2.44						
3	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Silt, Trace to Little Gravel and Moderate Calcareous Cementation, Interbedded with Sandy Clay	BS-3	3.05	NT	NT	
		RS-4	3.20	NT	NT	50/6"
4.88		RS-5	4.88	NT	NT	50/6"
5	End of Boring					
6						
7						
8						
9						
10						

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-30

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0 – 25 – 50)
0	Stiff Light Brown SANDY SILT (ML-Dry) with Trace Clay and Trace Gravel	S-1	0.76	NT	NT	
0.91						
1	Very Loose Light Brown SILTY SAND/CLAYEY SAND (SC/SM-Dry) with Trace Clay and Trace Gravel	BS-2	1.52	NT	NT	
		S-3	1.98	NT	NT	
2						
2.44						
3	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Silt, Trace Gravel and Moderate Calcareous Cementation	RS-4	3.23	7.5	1589.0	50/7"
4						
4.66	End of Boring	S-5	4.66	NT	NT	50/4"
5						
6						
7						
8						
9						
10						

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-31**

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

_METRIC SPEEDIE_34SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance-Blows per 300mm
0	Firm Light Brown SANDY SILT (ML-Dry) with Trace Clay and Trace Gravel	S-1	0.76	NT	NT	
1	1.07					
	Loose to Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Silt and Trace to Little Gravel	BS-2	1.52	NT	NT	
		S-3	1.98	NT	NT	
2						
3	3.35	RS-4	3.35	3.3	1792.5	
	Layer of Sandy Clay 3.66					
4	Hard Brown SANDY SILT/SILTY SAND (ML/SM-Dry) with Trace Clay, Trace Gravel and Moderate Calcareous Cementation	S-5	4.72	NT	NT	50/6"
5						
6	Interbedded with Sandy Clay 6.40	S-6	6.40	NT	NT	50/6"
	End of Boring					
7						
8						
9						
10						

Penetration Resistance scale: 0, 25, 50

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-32

Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

_METRIC SPEEDIE 010034SA.GPJ GENGEO.GDT 1/18/02

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (meters)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (kg/cu m)	Penetration Resistance Blows per 300mm (0–25–50)
0	Stiff Light Brown SANDY CLAY (CL-Dry)	S-1	0.76	NT	NT	
1 (1.07)	Stiff to Very Stiff Light Brown SANDY SILT (ML-Dry) with Trace to Little Clay Weak to Strong Calcareous Cementation	RS-2	1.83	6.2	1432.1	
2						
3 (3.14)	Trace Gravel	S-3	3.14	NT	NT	50/4"
	End of Boring					
4						
5						
6						
7						
8						
9						
10						

Boring Date: 6-21-01
Field Engineer/Technician: J. Laurie
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth (m)	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-34

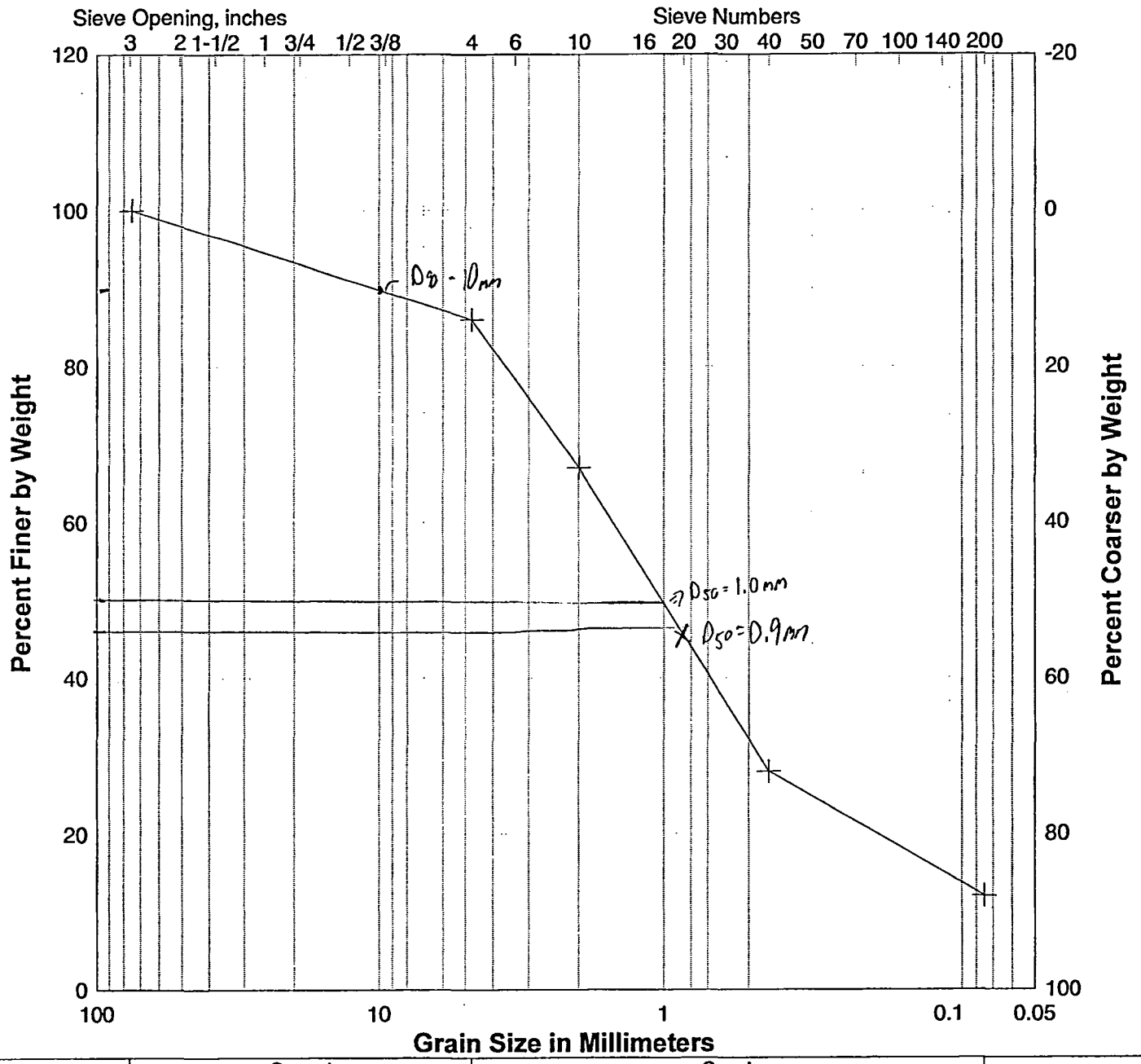
Ellsworth Road

Germann to 1/2 Mile N/o Elliot

Mesa, Arizona

Project No.: 010034SA

B-29

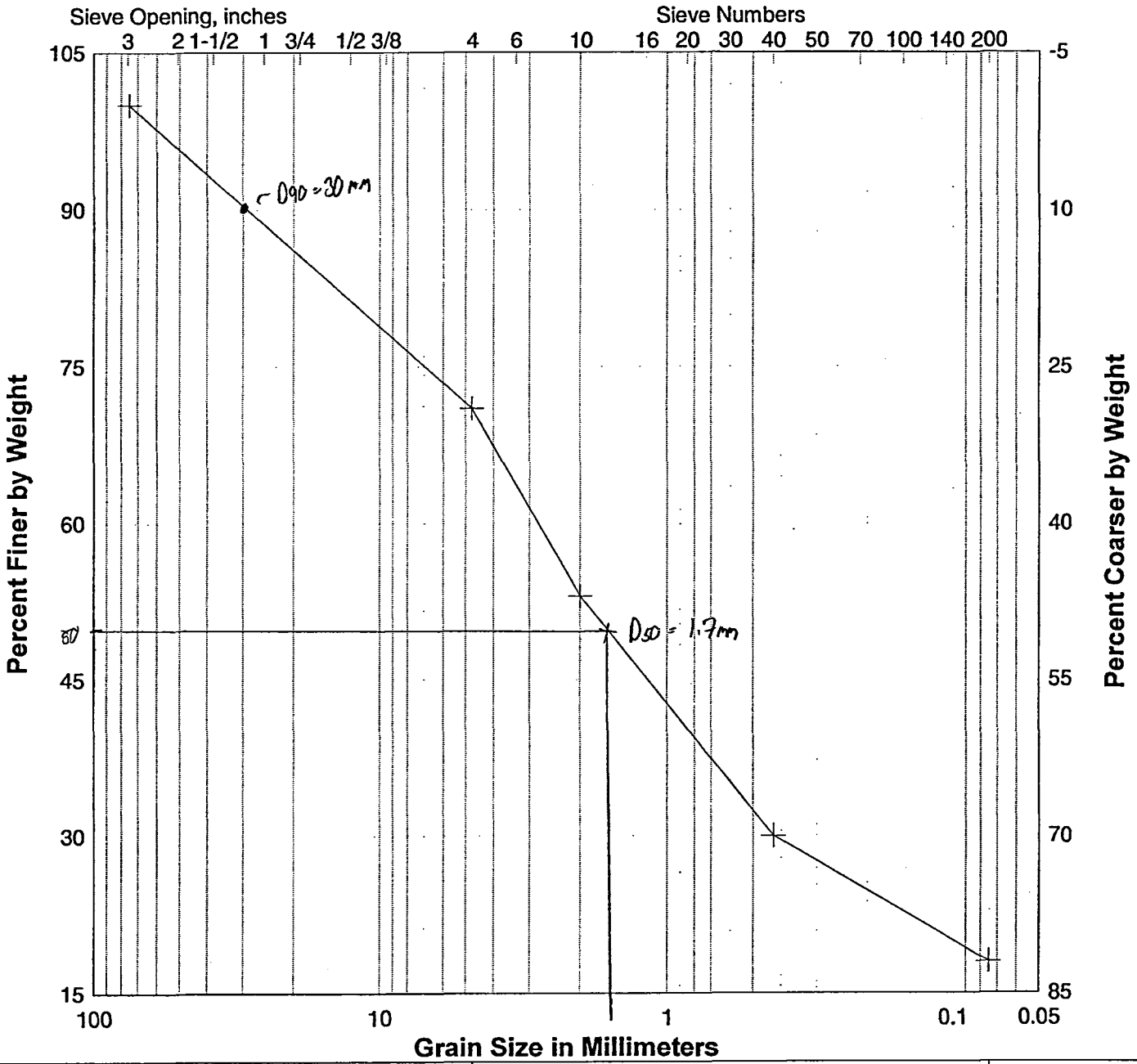


Cobbles	Gravel		Sand		
	Coarse	Fine	Coarse	Medium	Fine

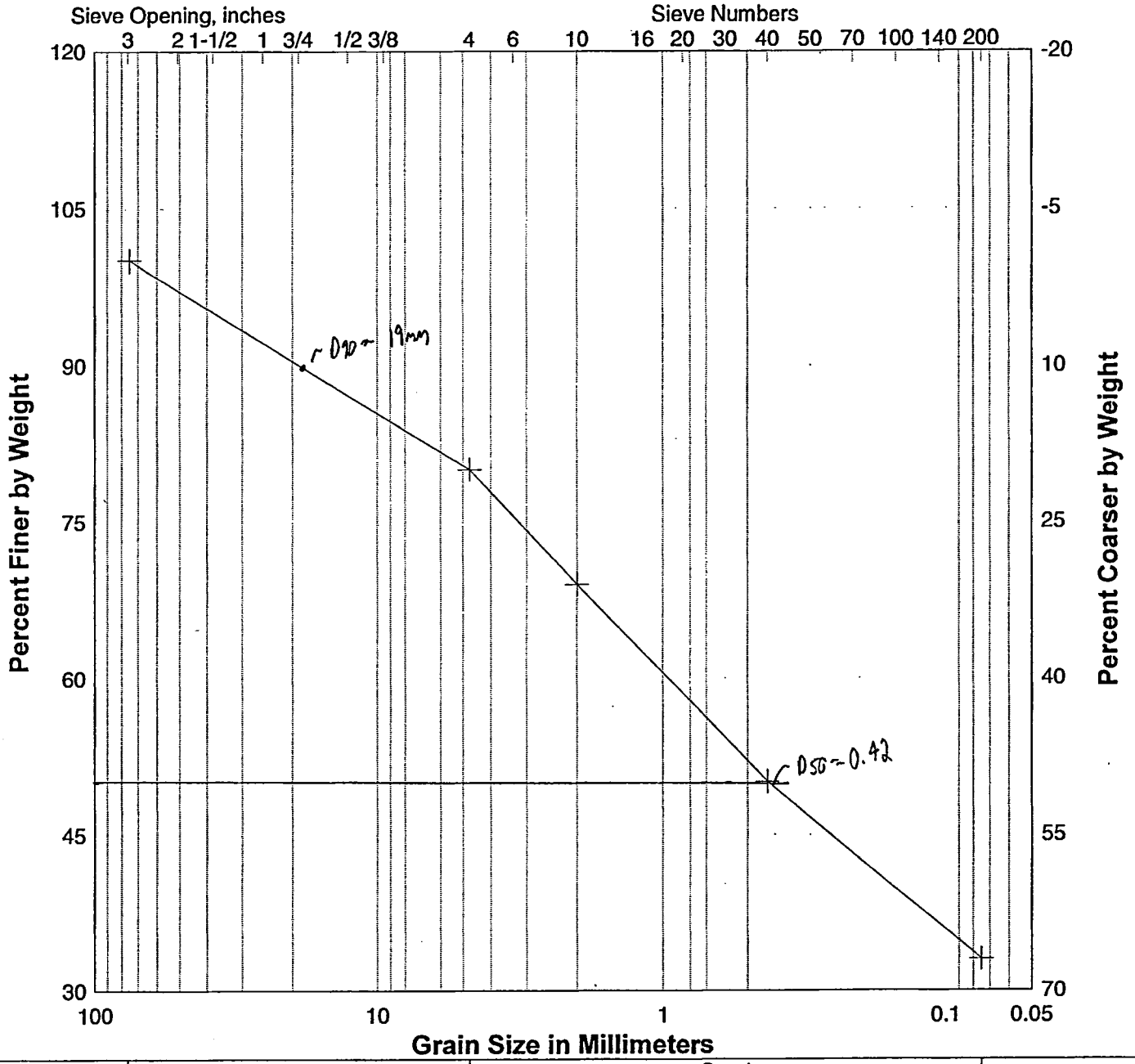
X - Grain size

y - mm

Plot1



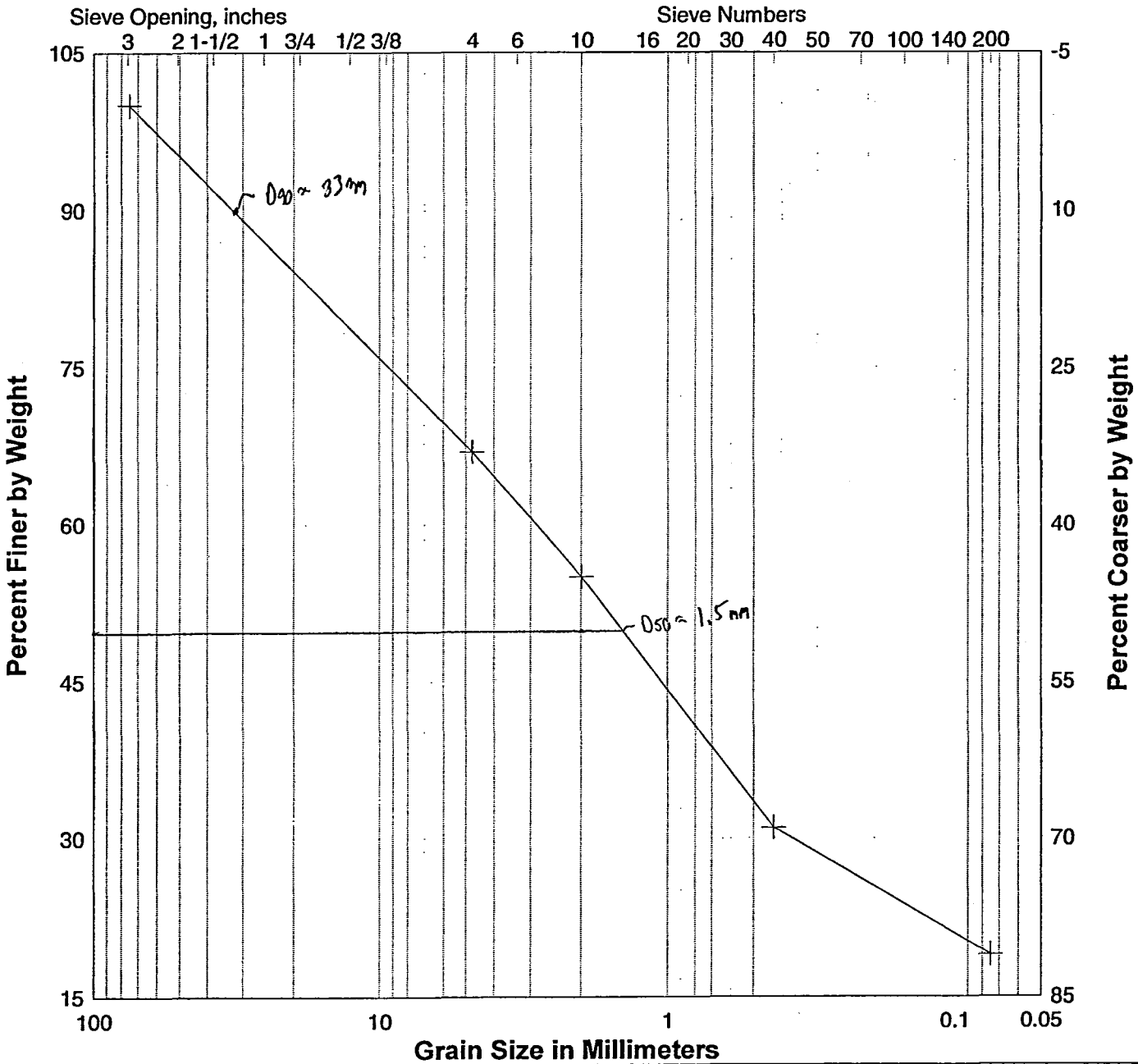
Cobbles	Gravel		Sand		
	Coarse	Fine	Coarse	Medium	Fine



Cobbles	Gravel		Sand			
	Coarse	Fine	Coarse	Medium	Fine	

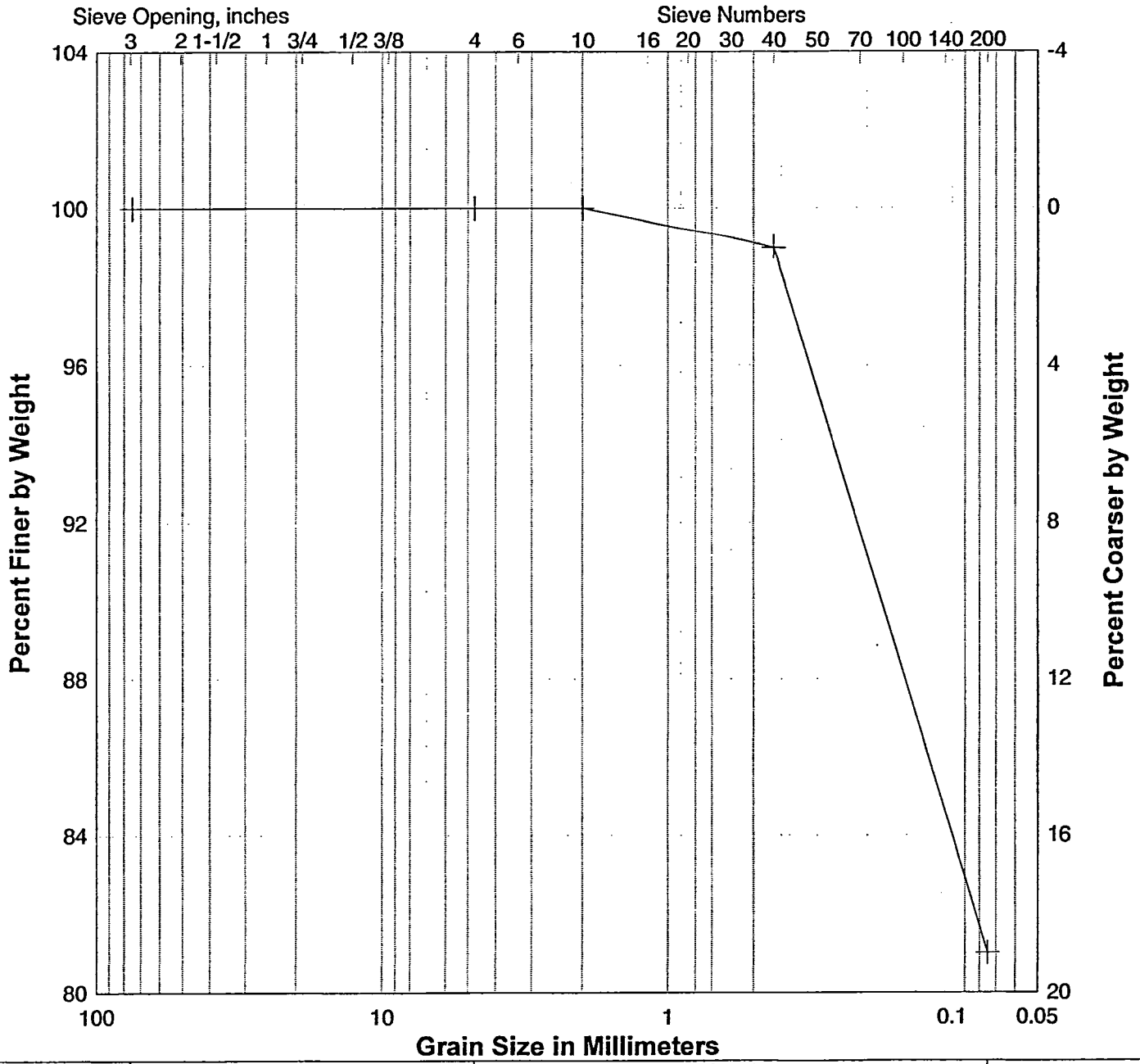
B-31

BS-2.arf



Cobbles	Gravel		Sand		
	Coarse	Fine	Coarse	Medium	Fine

B-32



Cobbles	Gravel		Sand			
	Coarse	Fine	Coarse	Medium	Fine	

B-39

S-1.grf

Station	Boring	Classif. 1	Depth (ft)	Classif. 2	Sample	PI	Depth (meters)	Depth (feet)	Penetration Resistance (Blows per foot)	
2+970	B-7	Sandy Silt	7	Silty Sand	BS-3	7	3.66	12.01	5	14
3+360	B-8	Clay	3.5	Sandy Clay	BS-4	17	4.57	14.99	12	50
3+740	B-9	Sandy Clay	9.5	Clayey Sand		NT		0.00	17	22
4+140	B-10	Sandy Clay	16	end of boring	BS-4	13	4.57	14.99	27	26
4+250	B-11	Sandy Clay	9	Clayey Sand		NT		0.00	18	23
4+500	B-12	Sandy Clay	10	Clayey Sand	BS-4	9	4.57	14.99	11	10
4+900	B-13	Sandy Clay	18.5	Clayey Sand		NT		0.00	18	23
5+300	B-14	Sandy Clay	18	Sand	BS-2	21	1.83	6.00	6	12
	B-29	Clayey San	16		RS-3	13	3.35	10.99	22	50
	B-30	Sandy Silt	3	Silty Sand	BS-3	3	3.05	10.01	9	8
	B-31	Sandy Silt	3	Silty Sand	BS-2	5	1.52	4.99	12	4
	B-32	Sandy Silt	3.5	Clayey Sand	RS-4	17	3.23	10.60	8	6
	B-33	Sandy Clay	4	Silty Sand	RS-3	NT			15	13
	B-34	Sandy Clay	3.5	Sandy Silt	S-1	12	0.76	2.49	10	26
	B-35	Sandy Silt	10.9			NT				
				Average		11.7			17.036	
				Std Dev		7.331			11.52	
				AVG-1STD		4.369			5.5161	

APPENDIX D

HEC-1 Output

- **100-Year Flow (From FCDMC)**
- **10-year Flow (Run by AMEC)**

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   07SEP04  TIME  14:31:42  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1          ID   Project ID: ELLSWORTH - Major Basin: 01 - Return Period: 100 Years
   2          ID
   3          ID   THIS MODEL IS THE FUTURE CONDITIONS MODEL FOR THE ELLSWORTH ROAD IMPROVEMENTS
   4          ID   AND CHANNEL DESIGN PROJECT.  IT HAS BEEN CHANGED FROM THE PREVIOUS MODEL BY
   5          ID   REDIRECTING FLOWS FROM SUBBASINS 61A, 61B, AND 67E TO FOLLOW THEIR EXISTING
   6          ID   CONDITIONS FLOW PATHS - WEST ACROSS ELLSWORTH ROAD.  THE PREVIOUS MODEL HAD
   7          ID   FLOWS FROM THESE SUBBASINS FLOWING SOUTH DOWN ELLSWORTH ROAD TO SUBBASIN 66D.
   8          ID   (cwr 4/17/03)
   9          ID
  10          ID   ****************************************************************************
  11          ID
  12          ID     THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
  13          ID     IT HAS BEEN MODIFIED BY CPE (7/2000)
  14          ID     FOR ALTERNATIVE 2 FOR THE EAST MARICOPA FLOOWAY
  15          ID     CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
  16          ID     TO ROUTE BOTH THE POWERLINE FLOOWAY
  17          ID     AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
  18          ID     INTO THE EMF
  19          ID
  20          ID    ****************************************************************
  21          ID
  22          ID          Model files changed by Collins/Pina Engineering
  23          ID          to reflect multi-use design concepts (recreation
```

```
 24          ID          and environment) proposed throughout the entire
 25          ID          EMF Corridor.    July 2000
 26          ID
 27          ID
 28          ID     VERSION 8.06  CPE 7/31/00
 29          ID
 30          ID  ******************************************************************************
 31          ID
 32          ID
 33          ID  ******************************************************************************
 34          ID   FILENAME: MIDDOUT.DAT
 35          ID
 36          ID   ALL CIP INFRASTRUCTURE IS IN PLACE, FUTURE CONDITIONS LANDUSE IS IN PLACE
 37          ID   FLOW IS ROUTED UP ELLSWORTH ROAD IN A EARTH LINED CHANNEL
 38          ID
 39          ID  ******************************************************************************
 40          ID   PRODUCED BY DIBBLE AND ASSOCIATES AND HOSKIN ENGINEERING CONSULTANTS.
 41          ID   File Name: Final8.Dat
 42          ID   Revised - Jan. 2000 by SZ (Wood/Patel) From Final7.dat - new Z-V & Sideweir
 43          ID   Revised - Jan. 2000 by SZ (Wood/Patel) from Final6.dat - 60% review comments
 44          ID   Revised - Dec. 1999 by SZ (Wood/Patel) from Final5.dat
 45          ID   Revised - Dec. 1999 by SZ (Wood/Patel) from Final4.dat
 46          ID   Revised - Nov. 1999 by SZ (Wood/Patel) from Final3.dat
 47          ID   Revised - June 1999 by SZ (Wood/Patel) for Final Model from Opt1.dat.
 48          ID   Revised - May 1999 by SZ (Wood/Patel) for Option 1, Based on Model SDIB.DAT
 49          ID   REVISED - MAY, 1999 BY VAS TO INCORPORATE INCREASE OF SUBBASIN RETENTION AND
 50          ID             REVISIONS TO THE REGIONAL DETENTION BASIN STORAGE
 51          ID   REVISED - FEB, 1999 BY VALERIE SWICK, FCD OF MARICOPA COUNTY
 52          ID   REVISED - MAY, 1998 BY D&A
 53          ID
 54          ID   REVISED BY VALERIE SWICK, FEB. 26, 1998
 55          ID
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 56          ID   FLOWS FROM DETENTION BASIN LOCATED AT NE CORNER OF ELLIOT AND ELLSWORTH ROADS
 57          ID   IS ROUTED TO THE SOUTHWEST BY SIPHON DRAW TO SUBBASIN 70A. FROM THERE THEY
 58          ID   WILL BE ROUTED BY A CHANNEL TO THE EMF. FLOWS FROM SUBBASINS ADJACENT TO
 59          ID   SANTAN FREEWAY ALIGNMENT WILL BE ROUTED SOUTH TO SUBBASIN 70A WHERE THEY WILL
 60          ID   BE COMBINED WITH FLOW IN SIPHON DRAW.
 61          ID
 62          ID   EAST MESA AREA DRAINAGE MASTER PLAN
 63          ID   AREA SOUTH OF SUPERSTITION (U.S. HWY 60)
 64          ID   AUGUST 1997
 65          ID   SOUTHEAST MESA HIGH RESOLUTION MODEL
 66          ID
 67          ID   ***********FUTURE CONDITION MODEL OF THE WATERSHED************************
 68          ID
 69          ID  ************ATTENTION*************************************************************
 70          ID    SUBBASINS 75, 79A, 79B, 78E,  LANDUSES WERE NOT
 71          ID    CHANGED BECAUSE IT WAS FELT THAT THEIR FUTURE CONDITIONS LANDUSES WOULD BE
 72          ID    SIMILAR TO THE EXISTING CONDITIONS LANDUSES.
 73          ID    RETENTION VOLUMES WILL ALSO NOT BE UTILIZED FOR SUBBASINS 75, 79A, 79B, 78E
 74          ID    SOME QUEEN CREEK SUBBASINS WILL ALSO NOT HAVE RETENTION VOLUMES, EITHER
 75          ID    BECAUSE THEY LIE IN PINAL COUNTY AND WE DONT KNOW PINAL COUNTIES PLANS OR
 76          ID    THEY LIE IN THE SANTAN MOUNTAINS AND WON'T GET DEVELOPED
 77          ID    WILLIAMS GATEWAY AIRPORT (SUBBASINS 80A, 80B, 81A, AND 81B) ARE MODELED AS
 78          ID    FUTURE CONDITIONS AND HAVE RETENTION VOLUMES FOR THE 100YR 2HR STORM
 79          ID  ******************************************************************************
 80          ID   FILENAME:  SDIBB.DAT
```

```
 81          ID
 82          ID   THIS MODEL REPRESENTS THE FUTURE CONDITION OF THE WATERSHED.
 83          ID   TOTAL DRAINAGE AREA IS APPROXIMATELY 213 SQ. MI.
 84          ID   THIS MODEL USES A Kn VALUE OF 0.09 FOR DESERT LAND USE DUE TO SHEET FLOW
 85          ID   CONDITIONS.
 86          ID
 87          ID   100-YEAR 24-HOUR FREQUENCY
 88          ID   AREAL REDUCTIONS FROM FCD HYDROLOGY MANUAL
 89          ID   THIS MODEL INCLUDES INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY
 90          ID   AND EAST OF THE CAP
 91          ID
 92          ID   DATA FROM THE QUEEN CREEK ADMS HAS BEEN ADDED TO CALCULATE FLOWS INTO THE
 93          ID   EMF.   MUSKINGUM ROUTING NSTEPS WERE ADJUSTED TO BE WITHIN THE SUGGESTED
 94          ID   RANGE.
 95          ID
 96          ID   METHODOLOGY
 97          ID   THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
 98          ID   SCS TYPE II RAINFALL DISTRIBUTION
 99          ID   S-GRAPH HYDROGRAPH
100          ID   GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
101          ID   NORMAL DEPTH STORAGE CHANNEL ROUTING
102          ID   APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
103          ID   EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
104          ID   DATED 1994
105          ID   THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS
106          ID
107          ID   ORIGINAL STUDY PERFORMED BY LISA C. YOUNG AND AFSHIN AHOURAIYAN, UPDATED BY
108          ID   DAVID DEGERNESS (OCT-DEC, 1996). REVIEWED BY VALERIE A. SWICK
109          ID   AND AMIR MOTAMEDI OF THE FLOOD CONTROL DISTRICT
110          ID   HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

111          ID   DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.
112          ID
113          ID   ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2-3 FT/SEC FOR WASH/NATURAL
114          ID   CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
115          ID
116          ID   VELOCITIES FOR ADMP IMPROVEMENT CHANNELS FROM DIBBLE AND ASSOCIATES
117          ID   SUGGESTED ALTERNATIVES (JULY 1, 1997)
118          ID
119          ID
120          ID   NOTE: MUST USE NDIBF.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
121          ID         SUPERSTITION FREEWAY.
122          ID
123          ID   DDM MCUHP2 SE MESA ADMP - SOUTH OF SUPERSTITION FWY, FUTURE CONDITIONS
             *DIAGRAM
124          IT       5  1APR97    0000     600
125          IO       5
126          IN      15
127          JD    3.60    0.01
128          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
129          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
130          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
131          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
132          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
133          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
134          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
135          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
136          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
```

```
137          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
138          JD   3.578     1.0
139          JD   3.492     5.0
140          JD   3.384    10.0
141          JD   3.240    30.0
142          JD   3.096    60.0
143          JD   3.046    90.0
144          JD   3.002   120.0
145          JD   2.970   150.0
             *
             * DDM   ***** Preserved *****

146          KK    SOSS
147          KM   INFLOW FROM SOSSAMAN BASIN VIA SOSSAMAN CHANNEL
148          KM   QI CARDS ARE BASED ON THE PEAK OF 1800CFS TO SOSSAMAN CHANNEL
149          BA   12.50
150          ZR  =QI A=SOSSAMAN DRAIN B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
             *
             * DDM   ***** Preserved *****

151          KK   RSOSS
152          KM   ROUTE FLOWS VIA SOSSAMAN CHANNEL TO BASELINE ROAD
153          RS       1    FLOW      -1
154          RC    .030    .025    .030    3500    .005
155          RX       0       5      10      35      75     110     115     120
156          RY      10      10      10       4       4      10      10      10
             *
             * DDM   ***** Updated *****
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

157          KK     59A
158          KM   BASIN 59A
159          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
160          KM    L=       .9  Lca=       .3   S=   34.9  Kn= .070  LAG=  29.7
161          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
162          BA     .26
163          LG     .23     .25    4.55     .42   33.00
164          UI     30.     77.    144.    186.    246.    364.    293.    226.    172.    123.
165          UI     64.     48.     30.     15.      9.      9.      9.      0.      0.      0.
166          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

167          KK    R59A
168          KM   RETAIN THE 100 YEAR 2 HOUR RUNOFF VOLUME
169          DT    D59A       2
170          DI       0   10000
171          DQ       0   10000
             *
             * DDM   ***** Preserved *****

172          KK    C59A
173          KM    SOSSAMAN DRAIN AT BASELINE ROAD
174          HC       2
             * DDM   ***** Preserved *****

175          KK  59A59B
176          KM   ROUTE S59A TO 59B VIA SOSSAMAN CHANNEL
```

```
177     KM   BLOCK WALL ON LEFT BANK, SOSSAMAN ROAD ON RIGHT BANK
178     RS       4    FLOW      -1
179     RC    .025    .018    .013    6500   .0015
180     RX       0       3      13      38      78     103     128     203
181     RY      16      10      10       0       0      10       8      10
        *
        * DDM   ***** Updated *****

182     KK     59B
183     KM   BASIN 59B
184     KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
185     KM    L=      1.2  Lca=       .7   S=   33.9  Kn= .087  LAG=  58.3
186     KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
187     BA     .94
188     LG     .22     .24    4.65     .41   24.00
189     UI     54.     54.     93.    193.    244.    284.    318.    361.    415.    501.
190     UI    653.    666.    546.    473.    422.    364.    319.    273.    233.    172.
191     UI    110.     94.     89.     68.     54.     54.     19.     17.     17.     17.
192     UI     17.     17.     17.     17.      0.      0.      0.      0.      0.      0.
193     UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

194     KK    R59B
195     KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
196     DT    D59B      63
197     DI       0   10000
198     DQ       0   10000
        *
        * DDM   ***** Preserved *****

199     KK    C59B
200     KM   SOSSAMAN CHANNEL AT GUADALUPE ROAD
201     HC       2
        *
        * DDM   ***** Preserved *****

202     KK  59BT60
203     KM     ROUTE 59B TO 60 GUADALUPE CHANNEL.  Assumed v=5ft/sec for NSTP calculation
204     RS       4    FLOW      -1
205     RC     .02    .013     .02    5500   .0005
206     RX       0     518     522     522     560     560     580    2580
207     RY     8.5     8.5     8.5       0       0       8       7       6
        *
        * DDM   ***** Updated *****

208     KK      60
209     KM   BASIN 60
210     KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
211     KM    L=      2.4  Lca=      1.4   S=   31.8  Kn= .087  LAG= 102.0
212     KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
213     BA    2.30
214     LG     .18     .24    4.65     .43   35.00
215     UI     76.     76.     76.     76.    130.    250.    286.    330.    364.    395.
216     UI    422.    452.    484.    522.    571.    607.    689.    820.    915.   1008.
217     UI    885.    793.    723.    669.    626.    591.    536.    496.    459.    424.
218     UI    387.    362.    324.    276.    219.    169.    134.    134.    126.    125.
```

```
219          UI    121.     76.     76.     76.     76.     56.     23.     23.     23.     23.
220          UI     23.     23.     23.     23.     23.     23.     23.     23.     23.     23.
221          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
222          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

223          KK     R60
224          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
225          DT     D60     170
226          DI       0   10000
227          DQ       0   10000
             *
             * DDM   ***** Preserved *****
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

228          KK  EMFGUA
229          KM     COMBINE S59 AND S60 AT EMF, GUADALUPE ROAD
230          KO                                      21
231          HC       2
             *
             * DDM   ***** Preserved *****

232          KK  GUATEL
233          KM   ROUTE EMF FLOW FROM GUADALUPE ROAD TO ELLIOT ROAD
234          RS       3    FLOW      -1
235          RC     .03    .022     .03    6000   .0003
236          RX       0     500     520     553     693     726     740     742
237          RY      14      12      11       0       0      11      11      12
             *
             * DDM   ***** Updated *****

238          KK      64
239          KM   BASIN 64
240          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
241          KM    L=      1.2  Lca=       .6   S=   25.4  Kn= .051  LAG=  34.4
242          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
243          BA     .81
244          LG     .18     .25    4.70     .41   54.00
245          UI     79.    155.    338.    438.    543.    709.    988.    778.    624.    493.
246          UI    388.    253.    139.    120.     79.     45.     24.     24.     24.     24.
247          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
248          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

249          KK     R64
250          KM   R64 IS WHAT REMAINS AFTER THE DIVERSION OF FLOW UP TO 67 AC-FT. THIS IS SENT
251          KM   TO TAPE 21 FOR RECALL INTO FCD'S EMF MODELS.  KK BLOCK THERE MUST BE UPDATED
252          KM   TO REFLECT THE CHANGE OF WHAT GETS SENT TO THE TAPE 21.
253          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
254          KO                                      21
255          DT     D64      67
256          DI       0   10000
257          DQ       0   10000
             *
             * DDM   ***** Preserved *****
```

```
258          KK  EMFELL
259          KM     COMBINE EMF FLOW WITH FLOW FROM SUBBASIN 64 AT ELLIOT ROAD
260          HC       2
             *
             * DDM   ***** Preserved *****

261          KK  ELTWAR
262          KM   ROUTE EMF FLOW AT ELLIOT ROAD TO WARNER ROAD VIA THE EMF
263          RS       2    FLOW      -1
264          RC     .03    .022     .03    5500   .0003
265          RX       0     500     520     553     693     726     740     742
266          RY      14      12      11       0       0      11      11      12
             *
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

267          KK     62B
268          KM   BASIN 62B
269          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
270          KM    L=        .6  Lca=       .3   S=   47.5  Kn= .021  LAG=   8.0
271          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
272          BA     .23
273          LG     .11     .25    4.65     .46   78.00
274          UI    334.    940.    431.     83.      0.      0.      0.      0.      0.      0.
275          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

276          KK    R62B
277          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
278          DT    D62B      19
279          DI       0   10000
280          DQ       0   10000
             *
             * DDM   ***** Preserved *****

281          KK   62BTD
282          KM   ROUTE 62B TO 62D VIA HAWES ROAD
283          RS       6    FLOW      -1
284          RC    .045     .04    .045    5280   .0041
285          RX       0     100     125     127     177     179     224     324
286          RY       3       2    1.50       0       0     1.5       2       3
             *
             * DDM   ***** Updated *****

287          KK     62D
288          KM   BASIN 62D
289          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
290          KM    L=        .9  Lca=       .3   S=   30.7  Kn= .045  LAG=  21.3
291          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
292          BA     .46
293          LG     .23     .25    4.65     .40   50.00
294          UI     76.    300.    519.    753.    475.    369.    286.    203.    163.    111.
295          UI     85.     63.     47.     36.     26.     14.     14.     14.     14.      0.
296          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
297          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****
```

```
298          KK    R62D
299          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
300          DT    D62D      35
301          DI       0   10000
302          DQ       0   10000
             * DDM   ***** Preserved *****
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

303          KK   CP62D
304          KM   COMBINE FLOWS FROM SUBBASINS 62B AND 62D
305          HC       2
             *
             * DDM   ***** Preserved *****

306          KK   62DTF
307          KM   ROUTE 62D TO 62F VIA HAWES ROAD
308          RS       4    FLOW      -1
309          RC    .045    .024    .045    3600   .0033
310          RX       0     500     750     753     793     796    1046    1546
311          RY       3     1.5    1.25       0       0    1.25     1.5       3
             *
             * DDM   ***** Updated *****

312          KK     62F
313          KM   BASIN 62F
314          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
315          KM    L=       .6  Lca=       .4  S=   31.9  Kn= .042  LAG=  18.1
316          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
317          BA     .26
318          LG     .21     .25    4.65     .41   54.00
319          UI     66.    224.    350.    546.    371.    235.     98.     56.     18.     15.
320          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
321          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

322          KK    R62F
323          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
324          DT    D62F      18
325          DI       0   10000
326          DQ       0   10000
             *
             * DDM   ***** Preserved *****

327          KK   CP62F
328          KM   COMBINE FLOWS FROM 62D AND 62F
329          HC       2
             *
             * DDM   ***** Preserved *****

330          KK   62T63
331          KM   ROUTE CP62F TO SUBBASIN 63 VIA WASH.
332          KM   WASH CROSSES HAWES, NORTH OF ELLIOT
333          RS       7    FLOW      -1
334          RC    .045     .04    .045    6000  0.0055
335          RX       0     500     750     770     780     800    1050    1550
336          RY       5       4       3       0       0       3       4       5
             *
```

```
                    * DDM   ***** Inserted *****
1                                          HEC-1 INPUT                                                    PAGE  9

LINE                ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 337                KK      63
 338                KM   BASIN 63
 339                KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 340                KM    L=       1.4  Lca=        .7   S=   28.2  Kn= .035  LAG=  26.8
 341                KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 342                BA     .91
 343                LG     .18      .25    4.65     .43   55.00
 344                UI    114.     346.    595.    780.   1159.   1291.    930.    689.    485.    241.
 345                UI    170.     113.     35.     35.     35.     35.      0.      0.      0.      0.
 346                UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    *
                    * DDM   ***** Preserved *****

 347                KK     R63
 348                KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
 349                DT     D63      71
 350                DI       0   10000
 351                DQ       0   10000
                    *
                    * DDM   ***** Preserved *****

 352                KK    CP63
 353                KM   COMBINE FLOWS FROM SUBBASIN 63 AND CP62F
 354                HC       2
                    *
                    * DDM   ***** Preserved *****

 355                KK   63T71
 356                KM   ROUTE CP63 TO S71 VIA SHEET FLOW
 357                KM   SOSSAMAN SOUTH OF ELLIOT
 358                RS       6    FLOW      -1
 359                RC    .055    .045    .055    5280   .0005
 360                RX       0    1000    1005    1010    1013    1043    1543    2043
 361                RY       6       5       0       0       3       5       2       5
                    *
                    *
                    * DDM   ***** Updated *****

 362                KK     68B
 363                KM   BASIN 68B
 364                KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 365                KM    L=       .6  Lca=        .3   S=   32.3  Kn= .020  LAG=   7.7
 366                KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 367                BA     .25
 368                LG     .10      .25    5.20     .36   80.00
 369                UI    377.    1018.    412.     72.      0.      0.      0.      0.      0.      0.
 370                UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    *
1                                          HEC-1 INPUT                                                    PAGE 10

LINE                ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 371                KK     R68
 372                KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
```

```
373          DT    D68B      24
374          DI       0   10000
375          DQ       0   10000
             *

376          KK  68BT69
377          KM   ROUTE S68B TO S69 VIA WASH CROSSING HAWES
378          RS       3    FLOW      -1
379          RC    .045     .04    .045    2750   .0036
380          RX       0     500     950    1003    1007    1057    1511    2011
381          RY       4     3.5       3       0       0       2     2.5       3
             *

382          KK      69
383          KM   BASIN 69
384          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
385          KM    L=       .7  Lca=       .3   S=   22.4  Kn= .020  LAG=   9.0
386          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
387          BA     .09
388          LG     .10     .25    4.70     .45   80.00
389          UI    104.    320.    213.     54.     11.      0.      0.      0.      0.      0.
390          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

391          KK     R69
392          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
393          DT     D69       9
394          DI       0   10000
395          DQ       0   10000
             *
             * DDM   ***** Preserved *****

396          KK     C69
397          KM   COMBINE FLOWS FROM SUBBASIN 68B AND 69
398          HC       2
             *
             * DDM   ***** Preserved *****

399          KK   69T71
400          KM   ROUTE S69 TO S71 VIA WASH AND SHEET FLOW, INCREASE OVERBANK N VALUES
401          RS       7    FLOW      -1
402          RC    .055    .045    .055    6000   .0033
403          RX       0     500    1000    1001    1002    1500    2000    2500
404          RY       4       3       2       0       0       2       3       4
             *
             * DDM   ***** Inserted *****
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

405          KK      71
406          KM   BASIN 71
407          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
408          KM    L=      1.6  Lca=       .8   S=   26.4  Kn= .020  LAG=  16.8
409          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
410          BA    1.09
411          LG     .10     .25    4.65     .47   80.00
412          UI    331.   1085.   1805.   2349.   1459.    780.    329.    144.     67.     67.
413          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
414          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

415          KK     R71
416          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
417          DT     D71     106
418          DI       0   10000
419          DQ       0   10000
             *
             * DDM   ***** Preserved *****

420          KK     C71
421          KM   original wording "COMBINE S71 WITH S69 AND S68B"
422          KM   was revised by Dibble to be "COMBINE FLOWS FROM S63, S68B, S69 AND S71,
423          KM   WHICH COMBINES HYDROGRAPHS 63T71, 69T71 AND R71"
424          KM   CONCENTRATION POINT IS ALONG SOSSAMAN AT THE MESQUITE ST ALIGNMENT
425          HC       3
             *

426          KK   71T72
427          KM   ROUTE C71 TO S72 VIA DIKE
428          KM    WASH WEST OF INTERSECTION OF SOSSAMAN & WARNER
429          RS       4    FLOW      -1
430          RC    .055    .045    .055    3750   .0037
431          RX       0     500    1000    1007    1017    1025    1530    2030
432          RY       9     8.5       8       0       0       8     8.5       9
             *
             * DDM   ***** Inserted *****

433          KK      72
434          KM   BASIN 72
435          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
436          KM    L=      1.6  Lca=       .9   S=   13.1  Kn= .020  LAG=  20.3
437          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
438          BA     .84
439          LG     .10     .25    5.40     .33   80.00
440          UI    161.    600.    906.   1496.   1347.    912.    566.    247.    153.     50.
441          UI     43.     43.      0.      0.      0.      0.      0.      0.      0.      0.
442          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

443          KK     R72
444          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
445          DT     D72      83
446          DI       0   10000
447          DQ       0   10000
             *
             * CONCENTRATION POINT ADDED PRIOR TO EMF COMBINE SO THAT FLOWS CAN BE SENT TO
             * TAPE21.

448          KK  CPKNOX
449          KO                                  21
450          HC       2
             *
             * DDM   ***** Preserved *****
```

```
451          KK  EMFWAR
452          KM   COMBINE ROUTED FLOW FROM 71 WITH 72 WITH EMF (HYDROGRAPH ELTWAR)
453          HC       2
             * DDM   ***** Preserved *****

454          KK  WARTKN
455          KM   ROUTE EMF WARNER ROAD FLOW TO KNOX ROAD
456          RS       1    FLOW      -1
457          RC     .03    .022     .03    2500   .0003
458          RX       0     500     520     553     693     726     740     742
459          RY      14      12      11       0       0      11      11      12
             *

460          KK     70B
461          KM   BASIN 70B
462          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
463          KM    L=      1.6  Lca=      1.1   S=   29.9  Kn= .022  LAG=  20.7
464          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
465          BA     .38
466          LG     .11     .15    8.00     .12   76.00
467          UI     68.    259.    390.    636.    615.    418.    267.    119.     73.     30.
468          UI     19.     19.      0.      0.      0.      0.      0.      0.      0.      0.
469          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

470          KK    R70B
471          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
472          DT    D70B      38
473          DI       0   10000
474          DQ       0   10000
             *

475          KK  70BT76
476          KM   ROUTE 70B TO 76B VIA WASH CROSSING SOSSAMAN, SOUTH OF WARNER ROAD
477          RS       6    FLOW      -1
478          RC    .045     .04    .045    5500   .0041
479          RX       0     500    1000    1003    1007    1011    1511    2011
480          RY       4     3.5       3       0       0       2     2.5       3
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

481          KK     76B
482          KM   BASIN 76B
483          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
484          KM    L=      1.8  Lca=       .9   S=   27.4  Kn= .021  LAG=  18.9
485          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
486          BA     .64
487          LG     .10     .15    8.80     .09   78.00
488          UI    148.    515.    789.   1294.    957.    629.    303.    157.     70.     35.
489          UI     35.      0.      0.      0.      0.      0.      0.      0.      0.      0.
490          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

491          KK    R76B
492          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
493          DT    D76B      66
```

```
494          DI       0   10000
495          DQ       0   10000
             *

496          KK    KNOX
497          KM   COMBINE FLOWS AT KNOX ROAD
498          KO                                      21
499          HC       2
             *

500          KK  EMFKNX
501          KM   COMBINE FLOWS INTO THE EMF AT KNOX ROAD
502          KM   THIS COMBINES HYDROGRAPHS WARTKN, 70BT76 and R76B.
503          HC       2
             *

504          KK  KNXTRY
505          KM   ROUTE EMF KNOX ROAD FLOW TO RAY ROAD
506          RS       1    FLOW      -1
507          RC     .03    .022     .03    3000   .0003
508          RX       0     500     520     553     693     726     740     742
509          RY      14      12      11       0       0      11      11      12
             *

510          KK     65A
511          KM   BASIN 65A
512          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
513          KM    L=      1.6  Lca=       .9   S=   51.2  Kn= .053  LAG=  41.5
514          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
515          BA    2.54
516          LG     .15     .25    5.10     .35   59.00
517          UI    206.    248.    735.   1001.   1188.   1423.   1760.   2487.   2309.   1835.
518          UI   1546.   1269.   1035.    777.    457.    351.    292.    206.    143.     63.
519          UI     63.     63.     63.     63.      0.      0.      0.      0.      0.      0.
520          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

521          KK    R65A
522          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
523          DT    D65A     174
524          DI       0   10000
525          DQ       0   10000
             * DDM   ***** Preserved *****

526          KK   CAP1A
527          KM   INFLOW FROM EAST OF THE CAP THROUGH 2 - 72" PIPE OVERCHUTES
528          KM   STATION #131+90 AND 158+00 SALT-GILA AQUEDUCT REACH 2
529          KM   QI CARDS BASED ON PEAK OUTFLOW FROM OVERCHUTES OF 217 CFS.
530          IN      60
531          BA     .01
532          QI       0      65     217     217     217     217     217     217     217     217
533          QI     217     217     217     217     217     217     217     217     217     217
534          QI     217     217     217     217     217
             *
             * DDM   ***** Preserved *****

535          KK  RCAP1A
```

```
KM   ROUTE FLOW FROM CAP OVERCHUTE TO A POINT ON THE MARICOPA/PINAL COUNTY LINE
KM   2000 FEET NORTH OF THE GUADALUPE ROAD COUNTY LINE INTERSECTION. ROUTING WILL
KM   BE BY A NATURAL CHANNEL.  THIS IS THEN ROUTED FOR 1200 FT
KM   IN A CHANNEL (DIBBLE ID MN3) TO THE POINT WERE THE ROUTED CAP1B FLOW
KM   INTERCEPTS THE CHANNEL. ORIGINAL SLOPE =.01
RS      13    FLOW      -1
RC    .045     .04    .045    4900    .010
RX       0     500    1000    1006    1026    1032    1511    2011
RY       4     3.5       3       0       0       3     3.5       4
*

KK  RRCP1A
KM   REACH MN-5 AND CULVERT MNC-1
KM   ROUTE FLOW FROM WHERE RCAP1A FLOWS INTO THE NEW CHANNEL ALONG MERIDIAN ROAD
KM   USES REVISED ROUTING PARAMETERS, CHANNEL MN-5 SHAPE
RS       1    FLOW      -1
RC   0.025   0.015   0.025    2350   .0017
RX       0       8      16      27      43      53      61      69
RY     5.1     5.2     5.3       0       0     5.3     5.2     5.1
*

KK   CAP1B
KM   INFLOW FROM EAST OF THE CAP THROUGH 2 - 72" PIPE OVERCHUTES
KM   STATION #131+90 AND 158+00 SALT-GILA AQUEDUCT REACH 2
KM   QI CARDS BASED ON PEAK OUTFLOW FROM OVERCHUTES OF 217 CFS.
IN      60
BA     .01
QI       0      65     217     217     217     217     217     217     217     217
QI     217     217     217     217     217     217     217     217     217     217
QI     217     217     217     217     217
*
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  RCAP1B
KM   ROUTE FLOW FROM CAP1B OVERCHUTE TO A POINT ALONG THE MARICOPA/PINAL COUNTY
KM   LINE 1000 FEET NORTH OF THE INTERSECTION OF GUADALUPE ROAD AND THE COUNTY
KM   LINE. ROUTING WILL BE BY A NATURAL CHANNEL. ORIGINAL SLOPE=.01
RS      14    FLOW      -1
RC    .045     .04    .045    4900    .010
RX       0     500    1000    1006    1026    1032    1511    2011
RY       4     3.5       3       0       0       3     3.5       4
*

KK   C65A1
KM   COMBINE FLOWS FROM SUBBASIN 65A(EAST OF MERIDIAN RD) AND CAP1A AND CAP1B
HC       3
*

KK  65ATB1
KM   REACH MN-4, MN-3B AND MN-3A
KM   ROUTE FLOW FROM BASIN 65A TO OFF-LINE DETENTION BASIN DIVERSION STRUCTURE
KM   USES REVISED ROUTING PARAMETERS, CHANNEL MN-3A SHAPE.
RS       1    FLOW      -1
RC   0.025   0.015   0.025    3760   .0015
RX     0.0     8.0    16.0      34      56      74      82      90
RY     8.8     8.9     9.0       0       0     9.0     8.9     8.8
*
```

```
581          KK  DIDB65
582          KM   DETENTION BASIN DIVERSION STRUCTURE
583          KM   DIVERT FLOW FROM CHANNEL TO OFF-LINE BASIN
             * KO      2       2
584          DT   DB65A
585          DI       0     100     434     582     854    1206    1624    2096    3188
586          DQ       0       0       0     148     420     772    1190    1662    2754
             *

587          KK  65B1T2
588          KM   REACH MN-2
589          KM   ROUTE FLOW FROM BASIN DIVERSION STRUCTURE TO BASIN OUTLET
590          RS       1    FLOW      -1       0
591          RC    .025    .015    .025     700   .0019
592          RX     0.0     8.0    16.0      25      35      44      52      60
593          RY     8.7     8.8     4.5       0       0     4.5     8.8     8.7
             *

594          KK  DIB65P
595          KM         RETURN DIVERT TO DETENTION BASIN
596          DR   DB65A
             *

597          KK   DB65A
598          KM   SIPHON DRAW BASIN
599          KM   OFF-LINE DETENTION BASIN LOCATED AT ELLIOT AND MERIDIAN ROAD
600          KM   WITH  36" OUTLET PIPE AND 235' WEIR
             * KO    2       2
601          RS       1    STOR       0
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

602          SA       0    4.67   15.05   27.12   37.88   42.12
603          SE      90      91      93      95      97      98
604          SL    91.5    7.07     .62      .5
605          SS    97.0     235     2.5     1.5
             *

606          KK   C65A2
607          KM   RECOMBINE FLOWS FROM DETENTION BASIN AND SUNLAND SPRINGS CHANNEL.
608          HC       2
             *

609          KK  65AT-1
610          KM   REACH MN-1
611          KM   ROUTE FROM DETENTION BASIN OUTLET TO ELLIOT ROAD AND MERIDIAN ROAD
612          KM   CONCRETE CHANNEL ON EAST SIDE OF MERIDIAN ROAD ALGN.
613          RS       1    FLOW      -1
614          RC    .025    .015    .025     630   .0014
615          RX       0       8      16      26      38      48      56      64
616          RY     4.7     4.8     4.9       0       0     4.9     4.8     4.7
             *

617          KK  65AT-2
618          KM   REACH ET-10, ET-11, ET-12 plus culverts ETC-4 AND ETC-3.
619          KM   ROUTE FROM ELLIOT AND MERIDIAN, ALONG ELLIOT ROAD IN ELLIOT CHANNEL
620          KM   TO ABOUT 0.6 MILES EAST OF CRISMON ROAD.
621          KM   EARTH CHANNEL PORTION ON NORTH SIDE OF ELLIOT
             * KO     1
622          RS       3    FLOW      -1
```

```
623          RC    .025    .025    .025    7680   .0005
624          RX       0       8      22      58      71     107     115     123
625          RY     6.1     6.0     5.9       0       0     5.9     6.0     6.1
             *

626          KK    65AW
627          KM   BASIN 65AW
628          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
629          KM    L=       .9  Lca=       .6   S=   54.7  Kn= .049  LAG=  26.1
630          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
631          BA     .43
632          LG     .24     .25    5.30     .29   32.00
633          UI     56.    176.    295.    391.    603.    594.    432.    316.    210.    101.
634          UI     73.     43.     17.     17.     17.      0.      0.      0.      0.      0.
635          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

636          KK   R65AW
637          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
638          DT   D65AW      31
639          DI       0   10000
640          DQ       0   10000
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

641          KK  65AT65
642          KM   ROUTE C65A TO BASIN 65B VIA A WASH,(THIS WASH IS NORTH OF SIPHON DRAW)
643          KM   THIS IS THE PART OF 65A WHICH IS WEST OF THE MERIDIAN RD ALIGNMENT
             * KO     3
644          RS      11    FLOW      -1
645          RC    .045     .04    .045    9500    .007
646          RX       0     500    1000    1003    1053    1056    1511    2011
647          RY       4     3.5       3       0       0       2     2.5       3
             *

648          KK     65B
649          KM   BASIN 65B
650          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
651          KM    L=      2.0  Lca=      1.2   S=   37.5  Kn= .036  LAG=  36.6
652          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
653          BA    1.37
654          LG     .18     .25    6.00     .24   53.00
655          UI    126.    218.    506.    669.    809.   1014.   1468.   1422.   1102.    901.
656          UI    720.    562.    337.    218.    182.    126.     71.     39.     39.     39.
657          UI     39.      0.      0.      0.      0.      0.      0.      0.      0.      0.
658          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

659          KK    R65B
660          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
661          DT    D65B     120
662          DI       0   10000
663          DQ       0   10000
             *

664          KK   CP65B
             * KO     1
```

```
665          KM   COMBINE FLOW FROM SUBBASIN 65AW (WEST OF MERIDIAN RD) WITH FLOW FROM
666          KM   SUBBASIN 65B
667          HC       2
             *

668          KK   DI65B
669          KM        DIVERSION STRUCTURE TO ROUTE PEAK FLOW TO NEW
670          KM        ELLIOT BASIN (EAST)
671          KM        By-pass 30 cfs to Elliot Channel, and Divert Remaining to E Basin
             *       The Existing Model By-pass 51 cfs. SZ, 5-17-99
672          DT  DIRS65
673          DI       0    15.0      30   100.0     200   350.0     500     700     900   1500.
674          DQ       0       0       0    70.0     170   320.0     470     670     870   1470.
             *

675          KK   CP65A
676          KM   COMBINE FLOWS FROM ELLIOT CHANNEL AT NON DIVERTED FLOWS (51CFS) FROM
677          KM   SUBBASIN 65B
678          HC       2
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

679          KK  65AT-3
             * KM REACH ET-9 plus culvert ETC-2
             * KM ROUTE FROM ABOUT 0.6 MILES EAST OF CRISMON ROAD
             * KM   TO ABOUT 0.18 MILES EAST OF CRISMON ROAD (CP65)
             * KM CONCRETE CHANNEL PORTION ON SOUTH SIDE OF ELLIOT
             * RD  2340  0.0019   0.013            CIRC     7.5
680          KM        E. 104th St to E. of EA (Sta. 83+10 to Sta. 90+50)
             *       RD card used for routing
681          RD     740  0.0064   0.012            CIRC     6.5
             *

682          KK   DR65B
             * KO     1
683          KM        RETURN DIVERT TO EAST DETENTION BASIN
684          DR  DIRS65
             *

685          KK   RS65A
686          KM   ELLIOT BASIN, EAST
687          KM        Bleed-off Pipe Size = 12", SZ, 5-17-99
             *       Since the bleed-off pipe length is short, no routing is provided.
             *       The Existing Pipe Size = 24"
             * KO     1
688          RS       1    STOR       0
689          SV       0    5.40    9.30   13.90   18.80   24.00   29.50   35.30   41.40   48.00
690          SE  1429.0  1433.0  1434.0  1435.0  1436.0  1437.0  1438.0  1439.0  1440.0  1441.0
691          SL  1430.0  0.7854     .62      .5
692          SS  1439.0     200     2.5     1.5
             *

693          KK    CP65
             *       "CP65B" changed to "CP65" -- SZ, 5-14, 1999
694          KM   COMBINE FLOWS FROM EAST ELLIOT BASIN AND ELLIOT CHANNEL
695          KM   BEFORE COMBINING WITH FLOWS FROM THE BYPASS CRISMON CHANNEL
             * KO     1
696          HC       2
```

```
*
KK   65T66
* KM REACH ET-8
* KM ROUTING IN ELLIOT CHANNEL FROM ABOUT
* KM   0.18 MILES EAST OF CRISMON ROAD (CP65) TO CRISMON ROAD (CP66).
*       Moved from "65AT-3" to here
KM        E. of EA to W. of EA (Sta. 76+06 to Sta. 83+10)
*       RD card used for routing
* RD   940  0.0060   0.013            CIRC     9.5
RD     704  0.0064   0.012            CIRC     7.5
*
```



```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  65T66A
KM        W. of EA to E. of Crismon Rd. (Sta. 69+00 to Sta. 76+06)
*       New additional routing operation
*       RD card used for routing
RD     706  0.0047   0.012            CIRC     7.5
*

KK  65T66B
KM        E. of Crismon Rd.to W. of Crismon Rd. (Sta. 61+25 to Sta. 69+00)
*       New additional routing operation
*       RD card used for routing
RD     775  0.0048   0.012            CIRC     9.5
*

KK  ADOT-E
KM   INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY ENTERING 67A
KM   FROM EAST ADOT DETENTION BASIN 4105.
*     KO       1
BA    0.01
ZR  =QI A=ADOT EAST BASIN B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
*

KK  AET67A
KM    ROUTE SUPERSTITION FLOW THROUGH 67A TO BASELINE ROAD
IN      15
RS       6    FLOW      -1
RC    .045    .040    .045    5500    .010
RX       0     100     110     120     130     140     150     250
RY       5       4       3       1       1       3       4       5
*

KK     67A
KM   BASIN 67A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.0  Lca=       .7   S=   42.9  Kn= .042  LAG=  25.7
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .30
LG     .21     .25    4.70     .39   43.00
UI     39.    126.    208.    277.    433.    400.    292.    213.    134.     67.
UI     47.     25.     12.     12.     12.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*

KK    R67A
```

```
 729          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
 730          DT    D67A      21
 731          DI       0   10000
 732          DQ       0   10000
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 733          KK    C67A
 734          KM    COMBINE FLOWS FROM ADOT-E AND SUBBASIN 67A
 735          HC       2
              *

 736          KK   67ATC
 737          KM   ROUTE 67A TO 67C VIA WASH CROSSING BASELINE
 738          RS       7    FLOW      -1
 739          RC    .055    .045    .055    6300   .0071
 740          RX       0     500     980    1003    1007    1031    1511    2011
 741          RY       4     3.5       3       0       0       3     3.5       4
              *

 742          KK    SUP2
 743          KM   INFLOW FROM NORTH OF SUPERSTITION FREEWAY, DISCHARGING INTO 67B
              *     KO      1
 744          BA    0.01
 745          ZR  =QI A=ADOT WEST BASIN B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
              *

 746          KK   RSUP2
 747          KM   ROUTE SUP2 THROUGH SUBBASIN 67B
              * KO                2
 748          IN      15
 749          RS       5    FLOW      -1
 750          RC    .045    .045    .045    4500   .0056
 751          RX       0     500    1000    1003    1007    1011    1511    2011
 752          RY       4     3.5       3       0       0       2     2.5       3
              *

 753          KK     67B
 754          KM   BASIN 67B
 755          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 756          KM    L=      1.2  Lca=       .9   S=   28.0  Kn= .034  LAG=  26.4
 757          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 758          BA     .53
 759          LG     .17     .25    4.90     .38   56.00
 760          UI     68.    210.    356.    470.    713.    741.    536.    395.    269.    131.
 761          UI     94.     59.     21.     21.     21.      0.      0.      0.      0.      0.
 762          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

 763          KK    R67B
 764          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
 765          DT    D67B      41
 766          DI       0   10000
 767          DQ       0   10000
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
768          KK    C67B
769          KM   COMBINE FLOWS FROM SUP2 AND SUBBASIN 67B
             * KO              2
770          HC       2
             *

771          KK   67BTC
772          KM   REACH CN-4, CN-5 plus culvert CNC-4.
773          KM   ROUTE FLOW IN THE CRISMON CHANNEL FROM BASELINE ROAD (C67B) TO
774          KM      GUADALUPE ROAD (C67C)
775          RS       2    FLOW      -1
776          RC    .025    .015    .025    5180   .0019
777          RX       0       8      16    24.4    36.4    44.8    52.8    60.8
778          RY     4.0     4.1     4.2       0       0     4.2     4.1     4.0
             *

779          KK     67C
780          KM   BASIN 67C
781          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
782          KM    L=      1.2  Lca=       .7  S=   40.2  Kn= .049  LAG=  32.3
783          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
784          BA     .93
785          LG     .25     .25    5.10     .32   31.00
786          UI     96.    213.    432.    557.    702.   1006.   1133.    842.    667.    518.
787          UI    365.    193.    157.     96.     59.     30.     30.     30.     30.      0.
788          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
789          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

790          KK    R67C
791          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
792          DT    D67C      67
793          DI       0   10000
794          DQ       0   10000
             *

795          KK    C67C
796          KM   COMBINE SUBBASINS 67C AND 67A AND 67B
797          HC       3
             *

798          KK  67CT67
799          KM   REACH CN-3 plus culvert CNC-3
800          KM   ROUTE FLOW IN THE CRISMON CHANNEL FROM C67C (@ GUADALUPE ROAD & CRISMON ROAD)
801          KM    TO C67D (AT APPROX. 1/2 MILE SOUTH OF GUADALUPE ROAD).
             *       Sta. 39+00 to Guadalupe Rd.
802          RS       1    FLOW      -1
803          RC    .025    .015    .025    2420   .0018
804          RX       0       6      12      24      64      76      82      88
805          RY       4       3       2       0       0       2       3       4
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

806          KK     67D
807          KM   BASIN 67D
808          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
809     KM    L=       .6  Lca=       .4   S=   34.7  Kn= .050  LAG=  20.5
810     KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
811     BA     .13
812     LG     .25     .25    5.20     .30   30.00
813     UI     23.     87.    132.    216.    202.    137.     86.     38.     23.      9.
814     UI      6.      6.      0.      0.      0.      0.      0.      0.      0.      0.
815     UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

816     KK    R67D
817     KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
818     DT    D67D       9
819     DI       0   10000
820     DQ       0   10000
        *

821     KK    C67D
822     KM    COMBINE HYDROGRAPHS AT CP67D
823     HC       2
        *

824     KK  67DT66
825     KM   REACH CN-2 plus culvert CNC-2
826     KM   ROUTE FLOW IN THE CRISMON CHANNEL FROM APPROX. 1/2 MILE SOUTH
827     KM    OF GUADALUPE ROAD TO THE INFLOW SPILLWAY FOR THE ELLIOT DETENTION BASIN.
        *       Sta. 20+00 to Sta. 39+00
828     RS       1    FLOW      -1
829     RC    .032    .032    .032    1900  0.0035
830     RX       0       6      12      24      64      76      82      88
831     RY       4       3       2       0       0       2       3       4
        *

832     KK     66A
833     KM   BASIN 66A
834     KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
835     KM    L=       .7  Lca=       .3   S=   55.9  Kn= .047  LAG=  17.1
836     KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
837     BA     .26
838     LG     .24     .25    6.00     .22   35.00
839     UI     78.    256.    417.    576.    363.    205.     84.     39.     16.     16.
840     UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
841     UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

842     KK    R66A
843     KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
844     DT    D66A      21
845     DI       0   10000
846     DQ       0   10000
        * DDM   ***** Preserved *****
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

847     KK   66ATB
848     KM   ROUTE S66A TO 66B VIA WASH CROSSING BASELINE
849     RS       7    FLOW      -1
850     RC    .045     .04    .045    7500   .0077
851     RX       0     500     980    1003    1007    1031    1511    2011
```

```
852          RY       4     3.5       3       0       0       3     3.5       4
             *
             * DDM   ***** Updated *****

853          KK     66B
854          KM   BASIN 66B
855          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
856          KM    L=      1.6  Lca=      1.0   S=   43.3  Kn= .050  LAG=  42.8
857          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
858          BA     .67
859          LG     .25     .25    5.00     .33   30.00
860          UI     53.     56.    185.    248.    297.    352.    426.    590.    636.    496.
861          UI    419.    346.    286.    232.    152.     93.     86.     58.     53.     21.
862          UI     16.     16.     16.     16.     16.      0.      0.      0.      0.      0.
863          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

864          KK    R66B
865          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
866          DT    D66B      48
867          DI       0   10000
868          DQ       0   10000
             * DDM   ***** Preserved *****

869          KK   CP66B
870          KM   COMBINE S66A AND S66B
871          HC       2
             *
             * DDM   ***** Preserved *****

872          KK   66BTC
873          KM   ROUTE 66B TO 66C VIA WASH
874          RS       7    FLOW      -1
875          RC    .045     .04    .045    6000   .0150
876          RX       0     500     995    1003    1007    1016    1511    2011
877          RY       4     3.5       3       0       0       3     3.5       4
             *
             * DDM   ***** Updated *****

878          KK     66C
879          KM   BASIN 66C
880          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
881          KM    L=      1.1  Lca=       .7   S=   46.5  Kn= .039  LAG=  24.3
882          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
883          BA     .50
884          LG     .19     .25    5.40     .29   48.00
885          UI     69.    243.    385.    528.    817.    635.    463.    325.    159.    103.
886          UI     63.     21.     21.     21.      0.      0.      0.      0.      0.      0.
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

887          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

888          KK    R66C
889          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
890          DT    D66C      42
891          DI       0   10000
```

```
892          DQ       0   10000
             *
             * DDM   ***** Preserved *****

893          KK  CP66C1
894          KM   Split up hydrograph combination in order to separate flows.
895          KM   Combine Hydrographs 66BTC (from Sub. 66A)and R66C (from Sub. 66C)
             * KO      2       2
896          HC        2
             *

897          KK  CP66C2
898          KM   Combine Hydrograph CP66C1 (from Subbasins 66A, 66B and 66C)
899          KM     plus hydrograph 67DT66 ( C67D )
             * KO      1
900          HC        2
             *

901          KK   DI67E
902          KM   DIVERT LOW FLOW FOR 404 PERMITTING TO SUBBASIN 67e WASH
903          DT    404A
904          DI        0      24      76   10000
905          DQ        0      24      76      76
             *

906          KK    DI66
907          KM    DIVERT FLOW TO DETENTION BASIN WA
908          KM    By-pass Flow Reduced to 410 cfs from 458, SZ, 5-17-99
             * KO      1       2
909          DT    DB66
910          DI        0     150     363   411.0   456.0     513     577     643     712    1000
911          DQ        0       0       0    32.0     71.     122     179     239     302     590
             *

912          KK  66C1T2
913          KM    ROUTE FLOW FROM DIVERSION STRUCTURE TO ELLIOT CHANNEL at ELLIOT ROAD.
914          KM    REACH CN-1 plus culvert CNC-1
915          KM        A single pipe size and an overall slope are used to represent this
916          KM        1,070 ft long reach which has pipe sizes of 78", 84" and 90", and
917          KM        about 250' long sideweir and transition open channel.
918          KM        RD card used for routing (Sta. 9+30 to Sta. 20+00)
919          RD    1070  0.0130   0.012            CIRC       7
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

920          KK   CP66C
921          KM   COMBINE FLOWS FROM ELLIOT CHANNEL AND CRISMON BYPASS CHANNEL
             * KO      1
922          HC        2
             *

923          KK   66CTD
             * KM REACH ET-7
924          KM   ROUTE FLOWS FROM INTERSECTION OF CRISMON AND ELLIOT CHANNELS
925          KM      AT THE INTERSECTION OF ELLIOT ROAD and CRISMON ROAD TO THE ELLIOT BASIN
926          KM      WA Bleed-off Outlet, WHICH IS ABOUT 390 ft WEST OF CRISMON ROAD.
             *       RD card used for routing (Sta. 57+35 to Sta. 61+25)
927          RD     390  0.0052   0.012            CIRC     9.5
```

```
                *
928             KK    DR66
                * KO     1
929             KM          RETURN DIVERT TO DETENTION BASIN FROM DIVERSION STRUCTURE
930             DR    DB66
                *

931             KK  RS66D1
                * KO     1
932             KM   ELLIOT BASIN, WEST A
933             KM   TWO PONDS OPERATING IN SERIES.
934             KM        Bottom Elevation Lowered to 1415.0 ft from 1420, and 18" Bleed-off
935             KM        Pipe Added from WA to Elliot Channel
                *       Since the bleed-off pipe length is short, no routing is provided.
                *       Existing SS = 1423   20   2.5   1.5, SZ, 5-18-99
936             RS       1    STOR      0
937             SV       0    1.60   10.00   25.50   34.70   44.20   54.10   64.40   75.10   86.00
938             SE  1415.0    1417    1419    1421    1422    1423    1424    1425    1426    1427
939             SL  1416.0  1.7672     .62      .5
940             SS  1423.5      20     3.0     1.5
                *

941             KK    B-WA
942             KM        Bleed-off Flow from WA to Elliot Channel = 18" Pipe, SZ, 6-15-99
943             KM        Divert Flow to WB by Weir Spillover (SS card on RS66D1)
                *       RS66D1 is the total routed flow = SL + SS
                *       This operation is designed to separate weir flow from pipe flow
944             DT    D-WB
945             DI       0       5      10      15   17.59   40.87   80.62  131.76  192.12  260.43
946             DQ       0       0       0       0       0    21.2    60.0   110.2   169.7   237.2
                *

947             KK    C-WA
948             KM        Combine Bleed-off Flow from WA with Flow in Elliot Channel
                *       Added by SZ, 5-17-99
949             HC       2
                *
```



```
LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

950             KK   RC-WA
951             KM        Route Flow from WA Outlet to WB Outlet in Elliot Channel
                *       Added by SZ, 5-17-99
                * RS     1    FLOW      -1
                * RC  .025    .015    .025     800   .0017
                * RX     0       8      16      28      44      56      64      72
                * RY   5.7     5.8     6.0       0       0     6.0     5.8     5.7
952             KM      WA Bleed-off Outlet to WB Bleed-off Outlet.
                *       RD card used for routing (Sta. 48+80 to Sta. 57+35)
953             RD     855  0.0052   0.012            CIRC     9.5
                *

954             KK   DR-WA
955             KM        Return Diverted Flow (Spillway) to WB from WA, SZ 5-7-99
                * KO     1
956             DR    D-WB
                *
```

```
957          KK  RS66D2
             * KO     1
958          KM   ELLIOT BASIN, WEST B
959          KM   TWO PONDS OPERATING IN SERIES.
960          KM        Bottom Elevation Lowered to 1413.5 ft from 1414, and 36" Bleed-off
961          KM        Pipe Reduced to 18" from WB to Elliot Channel
             *       Since the bleed-off pipe length is short, no routing is provided.
             *       Existing SS = 1420.5   80   2.5   1.5, SZ, 5-18-99
962          RS       1    STOR       0
963          SV       0    4.40    8.80   14.50   21.00   28.00   35.30   42.90   50.90   59.20
964          SE  1412.0    1415    1416    1417    1418    1419    1420    1421    1422    1423
965          SL  1413.0  1.7672     .62      .5
966          SS  1422.6      50     2.5     1.5
             *

967          KK   CP66D
968          KM       COMBINE FLOWS FROM WEST ELLIOT BASIN AND ELLIOT CHANNEL
969          KM       AT THE OUTLET PIPE.
             * KO     1
970          HC       2
             *

971          KK  66T66D
             * KM REACH ET-6
972          KM        ROUTE FROM DETENTION BASIN WB OUTLET TO ELLSWORTH RD
973          KM        2350 -> 3200,  SZ, 5-17-99
             *       First portion
             *       RD card used for routing (Sta. 36+44 to 48+80)
974          RD    1236  0.0052   0.012            CIRC     9.5
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

975          KK  66-66D
             * KM REACH ET-6
976          KM        ROUTE FROM DETENTION BASIN WB OUTLET TO ELLSWORTH RD
977          KM        2350 -> 3200,  SZ, 5-17-99
             *       Second portion
             *       RD card used for routing (Sta. 12+46 to Sta. 36+44)
978          RD    2398  0.0040   0.012            CIRC     9.5
             *

979          KK     66D
980          KM   BASIN 66D
981          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
982          KM    L=      1.0  Lca=       .7   S=   28.6  Kn= .020  LAG=  13.2
983          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
984          BA     .31
985          LG     .10     .17    6.80     .19   80.00
986          UI    162.    480.    845.    540.    232.     89.     24.      0.      0.      0.
987          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

988          KK    R66D
989          KM   RETENTION REDUCED BY 77% FROM 31 TO 7 AC-FT
990          KM   DUE TO DEVELOPMENT USING DETENTION BASIN
             *   The developer does not participate in the basin so the retention volume
             *   increased to 31 A-F
```

```
991          DT    D66D      31
992          DI       0   10000
993          DQ       0   10000
             * DDM   ***** Updated *****
             *

994          KK    C66D
995          KM   COMBINE FLOWS FROM SUBBASIN 66D AND FLOWS IN ELLIOT DRAIN
996          HC       2
             *
             * KK66T70A
997          KM    THIS ROUTING WAS TAKEN OUT BY DAVE DEGERNESS ON 2/11/00 TO AVOID ROUTING
998          KM    ERROR PROBLEMS
999          KM        Pipe Routing, Reach ET-5
             *       SE corner curve of Elliot Rd. & Ellsworth Rd.
             *       RD card used for routing (Junction Structure to Sta. 12+46)
             * RD   253  0.0015   0.012            CIRC     9.5
             *

1000         KK  66T70B
1001         KM        Pipe Routing, Reach ET-5
             *       Elliot Rd. to Culvert along Ellsworth Rd. 2-102" pipe = 144" pipe
             *       RD card used for routing (Sta. 85+65 to Sta. 97+51)
1002         RD    1186  0.0015   0.012            CIRC      12
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1003         KK   CULVT
1004         KM        Pipe Routing, Culvert
             *       2-102" pipe culvert crossing Ellsworth Rd.
             *       RD card used for routing
1005         RD     196  0.0008   0.012            CIRC      12
             *

1006         KK  66T70C
1007         KM   REACH ET-4, ET-5( COMPRISED OF ET-5A AND ET-5B).
1008         KM   ROUTE FROM ELLSWORTH Culvert TO SANTAN FREEWAY.
1009         RS       2    FLOW      -1
1010         RC    .032    .032    .032    2490   .0008
1011         RX       0      10      20      56      76     112     120     130
1012         RY     6.2     6.1     6.0       0       0     6.0     6.1     6.2
             *

1013         KK     62A
1014         KM   BASIN 62A
1015         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1016         KM    L=       .8  Lca=       .5   S=   30.0  Kn= .020  LAG=  10.2
1017         KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1018         BA     .38
1019         LG     .10     .25    4.50     .52   80.00
1020         UI    335.   1057.   1010.    367.     93.     38.      0.      0.      0.      0.
1021         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

1022         KK    R62A
1023         KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1024         DT    D62A      33
```

```
1025        DI       0   10000
1026        DQ       0   10000
            *

1027        KK   62ATC
1028        KM   ROUTE BASIN 62C TO BASIN 62E BY CHANNEL ALONG SANTAN FREEWAY
1029        RS       3    FLOW      -1
1030        RC    .040    .016    .040    5280   .0033
1031        RX      69      74      86     100     112     126     138     143
1032        RY       9     7.2       7       0      .5       7     7.2       9
            *
            * DDM   ***** Preserved *****
            *

1033        KK     62C
1034        KM   BASIN 62C
1035        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1036        KM    L=       .6  Lca=       .3   S=   24.2  Kn= .049  LAG=  19.8
1037        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1038        BA   0.546
1039        LG     .23     .25    4.65     .40   47.00
1040        UI    112.    406.    615.   1024.    853.    571.    330.    154.     83.     28.
1041        UI     28.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                        HEC-1 INPUT                                                PAGE 29

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1042        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

1043        KK    R62C
1044        KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1045        DT    D62C      31
1046        DI       0   10000
1047        DQ       0   10000
            *

1048        KK    C62C
1049        KM   COMBINE FLOWS FROM SUBBASIN 62A AND SUBBASIN 62C
1050        HC       2
            *
            * DDM   ***** Preserved *****

1051        KK   62CTE
1052        KM   ROUTE BASIN 62C TO BASIN 62E BY CHANNEL ON EAST SIDE OF PROPOSED SANTAN
1053        KM   FREEWAY ALIGNMENT
1054        RS       1    FLOW      -1
1055        RC    .040    .016    .040    2000   .0040
1056        RX      67      72      84     100     112     128     140     145
1057        RY      10     8.2       8       0      .5       8     8.2      10
            *
            * DDM   ***** Updated *****

1058        KK     62E
1059        KM   BASIN 62E
1060        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1061        KM    L=       .6  Lca=       .3   S=   31.9  Kn= .050  LAG=  20.4
1062        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1063        BA     .15
1064        LG     .25     .25    4.65     .39   45.00
```

```
1065          UI     29.    108.    163.    268.    246.    167.    104.     46.     28.     10.
1066          UI      8.      8.      0.      0.      0.      0.      0.      0.      0.      0.
1067          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1068          KK    R62E
1069          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1070          DT    D62E      12
1071          DI       0   10000
1072          DQ       0   10000
              *
              * DDM   ***** Preserved *****

1073          KK   CP62E
1074          KM   COMBINE FLOWS FROM SUBBASIN 62C AND SUBBASIN 62E
1075          HC       2
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1076          KK     61A
1077          KM   BASIN 61A
1078          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1079          KM    L=       .9  Lca=       .4   S=   36.8  Kn= .037  LAG=  19.1
1080          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1081          BA    .519
1082          LG     .19     .25    4.20     .56   52.00
1083          UI    117.    412.    628.   1037.    786.    517.    261.    132.     62.     28.
1084          UI     28.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1085          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1086          KK    R61A
1087          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1088          DT    D61A      42
1089          DI       0   10000
1090          DQ       0   10000
              * DDM   ***** Preserved *****

1091          KK   61ATB
1092          KM   ROUTING 61A TO 61B VIA ELLSWORTH ROAD
1093          RS       6    FLOW      -1
1094          RC    .035    .024    .035    5280    .005
1095          RX       0     500     750     752     802     852    1102    1602
1096          RY       3       2     1.5     1.2     1.2     1.5       2       3
              * DDM   ***** Updated *****

1097          KK    61B
1098          KM   BASIN 61B
1099          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1100          KM    L=      1.4  Lca=       .7   S=   39.7  Kn= .047  LAG=  33.6
1101          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1102          BA    1.09
1103          LG     .24     .25    4.80     .37   35.00
1104          UI    109.    223.    475.    615.    765.   1049.   1335.   1025.    822.    643.
1105          UI    495.    288.    187.    143.    109.     36.     34.     34.     34.     34.
1106          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
1107    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

1108    KK    R61B
1109    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1110    DT    D61B      81
1111    DI       0   10000
1112    DQ       0   10000
        * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                          PAGE 31

LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1113    KK   CP61B
1114    KM   COMBINE FLOWS FROM S61A AND S61B
1115    HC       2
        * DDM   ***** Preserved *****

1116    KK  61T62E
1117    KM   ROUTE CP61B TO SUBBASIN 62E VIA NATURAL WASH
1118    RS       4    FLOW      -1
1119    RC    .045    .040    .045    3500   .0057
1120    RX       0     500     980    1006    1012    1035    1515    2015
1121    RY       5     4.5       4       0       0       4     4.5       5
        *

1122    KK  CP62E2
1123    KM   COMBINE FLOWS FROM 61A AND 61B AND 62A, B, AND C
1124    HC       2
        * DDM   ***** Preserved *****

1125    KK  62T68A
1126    KM   ROUTE FLOW FROM CP62E TO SUBBASIN 68A BY CHANNEL ALONG PROPOSED ALIGNMENT
1127    KM   OF THE SANTAN FREEWAY
        * ZW   A=62T68A   B=NORTH OF ELLIOT  C=FLOW    F=100YR FUTURE
1128    RS       2    FLOW      -1
1129    RC    .040    .016    .040    3280  .00015
1130    RX      67      72      84     100     112     128     140     145
1131    RY      10     8.2       8       0      .5       8     8.2      10
        *
        * DDM   ***** Updated *****

1132    KK     68A
1133    KM   BASIN 68A
1134    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1135    KM    L=       .7  Lca=       .4   S=   37.7  Kn= .032  LAG=  13.7
1136    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1137    BA     .35
1138    LG     .16     .25    5.70     .27   66.00
1139    UI    168.    506.    914.    635.    301.    114.     34.     26.      0.      0.
1140    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

1141    KK    R68A
1142    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1143    DT    D68A      31
1144    DI       0   10000
1145    DQ       0   10000
        *
```

```
1146          KK   C68A1
1147          KM   COMBINE FLOWS FROM 68A AND 62E
1148          HC       2
              *
1                                   HEC-1 INPUT                                                    PAGE 32

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1149          KK    RD66
1150          KM   RETURN DIVERT FROM SUBBASIN 66 INTO WASH
1151          DR    404A
              *

1152          KK  RT404A
1153          KM   ROUTE FLOW FROM DIVERSION IN NATURAL WASH
1154          RS       6    FLOW      -1
1155          RC    .045     .04    .045    5300    .007
1156          RX       0     500    1000    1003    1053    1056    1511    2011
1157          RY       4     3.5       3       0       0       2     2.5       3
              *

1158          KK     67E
1159          KM   BASIN 67E
1160          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1161          KM    L=      1.2  Lca=       .7   S=  32.3  Kn= .038  LAG=  26.9
1162          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1163          BA     .58
1164          LG     .19     .25    5.40     .30   50.00
1165          UI     73.    219.    378.    496.    732.    830.    597.    443.    315.    157.
1166          UI    110.     73.     24.     22.     22.     22.      0.      0.      0.      0.
1167          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1168          KK    R67E
1169          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1170          KM   DUE TO DEVELOPMENT USING DETENTION BASIN
1171          DT   D67E       50
1172          DI       0   10000
1173          DQ       0   10000
              *

1174          KK    C67E
1175          KM   COMBINE FLOWS FROM 67E AND 404 DIVERSION
1176          HC       2
              *

1177          KK   67T68
1178          KM   ROUTE 67E AND 404 DIVERSION TO 68A VIA NATURAL WASH
1179          RS       3    FLOW      -1
1180          RC    0.45    0.04    .045    2500   .0068
1181          RX       0     500     950    1003    1007    1057    1511    2011
1182          RY       4     3.5       3       0       0       2     2.5       3
              *

1183          KK   C68A2
1184          KM   COMBINE FLOWS FROM 67E, 404 DIVERSION, AND ROUTED 62E
1185          HC       2
              *
              *
```

```
                    * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                                    PAGE 33

LINE                ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1186                KK  68T70A
1187                KM   ROUTE FLOW FROM CP68A AT ELLIOT AND SANTAN FREEWAY ALIGNMENT TO SUBBASIN
1188                KM   70A, AT THE POINT WHERE SIPHON DRAW INTERSECTS THE FREEWAY ALIGNMENT
1189                KM   CHANNEL IS NATURAL AND ONLY APPROXIMATE IN ROUTING PARAMETERS
1190                RS       2    FLOW      -1
1191                RC    .030    .030    .030    3960   .0006
1192                RX       0       5      10      20      30      40      45      50
1193                RY      10       5       4       0       0       4       5      10
                    *
                    * DDM   ***** Inserted *****

1194                KK     70A
1195                KM   BASIN 70A
1196                KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1197                KM    L=       .9  Lca=       .4   S=   23.5  Kn= .025  LAG=  12.7
1198                KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1199                BA     .54
1200                LG     .13     .15    7.60     .13   67.00
1201                UI    306.    899.   1524.    903.    346.    120.     44.      0.      0.      0.
1202                UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    *
                    * DDM   ***** Preserved *****

1203                KK    R70A
1204                KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1205                DT    D70A      52
1206                DI       0   10000
1207                DQ       0   10000
                    *
                    * DDM   ***** Preserved *****

1208                KK    C70A
1209                KM   COMBINE FLOWS FROM C68A AND SUBBASIN 70A
1210                HC       2
                    *
                    * DDM   ***** Preserved *****

1211                KK   C70A2
1212                KM   COMBINE FLOWS FROM CONCENTRATION POINT C70A WITH THOSE COMING FROM DETENTION
1213                KM   BASIN 66, LOCATED ON ELLIOT ROAD, ALONG SAN TAN @ 2/3 MILE SO. OF ELLIOT RD.
1214                HC       2
                    *

1215                KK  70T76A
1216                KM   DIBBLE DRAINAGE FACILITY
1217                KM   ROUTE FLOW ALONG NEW SANTAN FREEWAY ALIGNMENT
1218                KM   REACH ET-3A, ET-3B
1219                RS       2    FLOW      -1
1220                RC    .025    .025    .025    4500  0.0005
1221                RX       0       8      16      59      91     134     142     150
1222                RY     7.4     7.3     7.2       0       0     7.2     7.1     7.0
                    *
1                                   HEC-1 INPUT                                                    PAGE 34

LINE                ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
1223          KK     76A
1224          KM   BASIN 76A
1225          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1226          KM    L=      2.9  Lca=      1.7   S=   24.1  Kn= .030  LAG=  42.9
1227          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1228          BA    1.91
1229          LG     .15     .15    8.80     .08   56.00
1230          UI    150.    159.    528.    707.    847.   1004.   1213.   1673.   1826.   1424.
1231          UI   1201.    992.    822.    667.    444.    266.    247.    171.    150.     65.
1232          UI     46.     46.     46.     46.     46.      0.      0.      0.      0.      0.
1233          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1234          KK    R76A
1235          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1236          DT    D76A     185
1237          DI       0   10000
1238          DQ       0   10000
              *

1239          KK    C76A
1240          KM    COMBINE HYDROGRAPHS 70T76A (SANTAN FREEWAY CHANNEL FLOWS) WITH SUBBASIN 76A
1241          HC       2
              *
              * KK*DBSAN
              * KM DIVERT FROM SANTAN CHANNEL INTO THE RAY DETENTION BASIN
              * KM ADDED BY CPE IN JUNE 2000.
              * KM USES A REALISTIC SIDE-WEIR EQUATION TO FORM POWER CURVE
              * KM WEIR CREST = 4.5 FT; WEIR LENGTH = 200FT; 4.0 FT DIV STRUCTURE.
              * KO      3
              * DT SANDB    1537
              * DI      0     750     772     819     892     999    1356    8138
              * DQ      0       0       7      31      78     154     439    6509
              *

1242          KK  76ATPR
1243          KM   DIBBLE DRAINAGE FACILITY
1244          KM   ROUTE FLOW ALONG NEW SANTAN FREEWAY ALIGNMENT TO NEW POWERLINE FLOODWAY ALGN.
1245          KM   REACH ET-2A, ET-2B
1246          RS       2    FLOW      -1
1247          RC    .025    .025    .025    5750  0.0005
1248          RX       0       8      16      61      93     138     146     154
1249          RY    10.7     7.6     7.5       0       0     7.5     7.4    10.3
              *

1250          KK  EMFSTN
1251          KM   COMBINE FLOWS IN EMF AT SANTAN FREEWAY
1252          HC       2
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1253          KK  KNXTRY
1254          KM   ROUTE EMF KNOX ROAD TO RAY ROAD
1255          RS       1    FLOW      -1
1256          RC     .03    .022     .03    3000   .0003
```

```
1257          RX       0     500     520     553     693     726     740     742
1258          RY      14      12      11       0       0      11      11      12
              *

1259          KK     73A
1260          KM   BASIN 73A
1261          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1262          KM    L=       2.3  Lca=      1.0   S=   34.9  Kn= .093  LAG=  94.5
1263          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1264          BA     .95
1265          LG     .35     .36    5.00     .27     .00
1266          UI     34.     34.     34.     34.     84.    117.    134.    158.    171.    185.
1267          UI    197.    214.    232.    254.    274.    317.    381.    429.    424.    369.
1268          UI    332.    303.    282.    263.    240.    220.    202.    185.    169.    157.
1269          UI    134.    107.     90.     60.     60.     57.     55.     54.     34.     34.
1270          UI     34.     34.     16.     10.     10.     10.     10.     10.     10.     10.
1271          UI     10.     10.     10.     10.     10.     10.      0.      0.      0.      0.
1272          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1273          KK   73ATB
1274          KM   ROUTE 73A TO 73B VIA WASH RUNNING DIAGONALLY ACROSS 73B
1275          RS       3    FLOW      -1
1276          RC     .06     .05     .06    2700   .0074
1277          RX       0     500    1000    1003    1007    1011    1511    2011
1278          RY       4     3.5       3       0       0       2     2.5       3
              *

1279          KK     73B
1280          KM   BASIN 73B
1281          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1282          KM    L=        .6  Lca=       .4   S=   26.3  Kn= .050  LAG=  21.6
1283          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1284          BA     .42
1285          LG     .27     .25    5.30     .27   21.00
1286          UI     67.    268.    402.    621.    719.    486.    332.    162.     94.     50.
1287          UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
1288          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1289          KK    R73B
1290          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1291          DT    D73B      29
1292          DI       0   10000
1293          DQ       0   10000
              *
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1294          KK   CP73B
1295          KM   COMBINE S73A AND S73B
1296          HC       2
              *

1297          KK   73BTC
1298          KM   ROUTE 73B TO 73C VIA WASH CROSSING MOUNTAIN ROAD
1299          KM    THEN ROUTED SOUTH ALONG GENERAL MOTORS BERM TO SW CORNER OF 73C
```

```
1300    RS       6    FLOW      -1
1301    RC    .035    .022    .035    5000    .0036
1302    RX       0     500     700     710     720     730     930    1430
1303    RY       8     7.5       5       0       0       5     7.5       8
        *

1304    KK     73C
1305    KM   BASIN 73C
1306    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1307    KM    L=       .6  Lca=       .3   S=   43.7  Kn= .020  LAG=   7.0
1308    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1309    BA     .58
1310    LG     .10     .25    5.30     .34   80.00
1311    UI   1073.   2551.    742.    111.      0.      0.      0.      0.      0.      0.
1312    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

1313    KK    R73C
1314    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1315    DT    D73C      58
1316    DI       0   10000
1317    DQ       0   10000
        *
        * DDM   ***** Preserved *****

1318    KK   CP73C
1319    KM   COMBINE 73C AND 73B
1320    HC       2
        *
        * DDM   ***** Preserved *****

1321    KK  73T74C
1322    KM   ROUTE 73C TO 74C VIA GM BERM, WEST EDGE OF 74C
1323    RS       4    FLOW      -1
1324    RC    .035    .022    .035    3500    .0034
1325    RX       0     500    1000    1001    1016    1516    2016    2516
1326    RY       6     5.5       5       2       2     3.5     4.5     5.5
        *
        * DDM   ***** Updated *****

1327    KK     74A
1328    KM   BASIN 74A
1329    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1330    KM    L=      2.4  Lca=      1.0   S=   42.2  Kn= .095  LAG=  92.9
1331    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
        * KO     2       2
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1332    BA     .75
1333    LG     .35     .36    5.00     .27     .00
1334    UI     27.     27.     27.     27.     73.     96.    111.    129.    140.    151.
1335    UI    163.    175.    193.    208.    228.    268.    317.    362.    327.    287.
1336    UI    260.    239.    222.    206.    187.    171.    160.    142.    132.    118.
1337    UI     99.     79.     56.     48.     47.     45.     45.     32.     27.     27.
1338    UI     27.     19.      8.      8.      8.      8.      8.      8.      8.      8.
1339    UI      8.      8.      8.      8.      8.      0.      0.      0.      0.      0.
1340    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
```

```
1341    KK   DB74A
1342    KM   NEW BASIN REGRADED ON 18 DEC 97, by Dibble & Associates
1343    KM   revised to be on-line detention basin
1344    KM   DETENTION BASIN LOCATED EAST OF MERIDIAN ROAD & north of Powerline Floodway
1345    KM   WITH 24-INCH OUTFALL & 350-FT WEIR.
        * KO     2       2
1346    RS       1    STOR       0
1347    SA       0    1.43    5.38   11.14   18.97
1348    SE    76.0      78      80      82      84
1349    SL    77.0    3.14     .62      .5
1350    SS   82.20     350     2.5     1.5
        *

1351    KK   74ATB
1352    KM   ROUTE 74A TO 74B VIA WASH CROSSING COUNTY LINE
1353    RS       4    FLOW      -1
1354    RC    .045     .04    .045    3500   .0054
1355    RX       0     500    1000    1003    1007    1011    1511    2011
1356    RY       4     3.5       3       0       0       2     2.5       3
        *

1357    KK     74B
1358    KM   BASIN 74B
1359    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1360    KM    L=       .6  Lca=       .5   S=   32.1  Kn= .050  LAG=  23.3
1361    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1362    BA     .33
1363    LG     .30     .25    6.00     .18    5.00
1364    UI     48.    177.    273.    388.    563.    406.    289.    188.     87.     58.
1365    UI     28.     15.     15.      0.      0.      0.      0.      0.      0.      0.
1366    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

1367    KK    R74B
1368    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1369    DT    D74B      22
1370    DI       0   10000
1371    DQ       0   10000
        *
        * DDM   ***** Preserved *****
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1372    KK   CP74B
1373    KM   COMBINE S74A AND S74B
1374    HC       2
        *
        * DDM   ***** Preserved *****

1375    KK   74BTC
1376    KM   ROUTE 74B TO 74C VIA WASH CROSSING MOUNTAIN ROAD
1377    RS       4    FLOW      -1
1378    RC    .045     .04    .045    3500   .0051
1379    RX       0     500     980    1003    1007    1031    1511    2011
1380    RY       4     3.5       3       0       0       3     3.5       4
        *
        * DDM   ***** Updated *****
```

```
1381    KK     74C
1382    KM   BASIN 74C
1383    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1384    KM    L=       .7  Lca=       .5   S=   25.4  Kn= .020  LAG=  10.3
1385    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1386    BA     .34
1387    LG     .10     .15    7.00     .17   80.00
1388    UI    303.    950.    940.    348.     92.     35.      0.      0.      0.      0.
1389    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

1390    KK    R74C
1391    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1392    DT    D74C      35
1393    DI       0   10000
1394    DQ       0   10000
        *
        * DDM   ***** Preserved *****

1395    KK   CP74C
1396    KM   COMBINE 74C AND 74B AND 73C
1397    HC       3
        *
        * DDM   ***** Preserved *****

1398    KK  74CT75
1399    KM    ROUTE CP74C TO S75 VIA POWERLINE FLOODWAY TO ELLSWORTH RD & RAY ROAD.
1400    KM    Vel of 10 ft/sec for NSTP calc.
1401    RS       3    FLOW      -1
1402    RC     .03    .013     .03   10560   .0049
1403    RX       0    1005    1023  1030.5  1036.5    1044    1062    2067
1404    RY       6       5       5       0       0       5       5       6
        *
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1405    KK      75
1406    KM   BASIN 75 , WHICH IS THE GENERAL MOTORS DESERT PROVING GROUNDS
1407    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1408    KM    L=      4.0  Lca=      3.0   S=   20.0  Kn= .087  LAG= 182.0
1409    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1410    BA    4.01
1411    LG     .20     .35    6.80     .13   35.00
1412    UI     74.     74.     74.     74.     74.     74.     74.     74.    180.    243.
1413    UI    247.    284.    284.    335.    342.    363.    375.    396.    412.    422.
1414    UI    437.    458.    475.    495.    519.    550.    567.    585.    622.    672.
1415    UI    737.    819.    865.    935.   1002.    935.    870.    813.    764.    726.
1416    UI    693.    664.    637.    614.    593.    574.    547.    519.    496.    473.
1417    UI    452.    437.    425.    387.    377.    363.    347.    341.    289.    284.
1418    UI    233.    213.    213.    147.    131.    131.    131.    130.    122.    122.
1419    UI    122.    122.    122.     75.     74.     74.     74.     74.     74.     74.
1420    UI     74.     43.     23.     23.     23.     23.     23.     23.     23.     23.
1421    UI     23.     23.     23.     23.     23.     23.     23.     23.     23.     23.
1422    UI     23.     23.     23.     23.     23.     23.     23.     23.      0.      0.
1423    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

1424    KK     D75
```

```
1425          KM   RETAIN THE 100-YR 2-HR VOLUME. 80% OF VOLUME IS USED.
1426          DT   RET75     308
1427          DI       0   10000
1428          DQ       0   10000
              *

1429          KK     C75
1430          KM   COMBINE FLOWS FROM C74C AND SUBBASIN 75
1431          HC       2
              *
              * DDM   ***** Preserved *****

1432          KK   75TPC
1433          KM   ROUTE 75 THROUGH POWERLINE FLOODWAY TO AIR FORCE CHANNEL
1434          RS       2    FLOW      -1
1435          RC     .03    .013     .03    3900   .0041
1436          RX       0    1005    1023  1030.5  1036.5    1044    1062    2067
1437          RY       6       5       5       0       0       5       5       6
              *
              * DDM   ***** Updated *****

1438          KK     77A
1439          KM   BASIN 77A
1440          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1441          KM    L=      2.9  Lca=      1.5   S=   31.1  Kn= .092  LAG= 119.0
1442          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1443          BA    1.74
1444          LG     .35     .36    5.00     .27     .00
1445          UI     49.     49.     49.     49.     49.    108.    162.    185.    205.    230.
1446          UI    244.    264.    278.    293.    311.    333.    358.    380.    406.    462.
1447          UI    537.    584.    659.    601.    541.    496.    461.    430.    407.    385.
1448          UI    362.    334.    311.    293.    273.    252.    238.    226.    189.    161.
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1449          UI    141.    104.     87.     87.     83.     81.     81.     73.     49.     49.
1450          UI     49.     49.     49.     22.     15.     15.     15.     15.     15.     15.
1451          UI     15.     15.     15.     15.     15.     15.     15.     15.     15.     15.
1452          UI     15.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1453          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1454          KK   77ATB
1455          KM   ROUTE 77A TO 77B VIA WASH CROSSING COUNTY LINE
1456          RS       3    FLOW      -1
1457          RC    .045     .04    .045    3000    .006
1458          RX       0     500     980    1003    1007    1031    1511    2011
1459          RY       4     3.5       3       0       0       3     3.5       4
              *
              * DDM   ***** Updated *****

1460          KK     77B
1461          KM   BASIN 77B
1462          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1463          KM    L=       .6  Lca=       .3   S=   26.3  Kn= .050  LAG=  19.3
1464          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1465          BA     .36
1466          LG     .30     .25    5.30     .24    5.00
1467          UI     78.    277.    421.    700.    544.    360.    189.     93.     46.     19.
1468          UI     19.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
1469    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

1470    KK    R77B
1471    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1472    DT    D77B      16
1473    DI       0   10000
1474    DQ       0   10000
        *
        * DDM   ***** Preserved *****

1475    KK   CP77B
1476    KM   COMBINE S77A AND S77B
1477    HC       2
        *
        * DDM   ***** Preserved *****

1478    KK   77BTC
1479    KM   ROUTE 77B TO 77C VIA WASH CROSSING MOUNTAIN ROAD, THEN SOUTH ALONG
1480    KM    WESTERN EDGE OF 77C
1481    RS       5    FLOW      -1
1482    RC    .045     .04    .045    4750   .0042
1483    RX       0     500     950    1003    1007    1061    1511    2011
1484    RY       4     3.5       3       0       0       3     3.5       4
        *
        * DDM   ***** Updated *****
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1485    KK     77C
1486    KM   BASIN 77C
1487    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1488    KM    L=       .5  Lca=       .3   S=   32.3  Kn= .020  LAG=   7.2
1489    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1490    BA     .28
1491    LG     .10     .25    5.80     .27   79.00
1492    UI    492.   1219.    393.     60.      0.      0.      0.      0.      0.      0.
1493    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

1494    KK    R77C
1495    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1496    DT    D77C      28
1497    DI       0   10000
1498    DQ       0   10000
        *
        * DDM   ***** Preserved *****

1499    KK    C77C
1500    KM   COMBINE FLOWS FROM C77B AND SUBBASIN 77C
1501    HC       2
        *
        * DDM   ***** Preserved *****

1502    KK  77CT78
1503    RS       3    FLOW      -1
1504    RC   0.035   0.022   0.035    2400   0.002
```

```
1505    RX      0     100     110     115     120     125     130     135
1506    RY      4       3     2.5       0       0     2.5       8       9
        *
        * DDM   ***** Updated *****

1507    KK     78A
1508    KM   BASIN 78A
1509    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1510    KM    L=      3.3  Lca=      1.3   S=   30.2  Kn= .090  LAG= 118.0
1511    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1512    BA    1.88
1513    LG     .35     .36    5.00     .27     .00
1514    UI     54.     54.     54.     54.     54.    124.    176.    203.    227.    252.
1515    UI    268.    290.    305.    322.    342.    366.    396.    417.    451.    515.
1516    UI    612.    641.    716.    643.    579.    531.    494.    464.    437.    417.
1517    UI    385.    356.    334.    315.    290.    270.    255.    233.    206.    159.
1518    UI    153.     95.     95.     95.     88.     88.     88.     65.     54.     54.
1519    UI     54.     54.     45.     16.     16.     16.     16.     16.     16.     16.
1520    UI     16.     16.     16.     16.     16.     16.     16.     16.     16.     16.
1521    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1522    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1523    KK   78ATB
1524    KM   ROUTE FLOW FROM 78A TO 78B VIA WASH CROSSING COUNTY LINE
1525    RS       4    FLOW      -1
1526    RC    .045     .04    .045    3500   .0042
1527    RX       0     500     980    1003    1007    1031    1511    2011
1528    RY     4.5     3.5       3       0       0       3     3.5     4.5
        * DDM   ***** Updated *****

1529    KK     78B
1530    KM   BASIN 78B
1531    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1532    KM    L=       .6  Lca=       .4   S=   31.6  Kn= .050  LAG=  20.9
1533    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1534    KM    FCDMC REPORTS BASIN ALREADY BUILT-OUT, WITH RURAL 1 TO 2 ACRE LOTS
1535    KM    AND THERE IS NO RETENTION FOR THIS BASIN.
1536    BA     .39
1537    LG     .30     .15    8.40     .07    5.00
1538    UI     68.    262.    393.    635.    638.    433.    283.    126.     78.     34.
1539    UI     19.     19.      0.      0.      0.      0.      0.      0.      0.      0.
1540    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

1541    KK    C78B
1542    KM   COMBINE FLOW FROM SUBBASIN 78B AND SUBBASIN 78A
1543    HC       2
        *

1544    KK   78BTC
1545    KM   ROUTE 78B TO 78C VIA WASH CROSSING MOUNTAIN ROAD, THEN SOUTH ALONG
1546    KM    WESTERN EDGE OF 78C.
1547    RS       3    FLOW      -1
1548    RC    .035    .022    .035    4500   .0033
1549    RX       0     100     110     115     120     125     130     135
1550    RY       5       4     3.5       0       0     3.5       8       9
```

```
                 *

1551             KK     78C
1552             KM   BASIN 78C
1553             KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1554             KM    L=       .5  Lca=       .3   S=   31.7  Kn= .026  LAG=   9.0
1555             KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1556             BA     .28
1557             LG     .13     .10   11.20     .03   64.00
1558             UI    319.    980.    652.    164.     34.      0.      0.      0.      0.      0.
1559             UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                 *

1560             KK    R78C
1561             KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1562             DT    D78C      24
1563             DI       0   10000
1564             DQ       0   10000
                 *
```



```
LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1565             KK    C78C
1566             KM   COMBINE FLOWS FROM 78B, 78C & 77C @ WILLIAMS FIELD ROAD & SIGNAL BUTTE ROAD.
1567             HC       3
                 *

1568             KK  78CT79
1569             KM   ROUTE 78C TO 79A AT ELLSWORTH VIA GM CHANNEL TO
1570             KM    WILLIAMS FIELD RD & ELLSWORTH ROAD.
1571             RS       4    FLOW      -1
1572             RC    .035    .022    .035   10560   .0044
1573             RX       0     500     800     805     820     825    1125    1625
1574             RY       7       6       5       0       0       5       6       7
                 *

1575             KK     79A
1576             KM   BASIN 79A
1577             KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1578             KM    L=      2.3  Lca=      1.2   S=   23.2  Kn= .090  LAG= 106.0
1579             KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
                 * KO      2
1580             BA    2.01
1581             LG     .20     .30    8.00     .08   42.00
1582             UI     64.     64.     64.     64.     82.    209.    232.    262.    299.    321.
1583             UI    347.    367.    390.    421.    458.    489.    527.    610.    726.    792.
1584             UI    825.    727.    655.    600.    557.    523.    495.    451.    417.    390.
1585             UI    361.    328.    308.    285.    244.    190.    169.    113.    113.    109.
1586             UI    105.    105.     85.     64.     64.     64.     64.     37.     20.     20.
1587             UI     20.     20.     20.     20.     20.     20.     20.     20.     20.     20.
1588             UI     20.     20.     20.      0.      0.      0.      0.      0.      0.      0.
1589             UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                 *

1590             KK    D79A
1591             KM    RETAIN THE 100-YR 2-HR RUNOFF VOLUME. 80% OF VOLUME IS USED
1592             DT  DET79A   171.2
1593             DI       0   10000
1594             DQ       0   10000
```

```
                 *

1595             KK   C79A1
1596             KM   COMBINE FLOWS FROM 78C AND 79A @ GENERAL MOTORS DPG.
1597             HC       2
                 *

1598             KK     79B
1599             KM   BASIN 79B
1600             KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1601             KM    L=      1.4  Lca=       .6   S=    9.0  Kn= .090  LAG=  77.7
1602             KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
                 * KO     2
1603             BA    1.00
1604             LG     .25     .25    9.70     .05   55.00
1605             UI     43.     43.     43.     85.    150.    179.    207.    232.    250.    275.
1606             UI    306.    335.    388.    479.    557.    515.    444.    396.    360.    331.
1                                                HEC-1 INPUT                                          PAGE 44

LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1607             UI    295.    267.    240.    216.    192.    155.    123.     76.     76.     71.
1608             UI     71.     48.     43.     43.     36.     13.     13.     13.     13.     13.
1609             UI     13.     13.     13.     13.     13.     13.      0.      0.      0.      0.
1610             UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                 *

1611             KK    D79B
1612             KM   RETAIN THE 100-YR 2-HOUR RUNOFF VOLUME. 80% OF VOLUME IS USED
1613             DT  RET79B    92.8
1614             DI       0   10000
1615             DQ       0   10000
                 *

1616             KK   C79A2
1617             KM   COMBINE FLOWS FROM 79A AND 79B @ WILLIAMS FIELD ROAD & ELLSWORTH ROAD.
1618             HC       2
                 *

1619             KK     78F
1620             KM   BASIN 78F
1621             KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1622             KM    L=      3.7  Lca=      2.1   S=   29.8  Kn= .090  LAG= 147.0
1623             KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1624             BA    4.19
1625             LG     .35     .36    5.00     .27     .00
1626             UI     96.     96.     96.     96.     96.     96.    148.    315.    325.    368.
1627             UI    399.    442.    468.    495.    521.    541.    566.    595.    626.    663.
1628             UI    706.    737.    774.    845.    936.   1085.   1119.   1276.   1239.   1127.
1629             UI   1033.    968.    907.    862.    820.    782.    751.    712.    667.    629.
1630             UI    597.    570.    541.    502.    472.    454.    436.    368.    339.    276.
1631             UI    276.    174.    170.    170.    168.    158.    158.    158.    156.     96.
1632             UI     96.     96.     96.     96.     96.     79.     29.     29.     29.     29.
1633             UI     29.     29.     29.     29.     29.     29.     29.     29.     29.     29.
1634             UI     29.     29.     29.     29.     29.     29.     29.      0.      0.      0.
1635             UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                 *

1636             KK    82A1
1637             KM   BASIN 82A1
1638             KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
1639    KM    L=      3.6  Lca=       .9   S=   33.9  Kn= .090  LAG= 103.0
1640    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1641    BA    3.12
1642    LG     .35     .36    5.00     .27     .00
1643    UI    102.    102.    102.    102.    163.    335.    381.    436.    485.    526.
1644    UI    564.    599.    644.    693.    757.    801.    901.   1048.   1222.   1356.
1645    UI   1223.   1084.    987.    913.    852.    800.    742.    675.    629.    589.
1646    UI    529.    494.    459.    391.    304.    266.    180.    180.    173.    167.
1647    UI    167.    123.    102.    102.    102.    102.     36.     31.     31.     31.
1648    UI     31.     31.     31.     31.     31.     31.     31.     31.     31.     31.
1649    UI     31.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1650    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1651    KK   C82A1
1652    KM   COMBINE FLOWS FROM SUBBASINS 78F AND 82A1 NORTH OF PECOS ROAD AT
1653    KM   NEW DETENTION BASIN
1654    HC       2
        *

1655    KK  DB82A1
1656    KM   PECOS NORTH BASIN
1657    KM   NEW DETENTION BASIN LOCATED EAST OF MERIDIAN ROAD & 660' NORTH OF PECOS RD.
1658    KM   WITH 1-42" RCP OUTLET & 86' SPILLWAY AT ELEV=44
        * KO     2       2
1659    RS       1    STOR       0
1660    SV       0       8      34      73     113     153     195     237     280     346
1661    SE      36      37      38      39      40      41      42      43      44    46.1
1662    SL    33.5     9.6     .62      .5
1663    SS      44     195       3     1.5
        *

1664    KK    PS-9
1665    KM    REACH PS-9
1666    KM    OUTFLOW CHANNEL FROM NEW DETENTION BASIN 82A TO MAIN CHANNEL @ PECOS
1667    RS       1    FLOW      -1
1668    RC    .025    .025    .025     500   .0005
1669    RX       0       8      16      42      46      72      80      88
1670    RY     4.1     4.2     4.3       0       0     4.3     4.2     4.1
        *

1671    KK    CAP2
1672    KM   INFLOW FROM EAST OF THE CAP THROUGH 1 - 36" PIPE OVERCHUTE
1673    KM   STATION #536+00 SALT-GILA AQUEDUCT REACH 2
1674    KM   QI CARDS BASED ON OVERCHUTE CAPACITY OF 64 CFS
1675    IN     60
1676    BA     .01
1677    QI      0      20      64      64      64      64      64      64      64      64
1678    QI     64      64      64      64      64      64      64      64      64      64
1679    QI     64      64      64      64      64
        *

1680    KK   RCAP2
1681    KM   ROUTE CAP2 THROUGH 82A2 VIA WASH TO SUBBASIN 82A2
1682    IN     15
1683    RS     27    FLOW      -1
1684    RC   .045     .04    .045   24000     .05
```

```
1685    RX      0     500    1000    1010    1020    1030    1530    2030
1686    RY      8       5       3       0       0       3       5       8
        *

1687    KK    82A2
1688    KM   BASIN 82A2
1689    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1690    KM    L=      4.6  Lca=      2.9   S=   27.2  Kn= .089  LAG= 183.0
1691    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1692    BA    4.13
1693    LG     .35     .36    5.00     .27    1.00
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1694    UI     76.     76.     76.     76.     76.     76.     76.     76.    177.    249.
1695    UI    250.    291.    291.    339.    349.    371.    381.    406.    420.    430.
1696    UI    448.    466.    483.    503.    529.    561.    578.    596.    631.    680.
1697    UI    743.    805.    911.    923.   1027.    979.    901.    845.    794.    751.
1698    UI    717.    686.    659.    635.    613.    594.    570.    540.    514.    487.
1699    UI    470.    455.    437.    407.    393.    372.    362.    349.    315.    291.
1700    UI    263.    218.    218.    179.    134.    134.    134.    134.    128.    125.
1701    UI    125.    125.    125.     96.     76.     76.     76.     76.     76.     76.
1702    UI     76.     67.     23.     23.     23.     23.     23.     23.     23.     23.
1703    UI     23.     23.     23.     23.     23.     23.     23.     23.     23.     23.
1704    UI     23.     23.     23.     23.     23.     23.     23.     23.     23.      0.
1705    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1706    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

1707    KK  CP82A2
1708    KM   COMBINE FLOW FROM ROUTED CAP2 AND SUBBASIN 82A2
1709    HC       2
        *

1710    KK    82A4
1711    KM   BASIN 82A4
1712    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1713    KM    L=      3.5  Lca=      1.5   S=   29.1  Kn= .090  LAG= 128.0
1714    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1715    BA    2.13
1716    LG     .35     .36    5.00     .27     .00
1717    UI     56.     56.     56.     56.     56.     70.    184.    193.    214.    248.
1718    UI    265.    281.    302.    316.    332.    352.    374.    401.    424.    447.
1719    UI    494.    557.    650.    691.    742.    667.    606.    560.    523.    490.
1720    UI    466.    443.    419.    389.    364.    343.    325.    299.    281.    267.
1721    UI    251.    214.    182.    161.    126.     99.     99.     97.     92.     92.
1722    UI     92.     69.     56.     56.     56.     56.     56.     27.     17.     17.
1723    UI     17.     17.     17.     17.     17.     17.     17.     17.     17.     17.
1724    UI     17.     17.     17.     17.     17.     17.      0.      0.      0.      0.
1725    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

1726    KK  82A4T3
1727    KM   REACH MN-2
1728    KM   ROUTE FLOW FROM SUBBASIN 82A4 TO DETENTION BASIN 82A3
1729    RS       2    FLOW      -1
1730    RC    .025    .025    .025    1050   .0005
1731    RX       0       8      16      47     107     138     146     154
1732    RY     5.0     5.1     5.2       0       0     5.2     5.1     5.0
        *
```

```
1733          KK    82A3
1734          KM   BASIN 82A3
1735          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1736          KM    L=       3.6  Lca=      2.0   S=   28.3  Kn= .090  LAG= 145.0
1737          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1738          BA    2.02
1739          LG     .35      .36     5.00      .27      .00
1740          UI     47.      47.      47.      47.      47.      47.      82.     154.     162.     180.
1                                                HEC-1 INPUT                                                PAGE 47

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1741          UI    200.     218.     230.     246.     257.     268.     280.     294.     310.     330.
1742          UI    351.     365.     387.     425.     477.     553.     566.     633.     583.     529.
1743          UI    492.     460.     434.     410.     392.     376.     361.     336.     316.     299.
1744          UI    284.     271.     250.     237.     228.     216.     190.     180.     136.     135.
1745          UI    101.      83.      83.      83.      78.      77.      77.      77.      52.      47.
1746          UI     47.      47.      47.      47.      42.      14.      14.      14.      14.      14.
1747          UI     14.      14.      14.      14.      14.      14.      14.      14.      14.      14.
1748          UI     14.      14.      14.      14.      14.      14.       0.       0.       0.       0.
1749          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *

1750          KK   CP82A3
1751          KM    COMBINE FLOW FROM SUBBASIN 82A4 AND SUBBASIN 82A3 BEFORE DETENTION BASIN
1752          HC       2
              *

1753          KK   CP82A5
1754          KM    COMBINE FLOWS FROM CAP OVERCHUTE AND SUBBASIN 82A
1755          HC       2
              *

1756          KK    DB82B
1757          KM    PECOS SOUTH BASIN
1758          KM    NEW DETENTION BASIN LOCATED EAST OF MERIDIAN ROAD & 660' SOUTH OF PECOS RD.
1759          KM    WITH 1-66" RCP OUTLET & 80' SPILLWAY AT ELEV 41
              * KO     2       2
1760          RS       1    STOR       0
1761          SV       0     3.5     9.6     25.7     62.7    110.5    158.7    207.5    257.3      320
1762          SE    31.5      33      34       35       36       37       38       39       40     42.1
1763          SL      33    23.7     .62       .5
1764          SS      41      80       3      1.5
              *

1765          KK    MN-1
1766          KM    REACH MN-1  plus culvert PSC-7
1767          KM    ROUTE FLOW FROM NEW DETENTION BASIN 82B TO MAIN LINE CHANNEL @ PECOS
1768          RS       1    FLOW      -1
1769          RC    .025    .025    .025     1030    .0005
1770          RX       0       8      16       47       55       87       95      103
1771          RY     5.1     5.2     5.3        0        0      5.3      5.2      5.1
              *

1772          KK   CP82A6
1773          KM          COMBINE FLOWS AFTER DETENTION BASINS.
1774          HC       2
              *

1775          KK   82TBOX
```

```
1776          KM   REACH PS-8
1777          KM   ROUTE FLOW FROM DETENTION BASIN DB82B TO 1000' FOOT LONG BOX CULVERT (PSC-6).
1778          RS       1    FLOW      -1
1779          RC    .025    .025    .025     750   .0005
1780          RX       0       8      16    47.2      67      98     106     114
1781          RY     5.0     5.1     5.2       0       0     5.2     5.1     5.0
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1782          KK  BOXCLV
1783          KM   REACH PSC-6
1784          KM   ROUTE FLOW THROUGH BOX CULVERT
1785          RS       1    FLOW      -1
1786          RC    .015    .012    .015    1000   .0020
1787          RX       0       8      16   16.01   28.01   28.02      36      44
1788          RY     4.8     4.9       5       0       0       5     4.9     4.8
              *

1789          KK  BOXT78
1790          KM   REACH PS-5, PS-6, PS-7 plus culverts PSC-5 & PSC-4
1791          KM   ROUTE FLOW FROM 1000' BOX CULVERT TO C78D  (SIGNAL BUTTE ROAD)
1792          RS       1    FLOW      -1
1793          RC    .025    .025    .025    3400   .0005
1794          RX       0       8      16      47      67      98     106     114
1795          RY     5.4     5.3     5.2       0       0     5.2     5.3     5.4
              *

1796          KK     78D
1797          KM   BASIN 78D
1798          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1799          KM    L=      1.2  Lca=       .5   S=   21.7  Kn= .030  LAG=  19.5
1800          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1801          BA     .89
1802          LG     .15     .15    8.00     .11   55.00
1803          UI    189.    678.   1029.   1713.   1367.    909.    496.    240.    123.     47.
1804          UI     47.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1805          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1806          KK    R78D
1807          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1808          DT    D78D      84
1809          DI       0   10000
1810          DQ       0   10000
              *
              * DDM   ***** Updated *****

1811          KK     82B
1812          KM   BASIN 82B
1813          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1814          KM    L=       .9  Lca=       .4   S=   21.2  Kn= .030  LAG=  17.2
1815          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1816          BA     .92
1817          LG     .15     .25    5.00     .36   55.00
1818          UI    266.    879.   1420.   2004.   1268.    727.    294.    142.     55.     55.
1819          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1820          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1821          KK     R82
1822          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1823          DT     D82       1
1824          DI       0   10000
1825          DQ       0   10000
              *

1826          KK   DTTRW
1827          KM    DIVERTING 110.7 ACRE-FEET DUE TO ON-SITE RETENTION
1828          KM   VOLUMES WERE DERIVED FROM DRAINAGE REPORT - REFERENCE 7.
1829          DT     TRW   110.7
1830          DI       0   10000
1831          DQ       0   10000
              *
              * DDM   ***** Preserved *****

1832          KK    C78D
1833          KM    COMBINE FLOWS FROM 78D, 82B AND ROUTED FLOW 82T78D
1834          KM     @ PECOS ROAD AND SIGNAL BUTTE ROAD.
1835          HC       3
              *
              * DDM   ***** Preserved *****

1836          KK   78DTE
1837          KM   REACH PS-2, PS-3, PS-4 plus culverts PSC-3 AND PSC-2.
1838          KM   ROUTE FLOWS FROM 78D (PECOS RD AND SIGNAL BUTTE RD) TO 78E (PECOS AND CRISMON
1839          RS       2    FLOW      -1
1840          RC    .025   0.025   0.025    5100   .0005
1841          RX       0       8      16    53.2    93.2   130.4   138.4   146.4
1842          RY     6.0     6.1     6.2       0       0     6.3     6.1     6.0
              *

1843          KK     78E
1844          KM   BASIN 78E
1845          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1846          KM    L=      1.1  Lca=       .5   S=   17.4  Kn= .087  LAG=  57.4
1847          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * KO     2
1848          BA    1.01
1849          LG     .25     .26    8.80     .06   55.00
1850          UI     59.     59.    108.    212.    271.    313.    351.    402.    460.    565.
1851          UI    741.    698.    577.    502.    447.    382.    335.    289.    241.    166.
1852          UI    104.    100.     97.     60.     59.     45.     18.     18.     18.     18.
1853          UI     18.     18.     18.     18.      0.      0.      0.      0.      0.      0.
1854          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1855          KK    D78E
1856          KM   RETAIN THE 100-YR 2-HR RUNOFF VOLUME. 80% OF VOLUME IS USED
1857          DT  RET78E    93.6
1858          DI       0   10000
1859          DQ       0   10000
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
1860          KK      83
1861          KM   BASIN 83
1862          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1863          KM    L=      2.0  Lca=       .5   S=   15.0  Kn= .030  LAG=  25.8
1864          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1865          BA    1.01
1866          LG     .15      .25    5.00     .36   55.00
1867          UI    131.     423.    700.    931.   1454.   1362.    993.    726.    464.    226.
1868          UI    161.      89.     40.     40.     40.      0.      0.      0.      0.      0.
1869          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1870          KK     R83
1871          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1872          DT     D83      83
1873          DI       0   10000
1874          DQ       0   10000
              *

1875          KK    C78E
1876          KM   COMBINE FLOWS FROM 78D AND 78E (CRISMON ROAD)
1877          HC       3
              *

1878          KK  78ET84
1879          KM   REACH PS-1
1880          KM   ROUTE FLOWS WEST ALONG PECOS IN A PROPOSED CHANNEL
1881          KM   ROUTE FLOWS FROM CRISMON ROAD TO ELLSWORTH ROAD.
1882          RS       2    FLOW      -1
1883          RC    .025   0.025   0.025    4840   .0005
1884          RX       0       8      16    53.2    93.2   130.4   138.4   146.4
1885          RY     6.0     6.1     6.2       0       0     6.2     6.1     6.0
              *

1886          KK      84
1887          KM   BASIN 84
1888          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1889          KM    L=      2.0  Lca=       .5   S=   12.5  Kn= .030  LAG=  26.7
1890          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1891          BA     .99
1892          LG     .15      .25    4.70     .40   55.00
1893          UI    125.     380.    651.    855.   1278.   1399.   1008.    747.    520.    258.
1894          UI    182.     120.     38.     38.     38.      0.      0.      0.      0.      0.
1895          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1896          KK     R84
1897          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1898          DT     D84      85
1899          DI       0   10000
1900          DQ       0   10000
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1901          KK     C84
1902          KM    COMBINE FLOWS FROM 78E AND 84  AT ELLSWORTH AND PECOS ROAD
```

```
1903          KM    CHANNEL EAST SIDE OF GATEWAY WILLIAMS FLOWING TO THE NORTH
1904          HC       2
              *
              * DDM   ***** Preserved *****

1905          KK    EC-4   ROUTE   REACH
1906          KM   ELLSWORTH ROAD CHANNEL REACH-4
1907          KM   ROUTE FLOWS FROM THE CORNER OF PECOS AND ELLSWORTH ROADS TO
1908          KM   THE POINT 1/2 MILE NORTH OF PECOS WHERE FLOW FROM GM ENTERS
1909          RS       4    FLOW      -1
1910          RC   0.048   0.048   0.048    3000  0.0010    0.00
1911          RX     0.0    16.0    33.3    50.6   125.6   142.9   160.2   176.2
1912          RY     5.5     5.8     2.9     0.0     0.0     2.9     5.8     5.5
              *

1913          KK   C79B3
1914          KM    COMBINE FLOWS FROM SOUTH CHANNEL AND WGA AT ELLSWORTH ROAD.
1915          HC       2
              *

1916          KK    EC-3   ROUTE   REACH
1917          KM   ROUTE FLOWS FROM THE COMBINE POINT OF SUB-BASIN 79B TO
1918          KM   WILLIAMS FIELD ROAD ALIGNMENT AT THE GM MANIFOLD STRUCTURE
1919          RS       5    FLOW      -1
1920          RC   0.048   0.048   0.048    3500  0.0010    0.00
1921          RX     0.0    16.0    36.5    56.9   141.9   162.4   182.9   198.9
1922          RY     6.5     6.8     3.4     0.0     0.0     3.4     6.8     6.5
              *

1923          KK    EC-2   ROUTE   REACH
1924          KM   ROUTE FLOWS THROUGH WILLIAMS-GATEWAY (SUBBASIN 80A) BY WAY OF NEW NORTH
1925          KM   PERIMETER CHANNEL TO A POINT ABOUT 1/2 MILE WEST OF ELLSWORTH ROAD
1926          RS       4    FLOW      -1
1927          RC   0.034   0.034   0.034    4200  0.0010    0.00
1928          RX     0.0    16.0    37.0    57.9   157.9   178.9   199.8   215.8
1929          RY     6.7     7.0     3.5     0.0     0.0     3.5     7.0     6.7
              *

1930          KK    EC-1   ROUTE   REACH
1931          KM   ROUTE FLOWS THROUGH WILLIAMS-GATEWAY (SUBBASIN 80A) BY WAY OF NEW NORTH
1932          KM   FROM A POINT ABOUT 1/2 MILE WEST OF ELLSWORTH ROAD TO POWERLINE FLOODWAY.
1933          RS       3    FLOW      -1
1934          RC   0.034   0.034   0.034    3200  0.0010    0.00
1935          RX     0.0    16.0    37.0    57.9   157.9   178.9   199.8   215.8
1936          RY     6.7     7.0     3.5     0.0     0.0     3.5     7.0     6.7
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1937          KK   CPPWR
1938          KM   COMBINE FLOWS FROM 75 AND 79 IN THE POWERLINE FLOODWAY
1939          KM   AT ABOUT 1 MILE WEST OF ELLSWORTH ROAD
1940          HC       2
              *
              * KK*DBPWR
              * KM DIVERT FROM POWERLINE CHANNEL INTO THE RAY DETENTION BASIN
              * KM USES A REALISTIC SIDE-WEIR EQUATION TO FORM POWER CURVE
              * KM WEIR CREST = 3.25FT; WEIR LENGTH =  750; 4.0FT DIV STRUCTURE.
              * KO     3
```

```
* DT PWRDB    1537
* DI     0     528     544     576     628     704     955    5730
* DQ     0       0      11      40      89     162     410    5174
*

KK   PLF-2
KM   REVISED ROUTING TO RELFECT CHANGES REQUIRED DUE TO THE ELLSWORTH RD
KM   CHANNEL PROJECT.  EXISTING PLF DOES NOT HAVE CAPACITY FOR THESE FLOWS
KM   AND WILL NEED TO BE IMPROVED. -DCF, D&A 2/01
RS       3    FLOW      -1
RC   0.034   0.034   0.034    4710  0.0020    0.00
RX     0.0    16.0    29.8    43.5   123.5   137.3   151.0   167.0
RY     6.6     6.9     3.4     0.0     0.0     3.4     6.9     6.6
*
* THE FOLLOWING CODE REMOVED TO MODEL THE IMPROVED PLF
* KKPWRT80
* KM REACH PR-3, PR-4, plus culvert PRC-2
* KM ROUTE FLOWS FROM PLF COMBINE TO CATCH POINT AT 80A VIA PLF IMPROVEMENT
* RS     1    FLOW      -1
* RC  .025    .015    .025    3680   .0014
* RX     0       8      16      34      62      79      87      95
* RY   8.5     8.6     8.7       0       0     8.7     8.6     8.5
*

KK     80A
KM   BASIN 80A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      3.8  Lca=      2.2   S=   14.2  Kn= .030  LAG=  58.2
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA    2.64
LG     .15     .15    9.70     .06   55.00
UI    153.    153.    265.    544.    690.    802.    899.   1020.   1171.   1421.
UI   1851.   1871.   1534.   1330.   1185.   1024.    896.    770.    653.    479.
UI    305.    265.    251.    187.    153.    153.     50.     47.     47.     47.
UI     47.     47.     47.     47.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*

KK    R80A
KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
DT    D80A      33
DI       0   10000
DQ       0   10000
*
*  THE SECTION BELOW COMBINES THE ROUTED FLOW FROM SANTAN AND POWER,
*  THEN ROUTES THRU THE RAY DB
* KKDRSNDB
* KM RETURNS THE DIVERSION FROM THE SANTAN CHANNEL
* DR SANDB
*
* KKDRPWDB
* KM RETURNS THE DIVERSION FROM THE POWERLINE CHANNEL
* DR PWRDB
*
* KK CPRAY
* KM COMBINES THE TWO ROUTED FLOWS IN THE RAY DETENTION BASIN
* HC     2       1
*
* KK*RTRAY
* KM ROUTES THE HYDROGRAPH OUT OF THE RAY BASIN
* KM Currently incorporates a dummy set of outflow data
```

```
* KO      1
* RS      1    STOR      -1
* SV      0     244     493     747    1005    1269    1537
* SE      0    1.54    3.08    4.63    6.17    7.71    9.25
* SQ      0       1       2       3       4       5       6
*
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1966          KK   CP80A
1967          KM   COMBINE FLOW IN THE POWERLINE FLOODWAY WITH FLOW COMING FROM SUBBASIN 80A
1968          KM   THE LOCATION FOR THIS COMBINATION AT THE NW CORNER OF SUBBASIN 80A
1969          HC       2
              *

1970          KK   PLF-1
1971          KM   REVISED ROUTING TO RELFECT CHANGES REQUIRED DUE TO THE ELLSWORTH RD
1972          KM   CHANNEL PROJECT.  EXISTING PLF DOES NOT HAVE CAPACITY FOR THESE FLOWS
1973          KM   AND WILL NEED TO BE IMPROVED. -DCF, D&A 2/01
1974          RS       2    FLOW      -1
1975          RC   0.034   0.034   0.034    2958  0.0020    0.00
1976          RX     0.0    16.0    29.8    43.7   148.7   162.5   176.3   192.3
1977          RY     6.6     6.9     3.5     0.0     0.0     3.5     6.9     6.6
              *
              * THE FOLLOWING CODE REMOVED TO MODEL THE IMPROVED CONDITION OF THE PLF
              * KKPWRSAN
              * KM REACH PR-1, PR-2 plus culvert PRC-1
              * KM ROUTE FLOWS FROM COMBINE POINT AT 80A VIA PLF RE-ALIGNMENT.
              * RS      1    FLOW      -1
              * RC   .015    .015    .015    3500   .0014
              * RX      0       8      16      74     154     212     220     228
              * RY    9.5     9.6     9.7       0       0     9.7     9.6     9.5
              *
              * KK CPSAN
              * KM COMBINE FLOWS FROM THE POWERLINE FLOODWAY AND THE PROPOSED SANTAN FREEWAY
              * KM DRAINAGE CHANNEL
              * HC      2
              *
              * ****REMOVED BY CPE IN JUNE 2000 IN FAVOR OF SANDB AND PWRDB
              * ****DIVERSIONS LOCATED UPSTREAM.
              * KK*DBRAY
              * KM       BASIN TO WITHDRAW FLOW FROM POWERLINE FLOODWAY
              * KO      3
              * DT RAYDB    1200
              * DI      0    1000    1001    1500    4500   14500
              * DQ      0       0       1     500    3500   13500
              *

1978          KK  PWREMF
1979          KM   ROUTE FLOW FROM RE-ALIGNED POWERLINE FLOODWAY TO EMF VIA
1980          KM   NEW CHANNEL ALONG SANTAN FREEWAY ALIGNMENT
1981          KM   REACH ET-1
1982          KO                                  21
1983          RS       1    FLOW      -1
1984          RC    .025    .025    .025    3850   .0005
1985          RX      0       8      16      74     154     212     220     228
1986          RY    9.5     9.6     9.7       0       0     9.7     9.6     9.5
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1987          KK  EMFPOW
1988          KM   COMBINE FLOW FROM THE POWERLINE FLOODWAY WITH FLOW IN THE EMF
1989          HC       2
              *

1990          KK  POWTWI
1991          KM   ROUTE EMF FLOW TO WILLIAMS FIELD ROAD VIA THE EMF
1992          KM   THIS SECTION IS CONCRETE LINED TO PAST POWER ROAD BRIDGE
1993          RS       2    FLOW      -1
1994          RC     .03    .012     .03    4750   .0003
1995          RX       0     500     520     553     693     726     740     742
1996          RY      14      12      11       0       0      11      11      12
              *

1997          KK     80B
1998          KM   BASIN 80B
1999          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2000          KM    L=      1.5  Lca=       .9   S=   18.4  Kn= .044  LAG=  41.9
2001          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2002          KO                                      21
2003          BA    1.12
2004          LG     .13     .17    6.80     .18   48.00
2005          UI     90.    105.    319.    433.    515.    614.    754.   1063.   1032.    814.
2006          UI    687.    563.    464.    359.    213.    155.    136.     90.     73.     28.
2007          UI     28.     28.     28.     28.     28.      0.      0.      0.      0.      0.
2008          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2009          KK    R80B
2010          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2011          KO                                      21
2012          DT    D80B       4
2013          DI       0   10000
2014          DQ       0   10000
              *

2015          KK  MFWILL
2016          KM   COMBINE FLOWS INTO THE EMF WEST OF WILLIAMS AFB FROM 80B, EMF POWERLINE AND
2017          KM   EMFRAY
2018          HC       2
              *

2019          KK  WILTSP
2020          KM   ROUTE EMF FLOW FROM WILLIAMS FIELD ROAD TO THE SOUTHERN PACIFIC RAILROAD
2021          KM     (AT RITTENHOUSE ROAD)
2022          RS       3    FLOW      -1
2023          RC     .03    .022     .03    5000   .0003
2024          RX       0     500     520     553     693     726     740     742
2025          RY      14      12      11       0       0      11      11      12
              *
              * DDM   ***** Updated *****
```

1 HEC-1 INPUT PAGE 55

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2026          KK     81A
```

```
2027    KM   BASIN 81A
2028    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2029    KM    L=      3.3  Lca=      1.9   S=   16.4  Kn= .029  LAG=  49.0
2030    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2031    BA    1.81
2032    LG     .14      .25    4.70     .41   58.00
2033    UI    125.     125.    341.    523.    642.    737.    863.   1019.   1359.   1576.
2034    UI   1258.    1066.    922.    777.    656.    545.    386.    222.    209.    177.
2035    UI    125.     117.     38.     38.     38.     38.     38.     38.     38.      0.
2036    UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
2037    UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

2038    KK    R81A
2039    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2040    DT    D81A       5
2041    DI       0   10000
2042    DQ       0   10000
        *

2043    KK   81ATB
2044    KM   ROUTE SUBBASIN 81A TO 81B VIA ROAD NETWORK FOR ON-BASE HOUSING
2045    RS       9    FLOW      -1
2046    RC    .013    .013    .013    8000   .0035
2047    RX       0     500     750     753    1053    1056    1303    1803
2048    RY       3     1.5       1      .6      .6       1     1.5       3
        *

2049    KK     81B
2050    KM   BASIN 81B
2051    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2052    KM    L=      1.1  Lca=       .4   S=    6.9  Kn= .033  LAG=  24.7
2053    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2054    BA     .84
2055    LG     .10      .25    4.70     .45   67.00
2056    UI    115.     393.    631.    857.   1343.   1088.    796.    566.    296.    185.
2057    UI    115.      39.     35.     35.      0.      0.      0.      0.      0.      0.
2058    UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

2059    KK    R81B
2060    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2061    DT    D81B      35
2062    DI       0   10000
2063    DQ       0   10000
        *
        * DDM   ***** Preserved *****
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2064    KK     C81
2065    KM   COMBINE FLOWS FROM SUBBASINS 81A AND 81B BEFORE ENTERING INTO THE EMF
2066    KO                                        21
2067    HC       2
        *
        *
        * DDM   ***** Updated *****
```

```
2068          KK  EMFRT1      Hydrograph name changed by Dibble & Associates to avoid two
2069          KM              different hydrographs with the same name.
2070          KM   COMBINE 81A AND 81B AND RITTENHOUSE(HYDROGRAPH WILTSP, WHICH IS FROM EMFWIL)
2071          HC       2
              *
              *
              * THE NEXT KK BLOCKS COME FROM THE QUEEN CREEK ADMS
              *
              * DDM   ***** Preserved *****

2072          KK  SUB258
2073          KM   IN PINAL COUNTY, NO RETENTION
2074          KM        RUNOFF FROM SUBBASIN 258
2075          BA    3.68
2076          LS              78
2077          UD    3.87
              *
              *

2078          KK    R258
2079          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2080          DT    D258     121
2081          DI       0   10000
2082          DQ       0   10000
              *

2083          KK   RO259
2084          KM        ROUTE SUB258 TO CO262
2085          RM       8    1.57    0.20
              *
              * DDM   ***** Preserved *****

2086          KK  SUB260
2087          KM        RUNOFF FROM SUBBASIN 260
2088          BA    0.98
2089          LS              75
2090          UD    1.21
              *

2091          KK    R260
2092          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2093          DT    D260      27
2094          DI       0   10000
2095          DQ       0   10000
              *
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2096          KK   CO262
2097          KM        COMBINE SUB260 AND RO259
2098          HC       2
              * DDM   ***** Preserved *****

2099          KK   RO263
2100          KM        ROUTE CO262 TO CO266
2101          RM       8    1.56    0.20
              *
              * DDM   ***** Preserved *****
```

```
2102          KK  SUB264
2103          KM        RUNOFF FROM SUBBASIN 264
2104          BA    0.99
2105          LS              76
2106          UD    1.47
              *
              * DDM   ***** Preserved *****

2107          KK    R264
2108          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2109          DT    D264      29
2110          DI       0   10000
2111          DQ       0   10000
              *
              * DDM   ***** Preserved *****

2112          KK   CO266
2113          KM        COMBINE SUB264 AND RO263
2114          HC       2
              *
              * DDM   ***** Preserved *****

2115          KK   RO267
2116          KM        ROUTE CO266 TO CO270
2117          RM      16    3.31    0.20
              *
              * DDM   ***** Preserved *****

2118          KK  SUB268
2119          KM        RUNOFF FROM SUBBASIN 268
2120          BA    0.96
2121          LS              76
2122          UD    2.27
              *
              * DDM   ***** Preserved *****

2123          KK    R268
2124          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2125          DT    D268      28
2126          DI       0   10000
2127          DQ       0   10000
              *
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2128          KK   CO270
2129          KM        COMBINE RUNOFF FROM RO267 AND SUB268
2130          HC       2
              *
              * DDM   ***** Preserved *****

2131          KK   RO283
2132          KM        ROUTE CO282 TO CONCENTRATION POINT AT QUEEN CREEK ROAD
2133          RM      14    2.78    0.20
              *
              * THIS IS THE END OF THE QUEEN CREEK ADMS INSERT
              *
```

```
* DDM   ***** Updated *****

KK     88A
KM   BASIN 88A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=        .8  Lca=       .2   S=   13.2  Kn= .020  LAG=   9.2
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .50
LG     .10      .25    5.00     .40   80.00
UI    549.    1709.   1208.    323.     71.      0.      0.      0.      0.      0.
UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK    R88A
KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
DT    D88A      50
DI       0   10000
DQ       0   10000
*

KK  88AT89
KM   REACH RH-2b,RH-2a,RH-1,EXISTING CHANNEL (FCD 97-34), plus culvert RHC-1
KM   ROUTE 88A TO 89A VIA THE PROPOSED CHANNEL ALONG QUEEN CREEK ROAD
KM   FROM CRISMON ROAD TO ELLSWORTH ROAD
RS       1    FLOW      -1
RC    .025    .025    .025    5135   .0010
RX       0       8      16      45      55      85      93     101
RY     4.7     4.8     4.9       0       0     4.9     4.8     4.7
*

KK     89A
KM   BASIN 89A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.0  Lca=       .6   S=   19.0  Kn= .020  LAG=  13.5
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .50
LG     .10      .25    4.65     .47   80.00
UI    247.     742.   1328.    891.    408.    158.     41.     38.      0.      0.
UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
*
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK    R89A
KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
DT    D89A      50
DI       0   10000
DQ       0   10000
*

KK    C89A
KM   COMBINE FLOWS FROM 88A AND 89A AT QUEEN CREEK ROAD AND ELLSWORTH ROAD
HC       2
*

KK  89ATRI
KM   ROUTE 89A TO RITTENHOUSE ROAD VIA THE PROPOSED CHANNEL ALONG QUEEN CREEK ROAD
KM    FROM ELLSWORTH ROAD TO RITTENHOUSE ROAD
```

```
2176          KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN.
2177          RS       1    FLOW      -1
2178          RC    .025    .025    .025    3145   .0005
2179          RX       0      10      26      39      49      72      78     100
2180          RY    12.2     9.7     5.7       0       0     5.7     9.7    12.2
              *

2181          KK    C283
2182          KM   COMBINE FLOWS FROM QUEEN CREEK ADMS AND EC ADMP AT QUEEN CREEK ROAD AND
2183          KM   RITTENHOUSE ROAD.
              * KO              2
2184          HC       2
              *

2185          KK  283T90
2186          KM   ROUTE FLOWS FROM CONCENTRATION POINT 283 AT QUEEN CREAK ROAD NORTH IN
2187          KM   RITTENHOUSE CHANNEL TO THE HALF MILE STREET BETWEEN QUEEN CREEK ROAD AND
2188          KM   GERMANN ROAD (RYAN STREET)
2189          KM
2190          KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN (TYPICAL SECTION #5).
2191          KM
              * KO              2
2192          RS       1    FLOW      -1
2193          RC    .025    .025    .025    4400   .0005
2194          RX       0      22      28      51      61      83      90     108
2195          RY    11.2     9.7     5.7       0       0     5.7     9.7    11.2
              *

2196          KK     90A
2197          KM   BASIN 90A
2198          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2199          KM    L=       .6  Lca=       .2   S=   24.2  Kn= .038  LAG=  12.8
2200          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2201          BA     .48
2202          LG     .10     .25    4.60     .49   62.00
2203          UI    269.    789.   1351.    812.    319.    113.     39.      0.      0.      0.
2204          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2205          KK    R90A
2206          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2207          DT    D90A      42
2208          DI       0   10000
2209          DQ       0   10000
              *

2210          KK    C90A
2211          KM   COMBINE FLOWS FLOW C283 AND SUBBASIN 90 AT RYAN STREET ALIGNMENT
              * KO              2
2212          HC       2
              *

2213          KK   90ATB
2214          KM   ROUTE FLOWS FROM SUBBASIN 90A TO 90B VIA CHANNEL
2215          KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN (TYPICAL SECTION #4).
2216          KM
              * KO              2
```

```
2217    RS       1    FLOW      -1
2218    RC    .025    .025    .025    4400   .0005
2219    RX       0      22      28      51      61      83      90     108
2220    RY    11.2     9.7     5.7       0       0     5.7     9.7    11.2
        *

2221    KK     87A
2222    KM   BASIN 87A
2223    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2224    KM    L=      1.0  Lca=       .5   S=   24.8  Kn= .020  LAG=  11.7
2225    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2226    BA     .49
2227    LG     .10     .25    5.00     .40   80.00
2228    UI    333.    979.   1448.    720.    221.     66.      0.      0.      0.      0.
2229    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

2230    KK    R87A
2231    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2232    DT    D87A      49
2233    DI       0   10000
2234    DQ       0   10000
        *

2235    KK   87ATB
2236    KM   ROUTE 87A TO 87B VIA SHEET FLOW
2237    RS       3    FLOW      -1
2238    RC    .040    .040    .040    2640   .0056
2239    RX       0     500    1000    1005    1006    1011    1511    2011
2240    RY       1      .5       0       0       0      .5       1     1.5
        *
```



```
LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2241    KK     87B
2242    KM   BASIN 87B
2243    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2244    KM    L=       .9  Lca=       .5   S=   11.6  Kn= .020  LAG=  12.8
2245    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2246    BA     .49
2247    LG     .10     .25    5.00     .40   80.00
2248    UI    275.    809.   1385.    833.    327.    116.     40.      0.      0.      0.
2249    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

2250    KK    R87B
2251    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2252    DT    D87B      49
2253    DI       0   10000
2254    DQ       0   10000
        *

2255    KK     C87
2256    KM   COMBINE FLOW FROM SUBBASINS 87A AND 87B
2257    HC       2
        *

2258    KK  87T88B
2259    KM     ROUTE S87 TO S88 VIA GERMANN ROAD
```

```
2260          RS       6    FLOW      -1
2261          RC    .045    .025    .045    5280    .002
2262          RX       0    1000    1005    1010    1050    1060    1560    2060
2263          RY      14      13      18      12      11      14    14.5      15
              *

2264          KK     88B
2265          KM   BASIN 88B
2266          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2267          KM    L=       .9  Lca=       .6   S=   21.2  Kn= .020  LAG=  12.8
2268          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2269          BA     .50
2270          LG     .10     .25    5.00     .40   80.00
2271          UI    279.    819.   1402.    843.    331.    117.     40.      0.      0.      0.
2272          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2273          KK    R88B
2274          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2275          DT    D88B      50
2276          DI       0   10000
2277          DQ       0   10000
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2278          KK    C88B
2279          KM   COMBINE FLOWS FROM SUBBASINS 88A AND 88B
2280          HC       2
              *

2281          KK  88T89B
2282          KM     ROUTE S88 (CRISMON ROAD) TO S89B (ELLSWORTH ROAD) VIA GERMANN ROAD
2283          RS       6    FLOW      -1
2284          RC    .045    .025    .045    5280    .004
2285          RX       0    1000    1005    1010    1050    1060    1560    2060
2286          RY      14      13      18      12      11      14    14.5      15
              *

2287          KK     89B
2288          KM   BASIN 89B
2289          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2290          KM    L=       .9  Lca=       .5   S=   23.2  Kn= .020  LAG=  11.7
2291          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2292          BA     .50
2293          LG     .10     .25    4.80     .43   80.00
2294          UI    336.    987.   1460.    726.    223.     67.      0.      0.      0.      0.
2295          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2296          KK    R89B
2297          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2298          DT    D89B      49
2299          DI       0   10000
2300          DQ       0   10000
              *

2301          KK    C89B
2302          KM   COMBINE FLOWS FROM SUBBASINS 89A AND 89B
```

```
2303    HC       2
        *

2304    KK  89TB90
2305    KM    ROUTE S89B (ELLSWORTH ROAD) TO S90B (AT RITTENHOUSE ROAD) VIA GERMANN ROAD
2306    RS      10    FLOW      -1
2307    RC    .045    .025    .045    8818    .0045
2308    RX       0    1000    1005    1010    1050    1060    1560    2060
2309    RY      14      13      18      12      11      14    14.5      15
        *
        * DDM   ***** Updated *****

2310    KK     90B
2311    KM   BASIN 90B
2312    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2313    KM    L=      2.0  Lca=      1.2   S=   15.3  Kn= .042  LAG=  49.8
2314    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2315    BA     .82
2316    LG     .22     .25    4.65     .38   31.00
2317    UI     56.     56.    147.    232.    283.    327.    379.    444.    588.    709.
2318    UI    583.    490.    427.    359.    306.    259.    187.    117.     96.     91.
1                                    HEC-1 INPUT                                          PAGE 63

LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2319    UI     56.     56.     28.     17.     17.     17.     17.     17.     17.      0.
2320    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2321    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

2322    KK    R90B
2323    KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2324    DT    D90B      23
2325    DI       0   10000
2326    DQ       0   10000
        * DDM   ***** Preserved *****

2327    KK     C90
2328    KM   COMBINE FLOWS FROM 90A AND 90B
2329    HC       3
        *

2330    KK   90T91
2331    KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN (TYPICAL SECTION #3).
2332    KM
2333    RS       1    FLOW      -1
2334    RC    .025    .025    .025    6400    .0005
2335    RX       0      30      36      60      88     108     114     132
2336    RY     9.7     7.5       6       0       0       6     7.5     9.7
        *

2337    KK      85
2338    KM   BASIN 85
2339    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2340    KM    L=      2.0  Lca=       .5   S=   15.0  Kn= .030  LAG=  25.8
2341    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2342    BA    1.00
2343    LG     .15     .25    4.35     .51   55.00
2344    UI    131.    422.    698.    929.   1452.   1359.    991.    725.    463.    226.
2345    UI    161.     89.     40.     40.     40.      0.      0.      0.      0.      0.
```

```
2346        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

2347        KK     R85
2348        KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2349        DT     D85      84
2350        DI       0   10000
2351        DQ       0   10000
            * DDM   ***** Preserved *****

2352        KK   85T86
2353        KM     ROUTE S85 TO S86 VIA WAFB SOUTH PERIMETER CHANNEL
2354        RS       4    FLOW      -1
2355        RC   0.055   0.035   0.055    5280   .0039
2356        RX       0     500    1000    1013    1028    1041    1541    2041
2357        RY     5.5       5     4.5       0       0     4.5       5     5.5
            *
            * DDM   ***** Updated *****
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2358        KK      86
2359        KM   BASIN 86
2360        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2361        KM    L=      2.0  Lca=       .5   S=   15.0  Kn= .030  LAG=  25.8
2362        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2363        BA    1.00
2364        LG     .15     .25    4.55     .45   55.00
2365        UI    131.    420.    695.    925.   1446.   1354.    987.    722.    461.    225.
2366        UI    160.     89.     40.     40.     40.      0.      0.      0.      0.      0.
2367        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

2368        KK     R86
2369        KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2370        DT     D86      85
2371        DI       0   10000
2372        DQ       0   10000
            *
            * DDM   ***** Preserved *****

2373        KK     C86
2374        KM     COMBINE 85 AND 86 AT PECOS ROAD AND SOSSAMAN ROAD
2375        HC       2
            *
            * DDM   ***** Preserved *****

2376        KK   86T91
2377        KM     ROUTE S86 TO S91 VIA WAFB SOUTH PERIMETER CHANNEL. Grassy v=3ft/sec
2378        RS       6    FLOW      -1
2379        RC    0.05   0.035    0.05    5500   .0025
2380        RX       0     500    1000    1013    1028    1041    1541    2041
2381        RY     5.5       5     4.5       0       0     4.5       5     5.5
            *
            * DDM   ***** Updated *****

2382        KK      91
```

```
2383          KM   BASIN 91
2384          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2385          KM    L=      1.4  Lca=       .6   S=   18.4  Kn= .030  LAG=  22.7
2386          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2387          BA     .46
2388          LG     .15      .25     4.65      .42    55.00
2389          UI     68.     262.     399.     586.     792.     554.     390.     234.     116.      73.
2390          UI     28.      21.      21.       0.       0.       0.       0.       0.       0.       0.
2391          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *

2392          KK   RET91
2393          KM   RETAIN 100YR 2HR VOLUME
2394          DT     D91      38
2395          DI       0   10000
2396          DQ       0   10000
              *
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2397          KK    CP91
2398          KM     COMBINE 91, 90, AND 86 AT EMF NEAR THE RITTENHOUSE CHANNEL
2399          HC       3
              *
              * DDM   ***** Preserved *****

2400          KK  91TEMF
2401          KM   ROUTE 91 TO EMF
2402          KO                                    21
2403          RS       4    FLOW      -1
2404          RC   0.035   0.022   0.035    4000   0.003
2405          RX       0     200     230     240     270     280     310     410
2406          RY       9       7       6       0       0       6       7       9
              *
              * DDM   ***** Preserved *****

2407          KK  EMFRIT   Revised by Dibble & Associates to remove combination at "RITTEN"
2408          KM   COMBINE HYDROGRAPHS EMFRT1 AND 91TEMF
2409          HC       2
              *
              *
              *
              *
              *   ***********  modifications by Dibble & Associates ***************
              *
              * THE MODEL SEO2ALT2.DAT WAS USED AS A STARTING POINT AND THIS SECTION OF
              * COMMENTS REPLACES THE PERVIOUS COMMENTS. -DCF 5.10.01
              *
              * RAY BASIN REMOVED
              *
              * GM Subbasins updated to reflect future developed conditions.
              *
              *
              * Tuesday, November 20, 2001
2410          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

```
LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

146         SOSS
               V
               V
151        RSOSS
               .
               .
157            .          59A
               .            .
               .            .
169            .            .-------->    D59A
167            .        R59A
               .            .
               .            .
172         C59A............
               V
               V
175       59A59B
               .
               .
182            .          59B
               .            .
               .            .
196            .            .-------->    D59B
194            .        R59B
               .            .
               .            .
199         C59B............
               V
               V
202       59BT60
               .
               .
208            .           60
               .            .
               .            .
225            .            .-------->     D60
223            .          R60
               .            .
               .            .
228       EMFGUA............
               V
               V
232       GUATEL
               .
               .
238            .           64
               .            .
               .            .
255            .            .-------->     D64
249            .          R64
               .            .
               .            .
258       EMFELL............
               V
               V
261       ELTWAR
               .
```

```
267          .        62B
             .          .
             .          .
278          .          .-------->    D62B
276          .      R62B
             .         V
             .         V
281          .     62BTD
             .          .
             .          .
287          .          .        62D
             .          .          .
             .          .          .
300          .          .          .-------->    D62D
298          .          .      R62D
             .          .          .
             .          .          .
303          .     CP62D............
             .         V
             .         V
306          .     62DTF
             .          .
             .          .
312          .          .        62F
             .          .          .
             .          .          .
324          .          .          .-------->    D62F
322          .          .      R62F
             .          .          .
             .          .          .
327          .     CP62F............
             .         V
             .         V
330          .     62T63
             .          .
             .          .
337          .          .         63
             .          .          .
             .          .          .
349          .          .          .-------->     D63
347          .          .        R63
             .          .          .
             .          .          .
352          .      CP63............
             .         V
             .         V
355          .     63T71
             .          .
             .          .
362          .          .        68B
             .          .          .
             .          .          .
373          .          .          .-------->    D68B
371          .          .        R68
             .          .          V
             .          .          V
376          .          .     68BT69
             .          .          .
             .          .          .
382          .          .          .          69
```

```
                                                                  .
                                                                  .
393                                                               .-------->     D69
391                                                            R69
                                                                  .
                                                                  .
396                                                        C69.....
                                                              V
                                                              V
399                                                     69T71
                                                                  .
                                                                  .
405                                                            71
                                                                  .
                                                                  .
417                                                               .-------->     D71
415                                                            R71
                                                                  .
                                                                  .
420                                            C71.......................
                                                 V
                                                 V
426                                         71T72
                                                  .
                                                  .
433                                                  72
                                                     .
                                                     .
445                                                  .-------->     D72
443                                                  R72
                                                     .
                                                     .
448                                         CPKNOX.....
                                                  .
                                                  .
451                        EMFWAR.....
                                V
                                V
454                        WARTKN
                                .
                                .
460                                            70B
                                               .
                                               .
472                                            .-------->    D70B
470                                         R70B
                                               V
                                               V
475                                         70BT76
                                               .
                                               .
481                                               76B
                                                  .
                                                  .
493                                               .-------->    D76B
491                                            R76B
                                                  .
                                                  .
496                                         KNOX.....
                                               .
                                               .
```

```
500     EMFKNX............
             V
             V
504     KNXTRY
             .
             .
510          .        65A
             .          .
             .          .
523          .          .-------->   D65A
521          .       R65A
             .          .
             .          .
526          .          .      CAP1A
             .          .          V
             .          .          V
535          .          .     RCAP1A
             .          .          V
             .          .          V
545          .          .     RRCP1A
             .          .          .
             .          .          .
553          .          .          .       CAP1B
             .          .          .          V
             .          .          .          V
562          .          .          .     RCAP1B
             .          .          .          .
             .          .          .          .
570          .      C65A1.......................
             .          V
             .          V
573          .     65ATB1
             .          .
             .          .
584          .          .-------->   DB65A
581          .     DIDB65
             .          V
             .          V
587          .     65B1T2
             .          .
             .          .
596          .          .          .<-------   DB65A
594          .          .     DIB65P
             .          .          V
             .          .          V
597          .          .      DB65A
             .          .          .
             .          .          .
606          .      C65A2............
             .          V
             .          V
609          .     65AT-1
             .          V
             .          V
617          .     65AT-2
             .          .
             .          .
626          .          .       65AW
             .          .          .
             .          .          .
638          .          .          .-------->   D65AW
```

```
636                 R65AW
                      V
                      V
641                65AT65
                      .
                      .
648                   .          65B
                      .           .
                      .           .
661                   .           .-------->    D65B
659                   .        R65B
                      .           .
                      .           .
664                CP65B............
                      .
                      .
672                   .-------->  DIRS65
668                DI65B
                      .
                      .
675            CP65A............
                  V
                  V
679            65AT-3
                  .
                  .
684                   .<-------  DIRS65
682                DR65B
                      V
                      V
685                RS65A
                      .
                      .
693             CP65............
                  V
                  V
697             65T66
                  V
                  V
700             65T66A
                  V
                  V
703             65T66B
                  .
                  .
706                ADOT-E
                      V
                      V
711                AET67A
                      .
                      .
718                   .          67A
                      .           .
                      .           .
730                   .           .-------->    D67A
728                   .        R67A
                      .           .
                      .           .
733                C67A............
                      V
                      V
```

```
736                 67ATC
                      .
742                   .        SUP2
                      .          V
                      .          V
746                   .       RSUP2
                      .          .
753                   .          .         67B
                      .          .          .
765                   .          .          .-------->    D67B
763                   .          .       R67B
                      .          .          .
                      .          .          .
768                   .       C67B............
                      .          V
                      .          V
771                   .       67BTC
                      .          .
779                   .          .         67C
                      .          .          .
792                   .          .          .-------->    D67C
790                   .          .       R67C
                      .          .          .
                      .          .          .
795                 C67C.......................
                      V
                      V
798               67CT67
                      .
806                   .         67D
                      .          .
818                   .          .-------->    D67D
816                   .       R67D
                      .          .
821                 C67D............
                      V
                      V
824               67DT66
                      .
832                   .         66A
                      .          .
844                   .          .-------->    D66A
842                   .       R66A
                      .          V
                      .          V
847                   .       66ATB
                      .          .
853                   .          .         66B
                      .          .          .
                      .          .          .
```

```
                                                  SEBT-N2.OUT
866                                                  .------->    D66B
864                                               R66B
                                                     .
                                                     .
869                                        CP66B............
                                                V
                                                V
872                                        66BTC
                                                .
                                                .
878                                                66C
                                                     .
                                                     .
890                                                  .------->    D66C
888                                               R66C
                                                     .
                                                     .
893                                        CP66C1...........
                                                .
                                                .
897                                     CP66C2...........
                                                .
                                                .------->    404A
903
901                                      DI67E
                                                .
                                                .------->    DB66
909
906                                       DI66
                                                V
                                                V
912                                     66C1T2
                                                .
                                                .
920                                CP66C............
                                        V
                                        V
923                                66CTD
                                        .
                                        .
                                                .<-------    DB66
930
928                                       DR66
                                                V
                                                V
931                                     RS66D1
                                                .
                                                .
                                                .------->    D-WB
944
941                                       B-WA
                                                .
                                                .
947                                 C-WA............
                                        V
                                        V
950                                RC-WA
                                        .
                                        .
                                                .<-------    D-WB
956
954                                      DR-WA
                                                V
                                                V
```

```
 957          .          .      RS66D2
              .          .          .
              .          .          .
 967          .     CP66D............
              .          V
              .          V
 971          .     66T66D
              .          V
              .          V
 975          .     66-66D
              .          .
              .          .
 979          .          .        66D
              .          .          .
              .          .          .
 991          .          .          .-------->    D66D
 988          .          .       R66D
              .          .          .
              .          .          .
 994          .      C66D............
              .          V
              .          V
1000          .     66T70B
              .          V
              .          V
1003          .     CULVT
              .          V
              .          V
1006          .     66T70C
              .          .
              .          .
1013          .          .        62A
              .          .          .
              .          .          .
1024          .          .          .-------->    D62A
1022          .          .       R62A
              .          .          V
              .          .          V
1027          .          .      62ATC
              .          .          .
              .          .          .
1033          .          .          .         62C
              .          .          .          .
              .          .          .          .
1045          .          .          .          .-------->    D62C
1043          .          .          .        R62C
              .          .          .          .
              .          .          .          .
1048          .          .       C62C............
              .          .          V
              .          .          V
1051          .          .      62CTE
              .          .          .
              .          .          .
1058          .          .          .         62E
              .          .          .          .
              .          .          .          .
1070          .          .          .          .-------->    D62E
1068          .          .          .        R62E
              .          .          .          .
              .          .          .          .
```

```
1073                    CP62E............
                           .
1076                          61A
                              .
1088                          .-------->    D61A
1086                       R61A
                              V
                              V
1091                       61ATB
                              .
1097                          .          61B
                              .           .
1110                          .           .-------->    D61B
1108                          .        R61B
                              .           .
1113                       CP61B............
                              V
                              V
1116                      61T62E
                              .
1122                    CP62E2............
                           V
                           V
1125                    62T68A
                           .
1132                          68A
                              .
1143                          .-------->    D68A
1141                       R68A
                              .
1146                    C68A1............
                           .
1151                          .<--------    404A
1149                       RD66
                              V
                              V
1152                      RT404A
                              .
1158                          .          67E
                              .           .
1171                          .           .-------->    D67E
1168                          .        R67E
                              .           .
1174                       C67E............
                              V
                              V
1177                      67T68
                              .
```

```
1183                C68A2............
                      V
                      V
1186               68T70A
                      .
                      .
1194                  .         70A
                      .           .
                      .           .
1205                  .           .-------->    D70A
1203                  .        R70A
                      .           .
                      .           .
1208                C70A............
                      .
                      .
1211            C70A2............
                  V
                  V
1215           70T76A
                  .
                  .
1223                 76A
                      .
                      .
1236                  .-------->    D76A
1234                R76A
                      .
                      .
1239             C76A............
                  V
                  V
1242           76ATPR
                  .
                  .
1250      EMFSTN............
               V
               V
1253      KNXTRY
               .
               .
1259             73A
                  V
                  V
1273           73ATB
                  .
                  .
1279                 73B
                      .
                      .
1291                  .-------->    D73B
1289                R73B
                      .
                      .
1294           CP73B............
                  V
                  V
1297           73BTC
                  .
                  .
```

```
1304                          73C
                               .
1315                           .-------->   D73C
1313                          R73C
                               .
1318                CP73C.............
                      V
                      V
1321                73T74C
                      .
1327                          74A
                               V
                               V
1341                         DB74A
                               V
                               V
1351                         74ATB
                               .
1357                                   74B
                                        .
1369                                    .-------->   D74B
1367                                   R74B
                                        .
1372                         CP74B.............
                               V
                               V
1375                         74BTC
                               .
1381                                   74C
                                        .
1392                                    .-------->   D74C
1390                                   R74C
                                        .
1395                CP74C.........................
                      V
                      V
1398                74CT75
                      .
1405                           75
                               .
1426                           .-------->   RET75
1424                           D75
                               .
1429                  C75.............
                      V
                      V
1432                75TPC
                      .
```

```
1438                77A
                     V
                     V
1454              77ATB
                     .
                     .
1460                 .          77B
                     .           .
                     .           .
1472                 .           .-------->    D77B
1470                 .        R77B
                     .           .
                     .           .
1475              CP77B............
                     V
                     V
1478              77BTC
                     .
                     .
1485                 .          77C
                     .           .
                     .           .
1496                 .           .-------->    D77C
1494                 .        R77C
                     .           .
                     .           .
1499               C77C............
                     V
                     V
1502             77CT78
                     .
                     .
1507                 .          78A
                     .           V
                     .           V
1523                 .       78ATB
                     .           .
                     .           .
1529                 .           .          78B
                     .           .           .
                     .           .           .
1541                 .        C78B............
                     .           V
                     .           V
1544                 .       78BTC
                     .           .
                     .           .
1551                 .           .          78C
                     .           .           .
                     .           .           .
1562                 .           .           .-------->    D78C
1560                 .           .        R78C
                     .           .           .
                     .           .           .
1565               C78C........................
                     V
                     V
1568             78CT79
                     .
                     .
1575                 .          79A
```

```
                                                  .
                                                  .
1592                                              .-------> DET79A
1590                                        D79A  .
                                                  .
1595                                C79A1.........
                                                  .
1598                                         79B  .
                                                  .
1613                                              .-------> RET79B
1611                                        D79B  .
                                                  .
1616                                C79A2.........
                                                  .
1619                                         78F  .
                                                  .
1636                                              .       82A1
                                                  .         .
1651                                       C82A1..........
                                                  .
                                                  V
                                                  V
1655                                      DB82A1  .
                                                  .
                                                  V
                                                  V
1664                                        PS-9  .
                                                  .
1671                                              .       CAP2
                                                  .         V
                                                  .         V
1680                                              .      RCAP2
                                                  .         .
1687                                              .         .       82A2
                                                  .         .         .
1707                                              .      CP82A2.........
                                                  .         .
1710                                              .         .       82A4
                                                  .         .         V
                                                  .         .         V
1726                                              .         .     82A4T3
                                                  .         .         .
1733                                              .         .         .       82A3
                                                  .         .         .         .
1750                                              .         .     CP82A3.........
                                                  .         .         .
1753                                              .         .      CP82A5.........
                                                  .         .         V
                                                  .         .         V
```

```
1756                                  DB82B
                                         V
                                         V
1765                                  MN-1
                                         .
                                         .
1772                          CP82A6.........
                                 V
                                 V
1775                          82TBOX
                                 V
                                 V
1782                          BOXCLV
                                 V
                                 V
1789                          BOXT78
                                 .
                                 .
1796                                  78D
                                         .
                                         .
1808                                     .-------->    D78D
1806                                  R78D
                                         .
                                         .
1811                                     .         82B
                                         .           .
                                         .           .
1823                                     .           .-------->     D82
1821                                     .         R82
                                         .           .
                                         .           .
1829                                     .           .-------->     TRW
1826                                     .       DTTRW
                                         .           .
                                         .           .
1832                           C78D.......................
                                 V
                                 V
1836                           78DTE
                                 .
                                 .
1843                                  78E
                                         .
                                         .
1857                                     .-------->  RET78E
1855                                  D78E
                                         .
                                         .
1860                                     .          83
                                         .           .
                                         .           .
1872                                     .           .-------->     D83
1870                                     .         R83
                                         .           .
                                         .           .
1875                           C78E.......................
                                 V
                                 V
1878                           78ET84
                                 .
```

```
1886                                                  84
                                                       .
1898                                                   .-------->     D84
1896                                                  R84
                                                       .
1901                                            C84............
                                                  V
                                                  V
1905                                            EC-4
                                                  .
1913                                   C79B3............
                                          V
                                          V
1916                                    EC-3
                                          V
                                          V
1923                                    EC-2
                                          V
                                          V
1930                                    EC-1
                                          .
1937                          CPPWR............
                                  V
                                  V
1941                          PLF-2
                                  .
1949                                    80A
                                          .
1963                                          .-------->    D80A
1961                                    R80A
                                          .
1966                          CP80A............
                                  V
                                  V
1970                          PLF-1
                                  V
                                  V
1978                         PWREMF
                                  .
1987                 EMFPOW............
                         V
                         V
1990                 POWTWI
                         .
1997                            80B
                                  .
2012                              .-------->    D80B
2009                          R80B
                                  .
```

```
2015      MFWILL............
               V
               V
2019      WILTSP
               .
               .
2026           .         81A
               .           .
               .           .
2040           .           .-------->    D81A
2038           .        R81A
               .           V
               .           V
2043           .       81ATB
               .           .
               .           .
2049           .           .         81B
               .           .           .
               .           .           .
2061           .           .           .-------->    D81B
2059           .           .        R81B
               .           .           .
               .           .           .
2064           .         C81............
               .           .
               .           .
2068      EMFRT1............
               .
               .
2072           .      SUB258
               .           .
               .           .
2080           .           .-------->    D258
2078           .        R258
               .           V
               .           V
2083           .       RO259
               .           .
               .           .
2086           .           .      SUB260
               .           .           .
               .           .           .
2093           .           .           .-------->    D260
2091           .           .        R260
               .           .           .
               .           .           .
2096           .       CO262............
               .           V
               .           V
2099           .       RO263
               .           .
               .           .
2102           .           .      SUB264
               .           .           .
               .           .           .
2109           .           .           .-------->    D264
2107           .           .        R264
               .           .           .
               .           .           .
2112           .       CO266............
               .           V
```

```
                    .        V
2115                .     RO267
                    .        .
                    .        .
2118                .        .      SUB268
                    .        .          .
                    .        .          .
2125                .        .          .-------->    D268
2123                .        .       R268
                    .        .          .
                    .        .          .
2128                .     CO270.........
                    .        V
                    .        V
2131                .     RO283
                    .        .
                    .        .
2134                .        .        88A
                    .        .          .
                    .        .          .
2145                .        .          .-------->    D88A
2143                .        .       R88A
                    .        .          V
                    .        .          V
2148                .        .     88AT89
                    .        .          .
                    .        .          .
2156                .        .          .         89A
                    .        .          .          .
                    .        .          .          .
2167                .        .          .          .-------->    D89A
2165                .        .          .       R89A
                    .        .          .          .
                    .        .          .          .
2170                .        .       C89A...........
                    .        .          V
                    .        .          V
2173                .        .     89ATRI
                    .        .          .
                    .        .          .
2181                .     C283...........
                    .        V
                    .        V
2185                .    283T90
                    .        .
                    .        .
2196                .        .        90A
                    .        .          .
                    .        .          .
2207                .        .          .-------->    D90A
2205                .        .       R90A
                    .        .          .
                    .        .          .
2210                .     C90A...........
                    .        V
                    .        V
2213                .     90ATB
                    .        .
                    .        .
2221                .        .        87A
                    .        .          .
```

```
2232          .          .          .-------->    D87A
2230          .          .       R87A
              .          .          V
              .          .          V
2235          .          .      87ATB
              .          .          .
              .          .          .
2241          .          .          .        87B
              .          .          .          .
              .          .          .          .
2252          .          .          .          .-------->    D87B
2250          .          .          .       R87B
              .          .          .          .
              .          .          .          .
2255          .          .        C87...........
              .          .          V
              .          .          V
2258          .          .     87T88B
              .          .          .
              .          .          .
2264          .          .          .        88B
              .          .          .          .
              .          .          .          .
2275          .          .          .          .-------->    D88B
2273          .          .          .       R88B
              .          .          .          .
              .          .          .          .
2278          .          .       C88B...........
              .          .          V
              .          .          V
2281          .          .     88T89B
              .          .          .
              .          .          .
2287          .          .          .        89B
              .          .          .          .
              .          .          .          .
2298          .          .          .          .-------->    D89B
2296          .          .          .       R89B
              .          .          .          .
              .          .          .          .
2301          .          .       C89B...........
              .          .          V
              .          .          V
2304          .          .     89TB90
              .          .          .
              .          .          .
2310          .          .          .        90B
              .          .          .          .
              .          .          .          .
2324          .          .          .          .-------->    D90B
2322          .          .          .       R90B
              .          .          .          .
              .          .          .          .
2327          .        C90........................
              .          V
              .          V
2330          .      90T91
              .          .
              .          .
2337          .          .         85
```

```
                 .          .          .
                 .          .          .
2349             .          .          .-------->     D85
2347             .          .       R85
                 .          .        V
                 .          .        V
2352             .          .     85T86
                 .          .          .
                 .          .          .
2358             .          .          .         86
                 .          .          .          .
                 .          .          .          .
2370             .          .          .          .-------->     D86
2368             .          .          .        R86
                 .          .          .          .
                 .          .          .          .
2373             .          .       C86............
                 .          .        V
                 .          .        V
2376             .          .     86T91
                 .          .          .
                 .          .          .
2382             .          .          .         91
                 .          .          .          .
                 .          .          .          .
2394             .          .          .          .-------->     D91
2392             .          .          .      RET91
                 .          .          .          .
                 .          .          .          .
2397             .       CP91........................
                 .          V
                 .          V
2400             .     91TEMF
                 .          .
                 .          .
2407         EMFRIT..........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   07SEP04  TIME  14:31:42   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Project ID: ELLSWORTH - Major Basin: 01 - Return Period: 100 Years

THIS MODEL IS THE FUTURE CONDITIONS MODEL FOR THE ELLSWORTH ROAD IMPROVEMENTS AND CHANNEL DESIGN PROJECT. IT HAS BEEN CHANGED FROM THE PREVIOUS MODEL BY REDIRECTING FLOWS FROM SUBBASINS 61A, 61B, AND 67E TO FOLLOW THEIR EXISTING CONDITIONS FLOW PATHS - WEST ACROSS ELLSWORTH ROAD. THE PREVIOUS MODEL HAD FLOWS FROM THESE SUBBASINS FLOWING SOUTH DOWN ELLSWORTH ROAD TO SUBBASIN 66D. (cwr 4/17/03)

```
*****************************************************************************

  THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
  IT HAS BEEN MODIFIED BY CPE (7/2000)
  FOR ALTERNATIVE 2 FOR THE EAST MARICOPA FLOOWAY
  CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
  TO ROUTE BOTH THE POWERLINE FLOOWAY
  AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
  INTO THE EMF

 ***************************************************************

       Model files changed by Collins/Pina Engineering
       to reflect multi-use design concepts (recreation
       and environment) proposed throughout the entire
       EMF Corridor.    July 2000

  VERSION 8.06  CPE 7/31/00

*****************************************************************************


*****************************************************************************
 FILENAME: MIDDOUT.DAT

 ALL CIP INFRASTRUCTURE IS IN PLACE, FUTURE CONDITIONS LANDUSE IS IN PLACE
 FLOW IS ROUTED UP ELLSWORTH ROAD IN A EARTH LINED CHANNEL

*****************************************************************************
 PRODUCED BY DIBBLE AND ASSOCIATES AND HOSKIN ENGINEERING CONSULTANTS.
 File Name: Final8.Dat
 Revised - Jan. 2000 by SZ (Wood/Patel) From Final7.dat - new Z-V & Sideweir
 Revised - Jan. 2000 by SZ (Wood/Patel) from Final6.dat - 60% review comments
 Revised - Dec. 1999 by SZ (Wood/Patel) from Final5.dat
 Revised - Dec. 1999 by SZ (Wood/Patel) from Final4.dat
 Revised - Nov. 1999 by SZ (Wood/Patel) from Final3.dat
 Revised - June 1999 by SZ (Wood/Patel) for Final Model from Opt1.dat.
 Revised - May 1999 by SZ (Wood/Patel) for Option 1, Based on Model SDIB.DAT
 REVISED - MAY, 1999 BY VAS TO INCORPORATE INCREASE OF SUBBASIN RETENTION AND
           REVISIONS TO THE REGIONAL DETENTION BASIN STORAGE
 REVISED - FEB, 1999 BY VALERIE SWICK, FCD OF MARICOPA COUNTY
 REVISED - MAY, 1998 BY D&A

 REVISED BY VALERIE SWICK, FEB. 26, 1998

 FLOWS FROM DETENTION BASIN LOCATED AT NE CORNER OF ELLIOT AND ELLSWORTH ROADS
 IS ROUTED TO THE SOUTHWEST BY SIPHON DRAW TO SUBBASIN 70A. FROM THERE THEY
 WILL BE ROUTED BY A CHANNEL TO THE EMF. FLOWS FROM SUBBASINS ADJACENT TO
 SANTAN FREEWAY ALIGNMENT WILL BE ROUTED SOUTH TO SUBBASIN 70A WHERE THEY WILL
 BE COMBINED WITH FLOW IN SIPHON DRAW.

 EAST MESA AREA DRAINAGE MASTER PLAN
 AREA SOUTH OF SUPERSTITION (U.S. HWY 60)
 AUGUST 1997
 SOUTHEAST MESA HIGH RESOLUTION MODEL

 ***********FUTURE CONDITION MODEL OF THE WATERSHED*************************

************ATTENTION*************************************************
  SUBBASINS 75, 79A, 79B, 78E,  LANDUSES WERE NOT
```

```
CHANGED BECAUSE IT WAS FELT THAT THEIR FUTURE CONDITIONS LANDUSES WOULD BE
SIMILAR TO THE EXISTING CONDITIONS LANDUSES.
RETENTION VOLUMES WILL ALSO NOT BE UTILIZED FOR SUBBASINS 75, 79A, 79B, 78E
SOME QUEEN CREEK SUBBASINS WILL ALSO NOT HAVE RETENTION VOLUMES, EITHER
BECAUSE THEY LIE IN PINAL COUNTY AND WE DONT KNOW PINAL COUNTIES PLANS OR
THEY LIE IN THE SANTAN MOUNTAINS AND WON'T GET DEVELOPED
WILLIAMS GATEWAY AIRPORT (SUBBASINS 80A, 80B, 81A, AND 81B) ARE MODELED AS
FUTURE CONDITIONS AND HAVE RETENTION VOLUMES FOR THE 100YR 2HR STORM
*******************************************************************************
FILENAME:  SDIBB.DAT

THIS MODEL REPRESENTS THE FUTURE CONDITION OF THE WATERSHED.
TOTAL DRAINAGE AREA IS APPROXIMATELY 213 SQ. MI.
THIS MODEL USES A Kn VALUE OF 0.09 FOR DESERT LAND USE DUE TO SHEET FLOW
CONDITIONS.

100-YEAR 24-HOUR FREQUENCY
AREAL REDUCTIONS FROM FCD HYDROLOGY MANUAL
THIS MODEL INCLUDES INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY
AND EAST OF THE CAP

DATA FROM THE QUEEN CREEK ADMS HAS BEEN ADDED TO CALCULATE FLOWS INTO THE
EMF.   MUSKINGUM ROUTING NSTEPS WERE ADJUSTED TO BE WITHIN THE SUGGESTED
RANGE.

METHODOLOGY
THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
SCS TYPE II RAINFALL DISTRIBUTION
S-GRAPH HYDROGRAPH
GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
NORMAL DEPTH STORAGE CHANNEL ROUTING
APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
DATED 1994
THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS

ORIGINAL STUDY PERFORMED BY LISA C. YOUNG AND AFSHIN AHOURAIYAN, UPDATED BY
DAVID DEGERNESS (OCT-DEC, 1996). REVIEWED BY VALERIE A. SWICK
AND AMIR MOTAMEDI OF THE FLOOD CONTROL DISTRICT
HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.

ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2-3 FT/SEC FOR WASH/NATURAL
CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL

VELOCITIES FOR ADMP IMPROVEMENT CHANNELS FROM DIBBLE AND ASSOCIATES
SUGGESTED ALTERNATIVES (JULY 1, 1997)


NOTE: MUST USE NDIBF.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
      SUPERSTITION FREEWAY.

DDM MCUHP2 SE MESA ADMP - SOUTH OF SUPERSTITION FWY, FUTURE CONDITIONS

125 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
```

IDATE	1APR97	STARTING DATE
ITIME	0000	STARTING TIME
NQ	600	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	3APR97	ENDING DATE
NDTIME	0155	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 49.92 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

127 JD INDEX STORM NO. 1

STRM	3.60	PRECIPITATION DEPTH
TRDA	.01	TRANSPOSITION DRAINAGE AREA

128 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

138 JD INDEX STORM NO. 2

STRM	3.58	PRECIPITATION DEPTH
TRDA	1.00	TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

139 JD INDEX STORM NO. 3
STRM 3.49 PRECIPITATION DEPTH
TRDA 5.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

```
                .00       .00       .00       .00       .00       .00       .00       .00

140 JD        INDEX STORM NO. 4
                STRM        3.38  PRECIPITATION DEPTH
                TRDA       10.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00

141 JD        INDEX STORM NO. 5
                STRM        3.24  PRECIPITATION DEPTH
                TRDA       30.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

142 JD INDEX STORM NO. 6

STRM 3.10 PRECIPITATION DEPTH

TRDA 60.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

143 JD INDEX STORM NO. 7

STRM 3.05 PRECIPITATION DEPTH

TRDA 90.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

```
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00
144 JD        INDEX STORM NO. 8
                 STRM        3.00  PRECIPITATION DEPTH
                 TRDA      120.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
145 JD        INDEX STORM NO. 9
                 STRM        2.97  PRECIPITATION DEPTH
                 TRDA      150.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                    .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00
   -----DSS---ZOPEN:  Existing File Opened,  File: NEBUILD2.DSS
                      Unit:  71;  DSS Version: 6-JG
        ----- Entering ZRRTSX for unit 71 -----
Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW//5MIN/100YR/
        Time Window set.  Interval:     5  Number of data values:      1
        Starting date and time:  Mar 31, 1997  2400  (  35519 1440)
        Ending   date and time:  Mar 31, 1997  2400  (  35519 1440)
        Input time offset:      0
        After ZRDINF, Record found: T
        Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    2:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:    1   NVALS:    1    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35519
        JULS: 31MAR97        JULSD: 31MAR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:  288  NDATA:  288  NREAD:    1  ILIM:    1
      ----- Exiting ZRRTS, Number of data values:      1,  Status:  0
        Offset:       0,  Units: CFS      ,  Type:INST-VAL
        ----- Entering ZRRTSX for unit 71 -----
Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW//5MIN/100YR/
        Time Window set.  Interval:     5  Number of data values:    601
        Starting date and time:  Mar 31, 1997  2400  (  35519 1440)
        Ending   date and time:  Apr 3, 1997  0200  (  35522  120)
        Input time offset:      0
        After ZRDINF, Record found: T
        Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    2:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
```

```
      NSTART:    1   NVALS:  601    JULS:   35519  ISTIME:  1440
      NLDATA:  288   JULSD:   35519
      JULS: 31MAR97       JULSD: 31MAR97
      Quality Read: F,  Quality Requested: F
      ---ZRRTSB Calculations:  NPOS:  288  NDATA:  288  NREAD:    1  ILIM:    1
      After ZRDINF, Record found: T
      Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
      Number of actual data:  288  Header length:   0
      Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    2:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
     ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
      NSTART:    2   NVALS:  601    JULS:   35519  ISTIME:  1440
      NLDATA:  288   JULSD:   35520
      JULS: 31MAR97       JULSD: 01APR97
      Quality Read: F,  Quality Requested: F
      ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:  288  ILIM:  289
      After ZRDINF, Record found: T
      Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
      Number of actual data:  288  Header length:   0
      Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    2:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
     ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
      NSTART:  290   NVALS:  601    JULS:   35519  ISTIME:  1440
      NLDATA:  288   JULSD:   35521
      JULS: 31MAR97       JULSD: 02APR97
      Quality Read: F,  Quality Requested: F
      ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:  288  ILIM:  577
      After ZRDINF, Record found: T
      Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
      Number of actual data:  288  Header length:   0
      Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    2:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
     ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
      NSTART:  578   NVALS:  601    JULS:   35519  ISTIME:  1440
      NLDATA:  288   JULSD:   35522
      JULS: 31MAR97       JULSD: 03APR97
      Quality Read: F,  Quality Requested: F
      ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:   24  ILIM:  601
     ----- Exiting ZRRTS, Number of data values:    601,  Status:  0
      Offset:       0,  Units: CFS     ,  Type:INST-VAL


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 228 KK   *    EMFGUA  *
          *            *
          **************

 230 KO         OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 249 KK     *       R64  *
            *            *
            **************

 254 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 448 KK     *    CPKNOX  *
            *            *
            **************

 449 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 496 KK     *      KNOX  *
            *            *
            **************

 498 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        600  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .083  TIME INTERVAL IN HOURS

        ----- Entering ZRRTSX for unit 71 -----
Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW//5MIN/100YR/
        Time Window set.  Interval:     5  Number of data values:      1
        Starting date and time:  Mar 31, 1997  2400  (  35519 1440)
        Ending   date and time:  Mar 31, 1997  2400  (  35519 1440)
        Input time offset:      0
        After ZRDINF, Record found: T
        Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:    1   NVALS:    1    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35519
        JULS: 31MAR97       JULSD: 31MAR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:  288  NDATA:  288  NREAD:    1  ILIM:    1
      ----- Exiting ZRRTS, Number of data values:      1,  Status:  0
        Offset:       0,  Units: CFS     ,  Type:INST-VAL
        ----- Entering ZRRTSX for unit 71 -----
Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW//5MIN/100YR/
        Time Window set.  Interval:     5  Number of data values:    601
        Starting date and time:  Mar 31, 1997  2400  (  35519 1440)
        Ending   date and time:  Apr 3, 1997  0200  (  35522  120)
        Input time offset:      0
        After ZRDINF, Record found: T
        Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:    1   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35519
        JULS: 31MAR97       JULSD: 31MAR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:  288  NDATA:  288  NREAD:    1  ILIM:    1
        After ZRDINF, Record found: T
        Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:    2   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35520
        JULS: 31MAR97       JULSD: 01APR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:  288  ILIM:  289
        After ZRDINF, Record found: T
        Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:  290   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35521
```

```
        JULS: 31MAR97       JULSD: 02APR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:  288  ILIM:  577
        After ZRDINF, Record found: T
        Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:  578   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35522
        JULS: 31MAR97       JULSD: 03APR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:   24  ILIM:  601
      ----- Exiting ZRRTS, Number of data values:    601,  Status:  0
        Offset:       0,  Units: CFS      ,  Type:INST-VAL
        ----- Entering ZRRTSX for unit 71 -----
Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW//5MIN/100YR/
        Time Window set.  Interval:     5  Number of data values:      1
        Starting date and time:  Mar 31, 1997  2400  (  35519 1440)
        Ending   date and time:  Mar 31, 1997  2400  (  35519 1440)
        Input time offset:      0
        After ZRDINF, Record found: T
        Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:    1   NVALS:    1    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35519
        JULS: 31MAR97       JULSD: 31MAR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:  288  NDATA:  288  NREAD:    1  ILIM:    1
      ----- Exiting ZRRTS, Number of data values:      1,  Status:  0
        Offset:       0,  Units: CFS      ,  Type:INST-VAL
        ----- Entering ZRRTSX for unit 71 -----
Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW//5MIN/100YR/
        Time Window set.  Interval:     5  Number of data values:    601
        Starting date and time:  Mar 31, 1997  2400  (  35519 1440)
        Ending   date and time:  Apr 3, 1997  0200  (  35522  120)
        Input time offset:      0
        After ZRDINF, Record found: T
        Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:    1   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35519
        JULS: 31MAR97       JULSD: 31MAR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:  288  NDATA:  288  NREAD:    1  ILIM:    1
        After ZRDINF, Record found: T
        Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:    2   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35520
        JULS: 31MAR97       JULSD: 01APR97
```

```
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:  288  ILIM:  289
        After ZRDINF, Record found: T
        Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:  290   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35521
        JULS: 31MAR97        JULSD: 02APR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:  288  ILIM:  577
        After ZRDINF, Record found: T
        Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
        Number of actual data:  288  Header length:   0
        Compression:   0  Quality:   0
-----DSS--- ZREAD Unit  71; Vers.    1:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
      ----DSS---Debug:  Enter ZRRTSB;  Unit:  71
        NSTART:  578   NVALS:  601    JULS:   35519  ISTIME:  1440
        NLDATA:  288   JULSD:   35522
        JULS: 31MAR97        JULSD: 03APR97
        Quality Read: F,  Quality Requested: F
        ---ZRRTSB Calculations:  NPOS:    1  NDATA:  288  NREAD:   24  ILIM:  601
      ----- Exiting ZRRTS, Number of data values:    601,  Status:  0
        Offset:        0,  Units: CFS      ,  Type:INST-VAL
         WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
         WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
         WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO

WARNING --- ROUTED OUTFLOW (    316.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    342.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    359.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    369.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    371.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    367.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    359.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    347.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    332.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    317.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    302.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    302.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    323.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    337.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    342.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    341.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE
```

```
WARNING --- ROUTED OUTFLOW (    336.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    326.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    314.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    300.) IS GREATER THAN MAXIMUM OUTFLOW (    298.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    666.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    689.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    709.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    726.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    740.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    750.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    755.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    756.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    754.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    749.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    743.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    737.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    730.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    722.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    711.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    697.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    680.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    662.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    668.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    683.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    695.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    704.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    710.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    713.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    712.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    710.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE
```

```
WARNING --- ROUTED OUTFLOW (    707.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    703.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    698.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    692.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    683.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    671.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    656.) IS GREATER THAN MAXIMUM OUTFLOW (    654.) IN STORAGE-OUTFLOW TABLE

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
1978 KK     *    PWREMF  *
            *            *
            **************

1982 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
1997 KK     *       80B  *
            *            *
            **************

2002 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
                 **************
                 *            *
2009 KK          *     R80B   *
                 *            *
                 **************

2011 KO               OUTPUT CONTROL VARIABLES
                            IPRNT           5  PRINT CONTROL
                            IPLOT           0  PLOT CONTROL
                            QSCAL          0.  HYDROGRAPH PLOT SCALE
                            IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                             IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                            ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                            ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                           TIMINT        .083  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                 **************
                 *            *
2064 KK          *      C81   *
                 *            *
                 **************

2066 KO               OUTPUT CONTROL VARIABLES
                            IPRNT           5  PRINT CONTROL
                            IPLOT           0  PLOT CONTROL
                            QSCAL          0.  HYDROGRAPH PLOT SCALE
                            IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                             IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                            ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                            ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                           TIMINT        .083  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                 **************
                 *            *
2400 KK          *   91TEMF   *
                 *            *
                 **************

2402 KO               OUTPUT CONTROL VARIABLES
                            IPRNT           5  PRINT CONTROL
                            IPLOT           0  PLOT CONTROL
                            QSCAL          0.  HYDROGRAPH PLOT SCALE
                            IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                             IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                            ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                            ISAV2         600  LAST ORDINATE PUNCHED OR SAVED
                           TIMINT        .083  TIME INTERVAL IN HOURS
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SOSS	1695.	12.67	585.	208.	109.	12.50		
+	ROUTED TO	RSOSS	1671.	12.75	583.	208.	109.	12.50		
+	HYDROGRAPH AT	59A	302.	12.33	41.	13.	6.	.26		
+	DIVERSION TO	D59A	4.	8.42	3.	1.	0.	.26		
+	HYDROGRAPH AT	R59A	302.	12.33	41.	12.	6.	.26		
+	2 COMBINED AT	C59A	1759.	12.67	616.	218.	114.	12.76		
+	ROUTED TO	59A59B	1745.	12.83	613.	218.	113.	12.76		
+	HYDROGRAPH AT	59B	637.	12.83	132.	39.	19.	.94		
+	DIVERSION TO	D59B	637.	12.83	119.	32.	15.	.94		
+	HYDROGRAPH AT	R59B	137.	13.67	24.	8.	4.	.94		
+	2 COMBINED AT	C59B	1745.	12.83	623.	222.	116.	13.70		
+	ROUTED TO	59BT60	1635.	13.33	619.	222.	115.	13.70		
+	HYDROGRAPH AT	60	1069.	13.50	359.	112.	54.	2.30		
+	DIVERSION TO	D60	1069.	13.50	313.	86.	41.	2.30		
+	HYDROGRAPH AT	R60	365.	14.67	86.	27.	13.	2.30		
+	2 COMBINED AT	EMFGUA	1635.	13.33	665.	241.	124.	16.00		
+	ROUTED TO	GUATEL	1551.	13.67	635.	240.	123.	16.00		

+	HYDROGRAPH AT	64	924.	12.42	156.	51.	25.	.81
+	DIVERSION TO	D64	924.	12.42	121.	34.	16.	.81
+	HYDROGRAPH AT	R64	477.	12.75	57.	18.	8.	.81
+	2 COMBINED AT	EMFELL	1612.	13.67	672.	253.	129.	16.81
+	ROUTED TO	ELTWAR	1409.	14.08	646.	253.	128.	16.81
+	HYDROGRAPH AT	62B	544.	12.00	54.	19.	9.	.23
+	DIVERSION TO	D62B	454.	11.92	33.	10.	5.	.23
+	HYDROGRAPH AT	R62B	470.	12.08	30.	9.	4.	.23
+	ROUTED TO	62BTD	178.	12.50	28.	9.	4.	.23
+	HYDROGRAPH AT	62D	608.	12.17	86.	28.	13.	.46
+	DIVERSION TO	D62D	608.	12.17	63.	18.	8.	.46
+	HYDROGRAPH AT	R62D	274.	12.50	34.	10.	5.	.46
+	2 COMBINED AT	CP62D	451.	12.50	62.	19.	9.	.69
+	ROUTED TO	62DTF	267.	13.00	61.	19.	9.	.69
+	HYDROGRAPH AT	62F	421.	12.17	49.	16.	8.	.26
+	DIVERSION TO	D62F	421.	12.17	32.	9.	4.	.26
+	HYDROGRAPH AT	R62F	364.	12.25	24.	7.	3.	.26
+	2 COMBINED AT	CP62F	358.	12.25	84.	26.	13.	.95
+	ROUTED TO	62T63	284.	13.25	82.	26.	13.	.95
+	HYDROGRAPH AT	63	1189.	12.33	177.	58.	28.	.91
	DIVERSION TO							

+		D63	1189.	12.33	128.	36.	17.	.91
+	HYDROGRAPH AT	R63	787.	12.50	74.	22.	11.	.91
+	2 COMBINED AT	CP63	724.	12.50	151.	47.	23.	1.86
+	ROUTED TO	63T71	223.	15.33	132.	47.	23.	1.86
+	HYDROGRAPH AT	68B	581.	12.00	58.	20.	10.	.25
+	DIVERSION TO	D68B	581.	12.00	42.	12.	6.	.25
+	HYDROGRAPH AT	R68	292.	12.08	26.	8.	4.	.25
+	ROUTED TO	68BT69	111.	12.42	25.	8.	4.	.25
+	HYDROGRAPH AT	69	208.	12.00	22.	7.	4.	.09
+	DIVERSION TO	D69	208.	12.00	16.	5.	2.	.09
+	HYDROGRAPH AT	R69	106.	12.17	9.	3.	1.	.09
+	2 COMBINED AT	C69	134.	12.42	34.	11.	5.	.34
+	ROUTED TO	69T71	68.	13.92	31.	11.	5.	.34
+	HYDROGRAPH AT	71	1959.	12.17	258.	89.	43.	1.09
+	DIVERSION TO	D71	1959.	12.17	187.	53.	26.	1.09
+	HYDROGRAPH AT	R71	1065.	12.33	114.	35.	17.	1.09
+	3 COMBINED AT	C71	1046.	12.33	244.	90.	43.	3.29
+	ROUTED TO	71T72	677.	12.58	240.	90.	43.	3.29
+	HYDROGRAPH AT	72	1421.	12.17	202.	69.	33.	.84
+	DIVERSION TO	D72	1421.	12.17	146.	42.	20.	.84
+	HYDROGRAPH AT	R72	754.	12.42	89.	28.	13.	.84

+	2 COMBINED AT	CPKNOX	1144.	12.50	319.	115.	55.	4.13
+	2 COMBINED AT	EMFWAR	1599.	14.08	843.	346.	173.	20.94
+	ROUTED TO	WARTKN	1535.	14.25	841.	346.	173.	20.94
+	HYDROGRAPH AT	70B	646.	12.17	92.	31.	15.	.38
+	DIVERSION TO	D70B	646.	12.17	68.	19.	9.	.38
+	HYDROGRAPH AT	R70B	363.	12.42	38.	12.	6.	.38
+	ROUTED TO	70BT76	90.	13.92	37.	12.	6.	.38
+	HYDROGRAPH AT	76B	1156.	12.17	158.	53.	26.	.64
+	DIVERSION TO	D76B	1156.	12.17	117.	33.	16.	.64
+	HYDROGRAPH AT	R76B	539.	12.42	66.	20.	10.	.64
+	2 COMBINED AT	KNOX	538.	12.42	102.	32.	15.	1.02
+	2 COMBINED AT	EMFKNX	1635.	14.25	890.	369.	184.	21.96
+	ROUTED TO	KNXTRY	1561.	14.50	888.	369.	184.	21.96
+	HYDROGRAPH AT	65A	2593.	12.50	507.	168.	81.	2.54
+	DIVERSION TO	D65A	2593.	12.50	306.	88.	42.	2.54
+	HYDROGRAPH AT	R65A	2261.	12.67	275.	80.	39.	2.54
+	HYDROGRAPH AT	CAP1A	217.	2.00	217.	217.	212.	.01
+	ROUTED TO	RCAP1A	218.	2.33	217.	217.	211.	.01
+	ROUTED TO	RRCP1A	217.	2.67	217.	217.	210.	.01
+	HYDROGRAPH AT	CAP1B	217.	2.00	217.	217.	212.	.01

+	ROUTED TO	RCAP1B	218.	2.33	217.	217.	211.	.01
+	3 COMBINED AT	C65A1	2694.	12.67	709.	514.	459.	2.56
+	ROUTED TO	65ATB1	2287.	12.75	708.	514.	458.	2.56
+	DIVERSION TO	DB65A	1853.	12.75	274.	80.	39.	2.56
+	HYDROGRAPH AT	DIDB65	434.	3.58	434.	434.	419.	2.56
+	ROUTED TO	65B1T2	434.	3.42	434.	434.	419.	2.56
+	HYDROGRAPH AT	DIB65P	1853.	12.75	274.	80.	39.	2.56
+	ROUTED TO	DB65A	77.	17.17	76.	68.	37.	2.56
+	2 COMBINED AT	C65A2	511.	17.17	510.	502.	456.	2.56
+	ROUTED TO	65AT-1	511.	17.17	510.	502.	456.	2.56
+	ROUTED TO	65AT-2	511.	17.75	510.	502.	449.	2.56
+	HYDROGRAPH AT	65AW	555.	12.25	70.	21.	10.	.43
+	DIVERSION TO	D65AW	555.	12.25	58.	16.	8.	.43
+	HYDROGRAPH AT	R65AW	185.	12.58	19.	6.	3.	.43
+	ROUTED TO	65AT65	58.	13.67	17.	6.	3.	.43
+	HYDROGRAPH AT	65B	1551.	12.42	271.	88.	42.	1.37
+	DIVERSION TO	D65B	1551.	12.42	218.	61.	29.	1.37
+	HYDROGRAPH AT	R65B	671.	12.83	89.	28.	13.	1.37
+	2 COMBINED AT	CP65B	611.	12.83	102.	33.	16.	1.80
+	DIVERSION TO	DIRS65	581.	12.83	73.	18.	9.	1.80
	HYDROGRAPH AT							

+		DI65B	30.	12.83	30.	14.	7.	1.80
+	2 COMBINED AT	CP65A	540.	17.75	539.	514.	455.	4.36
+	ROUTED TO	65AT-3	540.	17.75	539.	514.	455.	4.36
+	HYDROGRAPH AT	DR65B	581.	12.83	73.	18.	9.	1.80
+	ROUTED TO	RS65A	11.	17.92	11.	10.	7.	1.80
+	2 COMBINED AT	CP65	551.	17.83	550.	524.	461.	4.36
+	ROUTED TO	65T66	551.	17.83	550.	524.	461.	4.36
+	ROUTED TO	65T66A	551.	17.83	550.	524.	461.	4.36
+	ROUTED TO	65T66B	551.	17.83	550.	524.	461.	4.36
+	HYDROGRAPH AT	ADOT-E	251.	14.50	182.	67.	32.	.01
+	ROUTED TO	AET67A	251.	14.75	182.	67.	32.	.01
+	HYDROGRAPH AT	67A	387.	12.25	52.	17.	8.	.30
+	DIVERSION TO	D67A	387.	12.25	38.	11.	5.	.30
+	HYDROGRAPH AT	R67A	229.	12.50	20.	6.	3.	.30
+	2 COMBINED AT	C67A	261.	14.75	190.	72.	35.	.31
+	ROUTED TO	67ATC	259.	15.08	190.	72.	35.	.31
+	HYDROGRAPH AT	SUP2	442.	13.00	384.	218.	106.	.01
+	ROUTED TO	RSUP2	397.	16.33	380.	218.	106.	.01
+	HYDROGRAPH AT	67B	714.	12.25	105.	34.	17.	.53
+	DIVERSION TO	D67B	714.	12.25	73.	21.	10.	.53
+	HYDROGRAPH AT	R67B	457.	12.50	46.	14.	7.	.53

+	2 COMBINED AT	C67B	495.	12.50	397.	232.	112.	.54
+	ROUTED TO	67BTC	414.	16.50	396.	232.	112.	.54
+	HYDROGRAPH AT	67C	1019.	12.42	146.	44.	21.	.93
+	DIVERSION TO	D67C	1019.	12.42	126.	34.	16.	.93
+	HYDROGRAPH AT	R67C	295.	12.83	34.	11.	5.	.93
+	3 COMBINED AT	C67C	678.	15.25	602.	313.	152.	1.78
+	ROUTED TO	67CT67	677.	15.33	601.	313.	152.	1.78
+	HYDROGRAPH AT	67D	183.	12.17	20.	6.	3.	.13
+	DIVERSION TO	D67D	183.	12.17	17.	5.	2.	.13
+	HYDROGRAPH AT	R67D	51.	12.50	5.	1.	1.	.13
+	2 COMBINED AT	C67D	680.	15.33	603.	314.	153.	1.91
+	ROUTED TO	67DT66	680.	15.42	603.	314.	153.	1.91
+	HYDROGRAPH AT	66A	445.	12.17	46.	14.	7.	.26
+	DIVERSION TO	D66A	445.	12.17	39.	11.	5.	.26
+	HYDROGRAPH AT	R66A	103.	12.42	11.	3.	2.	.26
+	ROUTED TO	66ATB	35.	13.17	10.	3.	2.	.26
+	HYDROGRAPH AT	66B	605.	12.58	104.	31.	15.	.67
+	DIVERSION TO	D66B	605.	12.58	90.	24.	12.	.67
+	HYDROGRAPH AT	R66B	164.	13.08	24.	7.	4.	.67
+	2 COMBINED AT	CP66B	191.	13.08	34.	11.	5.	.93

+	ROUTED TO	66BTC	168.	13.42	33.	11.	5.	.93
+	HYDROGRAPH AT	66C	706.	12.25	94.	30.	14.	.50
+	DIVERSION TO	D66C	706.	12.25	77.	21.	10.	.50
+	HYDROGRAPH AT	R66C	257.	12.58	29.	9.	4.	.50
+	2 COMBINED AT	CP66C1	233.	12.58	58.	19.	9.	1.43
+	2 COMBINED AT	CP66C2	720.	15.17	638.	331.	161.	3.34
+	DIVERSION TO	404A	76.	12.58	76.	63.	32.	3.34
+	HYDROGRAPH AT	DI67E	644.	15.17	562.	268.	129.	3.34
+	DIVERSION TO	DB66	240.	15.17	166.	45.	22.	3.34
+	HYDROGRAPH AT	DI66	404.	15.17	396.	223.	107.	3.34
+	ROUTED TO	66C1T2	404.	15.17	396.	223.	107.	3.34
+	2 COMBINED AT	CP66C	951.	15.50	943.	740.	564.	7.70
+	ROUTED TO	66CTD	951.	15.50	943.	740.	564.	7.70
+	HYDROGRAPH AT	DR66	240.	15.17	166.	45.	22.	3.34
+	ROUTED TO	RS66D1	102.	18.67	68.	33.	20.	3.34
+	DIVERSION TO	D-WB	81.	18.67	48.	15.	7.	3.34
+	HYDROGRAPH AT	B-WA	21.	18.67	20.	19.	13.	3.34
+	2 COMBINED AT	C-WA	967.	15.58	960.	753.	574.	11.04
+	ROUTED TO	RC-WA	967.	15.58	960.	753.	574.	11.04
+	HYDROGRAPH AT	DR-WA	81.	18.67	48.	15.	7.	3.34
	ROUTED TO							

+		RS66D2	19.	21.92	18.	14.	7.	3.34
+	2 COMBINED AT	CP66D	970.	18.33	966.	765.	579.	11.04
+	ROUTED TO	66T66D	970.	18.33	966.	765.	579.	11.04
+	ROUTED TO	66-66D	970.	18.42	966.	765.	579.	11.04
+	HYDROGRAPH AT	66D	651.	12.08	75.	26.	12.	.31
+	DIVERSION TO	D66D	651.	12.08	55.	16.	8.	.31
+	HYDROGRAPH AT	R66D	350.	12.25	32.	10.	5.	.31
+	2 COMBINED AT	C66D	982.	15.33	977.	771.	583.	11.35
+	ROUTED TO	66T70B	982.	15.33	977.	771.	582.	11.35
+	ROUTED TO	CULVT	981.	15.33	977.	771.	582.	11.35
+	ROUTED TO	66T70C	981.	15.50	976.	771.	580.	11.35
+	HYDROGRAPH AT	62A	806.	12.00	89.	31.	15.	.38
+	DIVERSION TO	D62A	806.	12.00	57.	17.	8.	.38
+	HYDROGRAPH AT	R62A	551.	12.08	46.	14.	7.	.38
+	ROUTED TO	62ATC	381.	12.25	45.	14.	7.	.38
+	HYDROGRAPH AT	62C	835.	12.17	98.	32.	15.	.55
+	DIVERSION TO	D62C	754.	12.08	55.	16.	8.	.55
+	HYDROGRAPH AT	R62C	795.	12.25	56.	16.	8.	.55
+	2 COMBINED AT	C62C	1172.	12.25	102.	30.	14.	.93
+	ROUTED TO	62CTE	1092.	12.33	101.	30.	14.	.93
+	HYDROGRAPH AT	62E	229.	12.17	27.	9.	4.	.15

+	DIVERSION TO	D62E	229.	12.17	22.	6.	3.	.15
+	HYDROGRAPH AT	R62E	75.	12.50	9.	3.	1.	.15
+	2 COMBINED AT	CP62E	1092.	12.33	110.	33.	16.	1.08
+	HYDROGRAPH AT	61A	794.	12.17	95.	31.	15.	.52
+	DIVERSION TO	D61A	794.	12.17	76.	21.	10.	.52
+	HYDROGRAPH AT	R61A	329.	12.42	33.	10.	5.	.52
+	ROUTED TO	61ATB	104.	13.25	31.	10.	5.	.52
+	HYDROGRAPH AT	61B	1175.	12.42	176.	55.	26.	1.09
+	DIVERSION TO	D61B	1175.	12.42	151.	41.	20.	1.09
+	HYDROGRAPH AT	R61B	330.	12.83	45.	14.	7.	1.09
+	2 COMBINED AT	CP61B	332.	12.92	73.	23.	11.	1.61
+	ROUTED TO	61T62E	274.	13.17	71.	23.	11.	1.61
+	2 COMBINED AT	CP62E2	1092.	12.33	180.	57.	27.	2.68
+	ROUTED TO	62T68A	595.	12.58	166.	54.	26.	2.68
+	HYDROGRAPH AT	68A	695.	12.08	76.	25.	12.	.35
+	DIVERSION TO	D68A	695.	12.08	55.	16.	8.	.35
+	HYDROGRAPH AT	R68A	391.	12.25	32.	10.	5.	.35
+	2 COMBINED AT	C68A1	661.	12.58	194.	63.	30.	3.03
+	HYDROGRAPH AT	RD66	76.	12.58	76.	63.	32.	3.34
+	ROUTED TO	RT404A	76.	13.83	76.	63.	32.	3.34

+	HYDROGRAPH AT	67E	771.	12.33	111.	36.	17.	.58
+	DIVERSION TO	D67E	771.	12.33	91.	25.	12.	.58
+	HYDROGRAPH AT	R67E	268.	12.67	34.	11.	5.	.58
+	2 COMBINED AT	C67E	297.	12.67	107.	74.	37.	.58
+	ROUTED TO	67T68	209.	12.92	106.	74.	37.	.58
+	2 COMBINED AT	C68A2	678.	12.58	289.	135.	67.	3.61
+	ROUTED TO	68T70A	576.	12.92	283.	135.	67.	3.61
+	HYDROGRAPH AT	70A	1143.	12.08	124.	41.	20.	.54
+	DIVERSION TO	D70A	1143.	12.08	94.	26.	13.	.54
+	HYDROGRAPH AT	R70A	568.	12.25	48.	15.	7.	.54
+	2 COMBINED AT	C70A	645.	12.92	322.	148.	73.	4.15
+	2 COMBINED AT	C70A2	1267.	14.42	1180.	899.	643.	15.51
+	ROUTED TO	70T76A	1258.	14.75	1179.	899.	638.	15.51
+	HYDROGRAPH AT	76A	2137.	12.58	427.	136.	66.	1.91
+	DIVERSION TO	D76A	2137.	12.58	338.	93.	45.	1.91
+	HYDROGRAPH AT	R76A	994.	13.00	141.	43.	21.	1.91
+	2 COMBINED AT	C76A	1509.	13.25	1262.	929.	652.	17.42
+	ROUTED TO	76ATPR	1330.	15.08	1252.	928.	647.	17.42
+	2 COMBINED AT	EMFSTN	2660.	14.58	2029.	1248.	805.	39.38
+	ROUTED TO	KNXTRY	2625.	14.83	2024.	1247.	800.	39.38
	HYDROGRAPH AT							

+		73A	377.	13.33	96.	24.	12.	.95
+	ROUTED TO	73ATB	306.	13.83	96.	24.	12.	.95
+	HYDROGRAPH AT	73B	584.	12.17	61.	18.	9.	.42
+	DIVERSION TO	D73B	584.	12.17	56.	15.	7.	.42
+	HYDROGRAPH AT	R73B	77.	12.67	10.	3.	1.	.42
+	2 COMBINED AT	CP73B	313.	13.83	104.	27.	13.	1.37
+	ROUTED TO	73BTC	312.	14.00	104.	27.	13.	1.37
+	HYDROGRAPH AT	73C	1399.	12.00	139.	48.	23.	.58
+	DIVERSION TO	D73C	1399.	12.00	103.	29.	14.	.58
+	HYDROGRAPH AT	R73C	702.	12.08	59.	18.	9.	.58
+	2 COMBINED AT	CP73C	599.	12.08	160.	44.	21.	1.95
+	ROUTED TO	73T74C	341.	14.33	157.	44.	21.	1.95
+	HYDROGRAPH AT	74A	306.	13.33	76.	19.	9.	.75
+	ROUTED TO	DB74A	85.	14.42	40.	19.	9.	.75
+	ROUTED TO	74ATB	64.	15.33	40.	19.	9.	.75
+	HYDROGRAPH AT	74B	451.	12.25	43.	11.	5.	.33
+	DIVERSION TO	D74B	451.	12.25	43.	11.	5.	.33
+	HYDROGRAPH AT	R74B	1.	18.00	1.	0.	0.	.33
+	2 COMBINED AT	CP74B	64.	15.33	40.	19.	9.	1.08
+	ROUTED TO	74BTC	62.	15.58	40.	19.	9.	1.08
+	HYDROGRAPH AT	74C	767.	12.00	85.	29.	14.	.34

+	DIVERSION TO	D74C	767.	12.00	62.	18.	8.	.34
+	HYDROGRAPH AT	R74C	488.	12.17	37.	11.	5.	.34
+	3 COMBINED AT	CP74C	392.	14.33	219.	72.	35.	3.37
+	ROUTED TO	74CT75	389.	14.50	216.	72.	35.	3.37
+	HYDROGRAPH AT	75	1311.	14.75	663.	211.	102.	4.01
+	DIVERSION TO	RET75	1311.	14.75	566.	155.	75.	4.01
+	HYDROGRAPH AT	D75	668.	16.25	193.	57.	27.	4.01
+	2 COMBINED AT	C75	711.	16.50	320.	120.	58.	7.38
+	ROUTED TO	75TPC	684.	16.58	320.	120.	58.	7.38
+	HYDROGRAPH AT	77A	556.	13.75	174.	43.	21.	1.74
+	ROUTED TO	77ATB	474.	14.17	173.	43.	21.	1.74
+	HYDROGRAPH AT	77B	524.	12.17	44.	12.	6.	.36
+	DIVERSION TO	D77B	524.	12.17	32.	8.	4.	.36
+	HYDROGRAPH AT	R77B	337.	12.33	13.	3.	2.	.36
+	2 COMBINED AT	CP77B	474.	14.17	185.	47.	22.	2.10
+	ROUTED TO	77BTC	465.	14.50	183.	46.	22.	2.10
+	HYDROGRAPH AT	77C	678.	12.00	67.	23.	11.	.28
+	DIVERSION TO	D77C	678.	12.00	50.	14.	7.	.28
+	HYDROGRAPH AT	R77C	328.	12.08	29.	9.	4.	.28
+	2 COMBINED AT	C77C	480.	14.50	209.	55.	26.	2.38

+	ROUTED TO	77CT78	473.	14.75	208.	55.	26.	2.38
+	HYDROGRAPH AT	78A	600.	13.75	188.	47.	23.	1.88
+	ROUTED TO	78ATB	493.	14.33	187.	47.	23.	1.88
+	HYDROGRAPH AT	78B	630.	12.17	67.	17.	8.	.39
+	2 COMBINED AT	C78B	633.	12.25	250.	64.	31.	2.27
+	ROUTED TO	78BTC	522.	12.50	250.	64.	31.	2.27
+	HYDROGRAPH AT	78C	663.	12.00	71.	23.	11.	.28
+	DIVERSION TO	D78C	611.	12.00	43.	12.	6.	.28
+	HYDROGRAPH AT	R78C	608.	12.08	37.	11.	5.	.28
+	3 COMBINED AT	C78C	947.	14.67	481.	126.	61.	4.93
+	ROUTED TO	78CT79	940.	14.92	478.	126.	61.	4.93
+	HYDROGRAPH AT	79A	1116.	13.50	393.	122.	59.	2.01
+	DIVERSION TO	DET79A	1116.	13.50	315.	86.	41.	2.01
+	HYDROGRAPH AT	D79A	566.	14.50	121.	36.	17.	2.01
+	2 COMBINED AT	C79A1	1341.	14.67	556.	154.	74.	6.94
+	HYDROGRAPH AT	79B	757.	13.08	223.	71.	34.	1.00
+	DIVERSION TO	RET79B	757.	13.08	169.	47.	22.	1.00
+	HYDROGRAPH AT	D79B	472.	13.67	82.	25.	12.	1.00
+	2 COMBINED AT	C79A2	1452.	14.67	610.	173.	83.	7.94
+	HYDROGRAPH AT	78F	1078.	14.17	403.	102.	49.	4.19
	HYDROGRAPH AT							

+		82A1	1124.	13.50	307.	77.	37.	3.12
+	2 COMBINED AT	C82A1	1675.	13.50	682.	172.	83.	7.31
+	ROUTED TO	DB82A1	185.	16.17	157.	135.	108.	7.31
+	ROUTED TO	PS-9	184.	16.17	157.	135.	108.	7.31
+	HYDROGRAPH AT	CAP2	64.	20.00	64.	64.	49.	.01
+	ROUTED TO	RCAP2	64.	21.17	64.	64.	47.	.01
+	HYDROGRAPH AT	82A2	880.	14.75	392.	104.	50.	4.13
+	2 COMBINED AT	CP82A2	917.	14.75	432.	160.	97.	4.14
+	HYDROGRAPH AT	82A4	631.	13.83	210.	53.	25.	2.13
+	ROUTED TO	82A4T3	622.	14.00	210.	53.	25.	2.13
+	HYDROGRAPH AT	82A3	536.	14.17	198.	50.	24.	2.02
+	2 COMBINED AT	CP82A3	1108.	14.08	400.	101.	49.	4.15
+	2 COMBINED AT	CP82A5	1617.	14.08	795.	252.	142.	8.29
+	ROUTED TO	DB82B	337.	16.83	315.	246.	140.	8.29
+	ROUTED TO	MN-1	337.	17.00	315.	246.	140.	8.29
+	2 COMBINED AT	CP82A6	471.	17.00	455.	370.	240.	15.60
+	ROUTED TO	82TBOX	471.	17.00	455.	370.	240.	15.60
+	ROUTED TO	BOXCLV	471.	17.08	455.	370.	240.	15.60
+	ROUTED TO	BOXT78	470.	17.33	454.	369.	240.	15.60
+	HYDROGRAPH AT	78D	1544.	12.17	194.	62.	30.	.89
+	DIVERSION TO	D78D	1544.	12.17	154.	42.	20.	.89

+	HYDROGRAPH AT	R78D	542.	12.42	64.	20.	9.	.89
+	HYDROGRAPH AT	82B	1557.	12.17	181.	59.	29.	.92
+	DIVERSION TO	D82	14.	1.08	2.	1.	0.	.92
+	HYDROGRAPH AT	R82	1557.	12.17	181.	59.	28.	.92
+	DIVERSION TO	TRW	1557.	12.17	181.	56.	27.	.92
+	HYDROGRAPH AT	DTTRW	19.	19.42	12.	3.	1.	.92
+	3 COMBINED AT	C78D	1124.	12.58	516.	428.	276.	17.41
+	ROUTED TO	78DTE	488.	17.67	471.	379.	245.	17.41
+	HYDROGRAPH AT	78E	931.	12.75	223.	71.	34.	1.01
+	DIVERSION TO	RET78E	931.	12.75	171.	47.	23.	1.01
+	HYDROGRAPH AT	D78E	545.	13.25	80.	24.	12.	1.01
+	HYDROGRAPH AT	83	1378.	12.25	198.	65.	31.	1.01
+	DIVERSION TO	D83	1378.	12.25	150.	42.	20.	1.01
+	HYDROGRAPH AT	R83	723.	12.50	75.	23.	11.	1.01
+	3 COMBINED AT	C78E	647.	13.50	523.	411.	261.	19.43
+	ROUTED TO	78ET84	548.	14.00	519.	409.	260.	19.43
+	HYDROGRAPH AT	84	1309.	12.25	193.	63.	30.	.99
+	DIVERSION TO	D84	1309.	12.25	154.	43.	21.	.99
+	HYDROGRAPH AT	R84	590.	12.58	66.	21.	10.	.99
+	2 COMBINED AT	C84	599.	14.00	547.	422.	266.	20.42

+	ROUTED TO	EC-4	589.	14.33	546.	421.	266.	20.42
+	2 COMBINED AT	C79B3	1744.	14.92	980.	557.	333.	28.36
+	ROUTED TO	EC-3	1688.	15.17	979.	556.	332.	28.36
+	ROUTED TO	EC-2	1657.	15.42	978.	555.	331.	28.36
+	ROUTED TO	EC-1	1639.	15.58	978.	554.	331.	28.36
+	2 COMBINED AT	CPPWR	1773.	15.58	1172.	629.	367.	35.74
+	ROUTED TO	PLF-2	1761.	15.75	1171.	629.	366.	35.74
+	HYDROGRAPH AT	80A	2421.	12.83	595.	189.	91.	2.64
+	DIVERSION TO	D80A	73.	8.83	53.	17.	8.	2.64
+	HYDROGRAPH AT	R80A	2421.	12.83	595.	172.	83.	2.64
+	2 COMBINED AT	CP80A	2264.	12.83	1432.	752.	436.	38.38
+	ROUTED TO	PLF-1	2214.	12.92	1430.	751.	436.	38.38
+	ROUTED TO	PWREMF	1970.	13.08	1417.	751.	435.	38.38
+	2 COMBINED AT	EMFPOW	3645.	15.83	3019.	1884.	1175.	77.76
+	ROUTED TO	POWTWI	3636.	15.92	3018.	1883.	1170.	77.76
+	HYDROGRAPH AT	80B	1197.	12.50	223.	71.	34.	1.12
+	DIVERSION TO	D80B	15.	4.00	8.	2.	1.	1.12
+	HYDROGRAPH AT	R80B	1197.	12.50	223.	69.	33.	1.12
+	2 COMBINED AT	MFWILL	3659.	15.92	3040.	1928.	1197.	78.88
+	ROUTED TO	WILTSP	3647.	16.17	3038.	1927.	1191.	78.88
	HYDROGRAPH AT							

+		81A	1656.	12.67	359.	119.	57.	1.81
+	DIVERSION TO	D81A	29.	2.67	10.	3.	1.	1.81
+	HYDROGRAPH AT	R81A	1656.	12.67	359.	117.	56.	1.81
+	ROUTED TO	81ATB	1531.	13.00	359.	117.	56.	1.81
+	HYDROGRAPH AT	81B	1214.	12.25	180.	61.	29.	.84
+	DIVERSION TO	D81B	447.	11.92	55.	18.	8.	.84
+	HYDROGRAPH AT	R81B	1214.	12.25	153.	43.	21.	.84
+	2 COMBINED AT	C81	1665.	13.00	502.	158.	76.	2.65
+	2 COMBINED AT	EMFRT1	3727.	16.17	3243.	2041.	1252.	81.53
+	HYDROGRAPH AT	SUB258	473.	16.17	374.	149.	72.	3.68
+	DIVERSION TO	D258	473.	16.17	244.	61.	29.	3.68
+	HYDROGRAPH AT	R258	442.	17.17	252.	88.	42.	3.68
+	ROUTED TO	RO259	362.	19.42	243.	88.	42.	3.68
+	HYDROGRAPH AT	SUB260	268.	13.25	113.	36.	17.	.98
+	DIVERSION TO	D260	268.	13.25	54.	14.	7.	.98
+	HYDROGRAPH AT	R260	222.	13.75	68.	22.	11.	.98
+	2 COMBINED AT	CO262	384.	19.42	263.	107.	52.	4.66
+	ROUTED TO	RO263	360.	21.17	258.	107.	52.	4.66
+	HYDROGRAPH AT	SUB264	249.	13.50	118.	38.	18.	.99
+	DIVERSION TO	D264	249.	13.50	58.	15.	7.	.99
+	HYDROGRAPH AT	R264	213.	14.08	71.	23.	11.	.99

+	2 COMBINED AT	CO266	376.	21.25	273.	126.	61.	5.65
+	ROUTED TO	RO267	345.	24.75	266.	126.	61.	5.65
+	HYDROGRAPH AT	SUB268	174.	14.42	108.	37.	18.	.96
+	DIVERSION TO	D268	174.	14.42	56.	14.	7.	.96
+	HYDROGRAPH AT	R268	159.	15.08	69.	23.	11.	.96
+	2 COMBINED AT	CO270	355.	24.83	272.	143.	69.	6.61
+	ROUTED TO	RO283	339.	27.67	269.	143.	69.	6.61
+	HYDROGRAPH AT	88A	1139.	12.00	119.	41.	20.	.50
+	DIVERSION TO	D88A	1139.	12.00	89.	25.	12.	.50
+	HYDROGRAPH AT	R88A	602.	12.17	50.	16.	8.	.50
+	ROUTED TO	88AT89	130.	12.42	48.	16.	8.	.50
+	HYDROGRAPH AT	89A	1008.	12.08	118.	41.	20.	.50
+	DIVERSION TO	D89A	1008.	12.08	89.	25.	12.	.50
+	HYDROGRAPH AT	R89A	564.	12.25	50.	15.	7.	.50
+	2 COMBINED AT	C89A	668.	12.25	97.	31.	15.	1.00
+	ROUTED TO	89ATRI	257.	12.58	94.	31.	15.	1.00
+	2 COMBINED AT	C283	339.	27.75	268.	163.	82.	7.61
+	ROUTED TO	283T90	329.	28.17	263.	159.	81.	7.61
+	HYDROGRAPH AT	90A	938.	12.08	98.	33.	16.	.48
+	DIVERSION TO	D90A	938.	12.08	76.	21.	10.	.48

+	HYDROGRAPH AT	R90A	456.	12.25	37.	12.	6.	.48
+	2 COMBINED AT	C90A	329.	28.17	263.	168.	86.	8.09
+	ROUTED TO	90ATB	321.	28.50	260.	165.	85.	8.09
+	HYDROGRAPH AT	87A	1040.	12.08	116.	40.	19.	.49
+	DIVERSION TO	D87A	1040.	12.08	87.	25.	12.	.49
+	HYDROGRAPH AT	R87A	435.	12.25	49.	15.	7.	.49
+	ROUTED TO	87ATB	145.	12.75	46.	15.	7.	.49
+	HYDROGRAPH AT	87B	1021.	12.08	117.	40.	19.	.49
+	DIVERSION TO	D87B	1021.	12.08	87.	25.	12.	.49
+	HYDROGRAPH AT	R87B	512.	12.25	50.	15.	7.	.49
+	2 COMBINED AT	C87	514.	12.25	95.	31.	15.	.98
+	ROUTED TO	87T88B	250.	12.92	92.	31.	15.	.98
+	HYDROGRAPH AT	88B	1034.	12.08	118.	41.	20.	.50
+	DIVERSION TO	D88B	1034.	12.08	89.	25.	12.	.50
+	HYDROGRAPH AT	R88B	518.	12.25	49.	15.	7.	.50
+	2 COMBINED AT	C88B	506.	12.25	136.	45.	22.	1.48
+	ROUTED TO	88T89B	310.	13.33	134.	45.	22.	1.48
+	HYDROGRAPH AT	89B	1047.	12.08	117.	40.	19.	.50
+	DIVERSION TO	D89B	1047.	12.08	87.	25.	12.	.50
+	HYDROGRAPH AT	R89B	438.	12.25	50.	16.	7.	.50
	2 COMBINED AT							

+		C89B	433.	12.25	177.	60.	29.	1.98
+	ROUTED TO	89TB90	353.	13.83	172.	60.	29.	1.98
+	HYDROGRAPH AT	90B	667.	12.67	128.	39.	19.	.82
+	DIVERSION TO	D90B	379.	12.25	39.	12.	6.	.82
+	HYDROGRAPH AT	R90B	667.	12.67	101.	27.	13.	.82
+	3 COMBINED AT	C90	767.	12.75	327.	234.	118.	10.89
+	ROUTED TO	90T91	546.	13.50	309.	231.	118.	10.89
+	HYDROGRAPH AT	85	1327.	12.25	192.	63.	30.	1.00
+	DIVERSION TO	D85	1327.	12.25	152.	42.	20.	1.00
+	HYDROGRAPH AT	R85	591.	12.58	68.	21.	10.	1.00
+	ROUTED TO	85T86	333.	12.92	65.	21.	10.	1.00
+	HYDROGRAPH AT	86	1341.	12.25	193.	64.	31.	1.00
+	DIVERSION TO	D86	1341.	12.25	154.	43.	21.	1.00
+	HYDROGRAPH AT	R86	594.	12.58	67.	21.	10.	1.00
+	2 COMBINED AT	C86	499.	12.58	126.	40.	19.	2.00
+	ROUTED TO	86T91	451.	13.17	123.	40.	19.	2.00
+	HYDROGRAPH AT	91	667.	12.25	89.	29.	14.	.46
+	DIVERSION TO	D91	667.	12.25	69.	19.	9.	.46
+	HYDROGRAPH AT	RET91	302.	12.50	33.	10.	5.	.46
+	3 COMBINED AT	CP91	810.	13.42	415.	265.	135.	13.35
+	ROUTED TO	91TEMF	805.	13.50	414.	265.	135.	13.35

```
          2 COMBINED AT
+                        EMFRIT      3938.   16.17        3443.       2202.       1336.      94.88
1
                                   SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                       (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                          INTERPOLATED TO
                                                                       COMPUTATION INTERVAL
          ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                   PEAK                                     PEAK

                               (MIN)     (CFS)     (MIN)      (IN)     (MIN)     (CFS)     (MIN)       (IN)

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
           65AT-3  MANE          .65    541.95   1069.33      8.11      5.00    541.95   1070.00       8.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1886E+04 EXCESS= .0000E+00 OUTFLOW= .1886E+04 BASIN STORAGE= .4484E+00 PERCENT ERROR=    .0

         FOR STORM = 2  STORM AREA (SQ MI) =       1.00
           65AT-3  MANE          .65    541.51   1068.22      8.10      5.00    541.51   1070.00       8.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1884E+04 EXCESS= .0000E+00 OUTFLOW= .1884E+04 BASIN STORAGE= .4482E+00 PERCENT ERROR=    .0

         FOR STORM = 3  STORM AREA (SQ MI) =       5.00
           65AT-3  MANE          .65    539.81   1065.60      8.06      5.00    539.81   1070.00       8.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1875E+04 EXCESS= .0000E+00 OUTFLOW= .1875E+04 BASIN STORAGE= .4474E+00 PERCENT ERROR=    .0

         FOR STORM = 4  STORM AREA (SQ MI) =      10.00
           65AT-3  MANE          .66    537.67   1065.79      8.01      5.00    537.67   1065.00       8.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1864E+04 EXCESS= .0000E+00 OUTFLOW= .1863E+04 BASIN STORAGE= .4467E+00 PERCENT ERROR=    .0

         FOR STORM = 5  STORM AREA (SQ MI) =      30.00
           65AT-3  MANE          .66    534.29   1068.46      7.95      5.00    534.29   1070.00       7.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1848E+04 EXCESS= .0000E+00 OUTFLOW= .1848E+04 BASIN STORAGE= .4461E+00 PERCENT ERROR=    .0

         FOR STORM = 6  STORM AREA (SQ MI) =      60.00
           65AT-3  MANE          .66    530.60   1070.60      7.88      5.00    530.60   1070.00       7.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1832E+04 EXCESS= .0000E+00 OUTFLOW= .1832E+04 BASIN STORAGE= .4457E+00 PERCENT ERROR=    .0

         FOR STORM = 7  STORM AREA (SQ MI) =      90.00
           65AT-3  MANE          .66    529.28   1071.15      7.85      5.00    529.28   1075.00       7.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1826E+04 EXCESS= .0000E+00 OUTFLOW= .1825E+04 BASIN STORAGE= .4456E+00 PERCENT ERROR=    .0
```

```
FOR STORM = 8  STORM AREA (SQ MI) =      120.00
  65AT-3  MANE          .66    527.85   1077.61      7.83      5.00    527.85   1080.00        7.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1820E+04 EXCESS= .0000E+00 OUTFLOW= .1820E+04 BASIN STORAGE= .4455E+00 PERCENT ERROR=    .0

FOR STORM = 9  STORM AREA (SQ MI) =      150.00
  65AT-3  MANE          .66    526.71   1030.06      7.81      5.00    526.71   1030.00        7.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1816E+04 EXCESS= .0000E+00 OUTFLOW= .1815E+04 BASIN STORAGE= .4455E+00 PERCENT ERROR=    .0

FOR STORM = 1  STORM AREA (SQ MI) =          .01
  65T66  MANE          .61    553.55   1070.53      8.24      5.00    553.55   1070.00        8.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1916E+04 EXCESS= .0000E+00 OUTFLOW= .1916E+04 BASIN STORAGE= .4245E+00 PERCENT ERROR=    .0

FOR STORM = 2  STORM AREA (SQ MI) =         1.00
  65T66  MANE          .61    552.95   1070.76      8.23      5.00    552.95   1070.00        8.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1914E+04 EXCESS= .0000E+00 OUTFLOW= .1913E+04 BASIN STORAGE= .4241E+00 PERCENT ERROR=    .0

FOR STORM = 3  STORM AREA (SQ MI) =         5.00
  65T66  MANE          .61    550.63   1070.45      8.18      5.00    550.63   1070.00        8.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1902E+04 EXCESS= .0000E+00 OUTFLOW= .1902E+04 BASIN STORAGE= .4226E+00 PERCENT ERROR=    .0

FOR STORM = 4  STORM AREA (SQ MI) =        10.00
  65T66  MANE          .61    547.61   1069.79      8.11      5.00    547.61   1070.00        8.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1887E+04 EXCESS= .0000E+00 OUTFLOW= .1887E+04 BASIN STORAGE= .4192E+00 PERCENT ERROR=    .0

FOR STORM = 5  STORM AREA (SQ MI) =        30.00
  65T66  MANE          .61    542.85   1069.80      8.01      5.00    542.85   1070.00        8.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1863E+04 EXCESS= .0000E+00 OUTFLOW= .1863E+04 BASIN STORAGE= .4165E+00 PERCENT ERROR=    .0

FOR STORM = 6  STORM AREA (SQ MI) =        60.00
  65T66  MANE          .61    537.46   1070.12      7.90      5.00    537.46   1070.00        7.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1838E+04 EXCESS= .0000E+00 OUTFLOW= .1838E+04 BASIN STORAGE= .4160E+00 PERCENT ERROR=    .0

FOR STORM = 7  STORM AREA (SQ MI) =        90.00
  65T66  MANE          .61    534.54   1045.54      7.87      5.00    534.54   1045.00        7.87
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1830E+04 EXCESS= .0000E+00 OUTFLOW= .1829E+04 BASIN STORAGE= .4159E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
             65T66  MANE          .61    531.70   1025.20      7.83      5.00    531.70   1025.00        7.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1822E+04 EXCESS= .0000E+00 OUTFLOW= .1822E+04 BASIN STORAGE= .4159E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
             65T66  MANE          .61    529.58   1025.42      7.81      5.00    529.58   1025.00        7.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1817E+04 EXCESS= .0000E+00 OUTFLOW= .1816E+04 BASIN STORAGE= .4158E+00 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
            65T66A  MANE          .69    553.55   1071.12      8.24      5.00    553.55   1075.00        8.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1916E+04 EXCESS= .0000E+00 OUTFLOW= .1916E+04 BASIN STORAGE= .4817E+00 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            65T66A  MANE          .69    552.95   1070.65      8.23      5.00    552.95   1070.00        8.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1913E+04 EXCESS= .0000E+00 OUTFLOW= .1913E+04 BASIN STORAGE= .4812E+00 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            65T66A  MANE          .69    550.63   1070.87      8.18      5.00    550.63   1070.00        8.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1902E+04 EXCESS= .0000E+00 OUTFLOW= .1902E+04 BASIN STORAGE= .4795E+00 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            65T66A  MANE          .69    547.61   1069.99      8.11      5.00    547.61   1070.00        8.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1887E+04 EXCESS= .0000E+00 OUTFLOW= .1886E+04 BASIN STORAGE= .4756E+00 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
            65T66A  MANE          .69    542.85   1070.44      8.01      5.00    542.85   1070.00        8.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1863E+04 EXCESS= .0000E+00 OUTFLOW= .1862E+04 BASIN STORAGE= .4725E+00 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
            65T66A  MANE          .69    537.46   1070.49      7.90      5.00    537.45   1070.00        7.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1838E+04 EXCESS= .0000E+00 OUTFLOW= .1838E+04 BASIN STORAGE= .4720E+00 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
            65T66A  MANE          .69    534.54   1045.96      7.86      5.00    534.54   1045.00        7.86
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1829E+04 EXCESS= .0000E+00 OUTFLOW= .1829E+04 BASIN STORAGE= .4719E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =      120.00
            65T66A  MANE          .70    531.70   1025.49      7.83      5.00    531.70   1025.00        7.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1822E+04 EXCESS= .0000E+00 OUTFLOW= .1821E+04 BASIN STORAGE= .4719E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =      150.00
            65T66A  MANE          .70    529.58   1024.94      7.81      5.00    529.58   1025.00        7.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1816E+04 EXCESS= .0000E+00 OUTFLOW= .1816E+04 BASIN STORAGE= .4718E+00 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =          .01
            65T66B  MANE          .73    553.55   1073.70      8.24      5.00    553.55   1075.00        8.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1916E+04 EXCESS= .0000E+00 OUTFLOW= .1915E+04 BASIN STORAGE= .5081E+00 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =         1.00
            65T66B  MANE          .73    552.95   1071.05      8.22      5.00    552.95   1075.00        8.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1913E+04 EXCESS= .0000E+00 OUTFLOW= .1913E+04 BASIN STORAGE= .5076E+00 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =         5.00
            65T66B  MANE          .73    550.63   1070.48      8.17      5.00    550.63   1070.00        8.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1901E+04 EXCESS= .0000E+00 OUTFLOW= .1901E+04 BASIN STORAGE= .5057E+00 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =        10.00
            65T66B  MANE          .73    547.61   1070.18      8.11      5.00    547.61   1070.00        8.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1886E+04 EXCESS= .0000E+00 OUTFLOW= .1886E+04 BASIN STORAGE= .5017E+00 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =        30.00
            65T66B  MANE          .73    542.85   1070.61      8.01      5.00    542.85   1070.00        8.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1862E+04 EXCESS= .0000E+00 OUTFLOW= .1862E+04 BASIN STORAGE= .4984E+00 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =        60.00
            65T66B  MANE          .73    537.45   1070.53      7.90      5.00    537.45   1070.00        7.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1838E+04 EXCESS= .0000E+00 OUTFLOW= .1837E+04 BASIN STORAGE= .4979E+00 PERCENT ERROR=    .0
```

```
FOR STORM = 7  STORM AREA (SQ MI) =      90.00
  65T66B  MANE          .73    534.54   1046.07      7.86      5.00    534.54   1050.00        7.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1829E+04 EXCESS= .0000E+00 OUTFLOW= .1828E+04 BASIN STORAGE= .4978E+00 PERCENT ERROR=    .0

FOR STORM = 8  STORM AREA (SQ MI) =     120.00
  65T66B  MANE          .73    531.69   1025.91      7.83      5.00    531.69   1025.00        7.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1821E+04 EXCESS= .0000E+00 OUTFLOW= .1821E+04 BASIN STORAGE= .4977E+00 PERCENT ERROR=    .0

FOR STORM = 9  STORM AREA (SQ MI) =     150.00
  65T66B  MANE          .73    529.58   1025.26      7.81      5.00    529.58   1025.00        7.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1816E+04 EXCESS= .0000E+00 OUTFLOW= .1816E+04 BASIN STORAGE= .4976E+00 PERCENT ERROR=    .0

FOR STORM = 1  STORM AREA (SQ MI) =        .01
  66C1T2  MANE          .75    404.26    910.69      2.51      5.00    404.26    910.00        2.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4475E+03 EXCESS= .0000E+00 OUTFLOW= .4475E+03 BASIN STORAGE= .1333E-03 PERCENT ERROR=    .0

FOR STORM = 2  STORM AREA (SQ MI) =       1.00
  66C1T2  MANE          .75    404.21    910.71      2.51      5.00    404.21    910.00        2.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4465E+03 EXCESS= .0000E+00 OUTFLOW= .4465E+03 BASIN STORAGE= .1320E-03 PERCENT ERROR=    .0

FOR STORM = 3  STORM AREA (SQ MI) =       5.00
  66C1T2  MANE          .75    404.02    911.54      2.48      5.00    404.01    915.00        2.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4417E+03 EXCESS= .0000E+00 OUTFLOW= .4417E+03 BASIN STORAGE= .1179E-03 PERCENT ERROR=    .0

FOR STORM = 4  STORM AREA (SQ MI) =      10.00
  66C1T2  MANE          .75    403.76    911.67      2.43      5.00    403.76    915.00        2.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4323E+03 EXCESS= .0000E+00 OUTFLOW= .4323E+03 BASIN STORAGE= .1027E-03 PERCENT ERROR=    .0

FOR STORM = 5  STORM AREA (SQ MI) =      30.00
  66C1T2  MANE          .75    403.32    916.35      2.36      5.00    403.31    915.00        2.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4209E+03 EXCESS= .0000E+00 OUTFLOW= .4209E+03 BASIN STORAGE= .1234E-03 PERCENT ERROR=    .0

FOR STORM = 6  STORM AREA (SQ MI) =      60.00
  66C1T2  MANE          .75    399.86    965.92      2.32      5.00    399.84    965.00        2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4133E+03 EXCESS= .0000E+00 OUTFLOW= .4133E+03 BASIN STORAGE= .1144E-03 PERCENT ERROR=    .0
```

```
          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
            66C1T2  MANE          .75    399.29    930.18      2.31      5.00    399.29    930.00        2.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4108E+03 EXCESS= .0000E+00 OUTFLOW= .4108E+03 BASIN STORAGE= .1341E-03 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
            66C1T2  MANE          .75    399.24    930.22      2.30      5.00    399.24    930.00        2.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4092E+03 EXCESS= .0000E+00 OUTFLOW= .4092E+03 BASIN STORAGE= .1303E-03 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
            66C1T2  MANE          .75    399.20    930.24      2.29      5.00    399.20    930.00        2.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4078E+03 EXCESS= .0000E+00 OUTFLOW= .4078E+03 BASIN STORAGE= .1290E-03 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
               66CTD  MANE          .32    956.42    930.24      5.75      5.00    956.42    930.00        5.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2363E+04 EXCESS= .0000E+00 OUTFLOW= .2363E+04 BASIN STORAGE= .2476E+00 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
               66CTD  MANE          .32    955.79    929.99      5.74      5.00    955.79    930.00        5.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2359E+04 EXCESS= .0000E+00 OUTFLOW= .2359E+04 BASIN STORAGE= .2474E+00 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
               66CTD  MANE          .32    953.28    930.18      5.70      5.00    953.28    930.00        5.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2343E+04 EXCESS= .0000E+00 OUTFLOW= .2343E+04 BASIN STORAGE= .2465E+00 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
               66CTD  MANE          .32    950.00    930.49      5.64      5.00    950.00    930.00        5.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2318E+04 EXCESS= .0000E+00 OUTFLOW= .2318E+04 BASIN STORAGE= .2445E+00 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
               66CTD  MANE          .32    944.64    935.40      5.56      5.00    944.64    935.00        5.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2283E+04 EXCESS= .0000E+00 OUTFLOW= .2282E+04 BASIN STORAGE= .2429E+00 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
               66CTD  MANE          .32    936.76    970.15      5.48      5.00    936.76    970.00        5.48
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2250E+04 EXCESS= .0000E+00 OUTFLOW= .2250E+04 BASIN STORAGE= .2427E+00 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
             66CTD  MANE          .32    932.76    955.00      5.45      5.00    932.76    955.00        5.45

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2239E+04 EXCESS= .0000E+00 OUTFLOW= .2239E+04 BASIN STORAGE= .2426E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
             66CTD  MANE          .32    929.85    955.27      5.43      5.00    929.85    955.00        5.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2230E+04 EXCESS= .0000E+00 OUTFLOW= .2230E+04 BASIN STORAGE= .2426E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
             66CTD  MANE          .32    927.55    960.27      5.41      5.00    927.55    960.00        5.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2223E+04 EXCESS= .0000E+00 OUTFLOW= .2223E+04 BASIN STORAGE= .2425E+00 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
             RC-WA  MANE          .69    974.33    934.95      4.10      5.00    974.33    935.00        4.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2416E+04 EXCESS= .0000E+00 OUTFLOW= .2416E+04 BASIN STORAGE= .5557E+00 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
             RC-WA  MANE          .69    973.67    935.08      4.10      5.00    973.67    935.00        4.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2412E+04 EXCESS= .0000E+00 OUTFLOW= .2412E+04 BASIN STORAGE= .5552E+00 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
             RC-WA  MANE          .70    971.11    934.87      4.07      5.00    971.11    935.00        4.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2395E+04 EXCESS= .0000E+00 OUTFLOW= .2395E+04 BASIN STORAGE= .5532E+00 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
             RC-WA  MANE          .70    967.81    935.52      4.02      5.00    967.80    935.00        4.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2370E+04 EXCESS= .0000E+00 OUTFLOW= .2369E+04 BASIN STORAGE= .5488E+00 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
             RC-WA  MANE          .70    962.40    940.75      3.96      5.00    962.39    940.00        3.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2334E+04 EXCESS= .0000E+00 OUTFLOW= .2334E+04 BASIN STORAGE= .5453E+00 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
```

```
      RC-WA  MANE          .70    954.56    970.87      3.91      5.00    954.55    970.00        3.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2301E+04 EXCESS= .0000E+00 OUTFLOW= .2301E+04 BASIN STORAGE= .5445E+00 PERCENT ERROR=    .0

     FOR STORM = 7  STORM AREA (SQ MI) =      90.00
      RC-WA  MANE          .70    950.47    956.34      3.89      5.00    950.47    960.00        3.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2290E+04 EXCESS= .0000E+00 OUTFLOW= .2289E+04 BASIN STORAGE= .5442E+00 PERCENT ERROR=    .0

     FOR STORM = 8  STORM AREA (SQ MI) =     120.00
      RC-WA  MANE          .70    947.56    960.44      3.87      5.00    947.56    960.00        3.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2280E+04 EXCESS= .0000E+00 OUTFLOW= .2280E+04 BASIN STORAGE= .5437E+00 PERCENT ERROR=    .0

     FOR STORM = 9  STORM AREA (SQ MI) =     150.00
      RC-WA  MANE          .70    945.27    961.59      3.86      5.00    945.27    965.00        3.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2273E+04 EXCESS= .0000E+00 OUTFLOW= .2272E+04 BASIN STORAGE= .5432E+00 PERCENT ERROR=    .0

     FOR STORM = 1  STORM AREA (SQ MI) =        .01
      66T66D  MANE         1.00    981.54   1061.83      4.16      5.00    981.49   1065.00        4.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2448E+04 EXCESS= .0000E+00 OUTFLOW= .2448E+04 BASIN STORAGE= .8035E+00 PERCENT ERROR=    .0

     FOR STORM = 2  STORM AREA (SQ MI) =       1.00
      66T66D  MANE         1.00    980.26   1071.13      4.15      5.00    980.26   1070.00        4.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2443E+04 EXCESS= .0000E+00 OUTFLOW= .2442E+04 BASIN STORAGE= .8027E+00 PERCENT ERROR=    .0

     FOR STORM = 3  STORM AREA (SQ MI) =       5.00
      66T66D  MANE         1.00    975.73   1090.18      4.11      5.00    975.73   1090.00        4.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2422E+04 EXCESS= .0000E+00 OUTFLOW= .2421E+04 BASIN STORAGE= .7998E+00 PERCENT ERROR=    .0

     FOR STORM = 4  STORM AREA (SQ MI) =      10.00
      66T66D  MANE         1.00    971.18   1101.26      4.06      5.00    971.15   1100.00        4.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2394E+04 EXCESS= .0000E+00 OUTFLOW= .2393E+04 BASIN STORAGE= .7935E+00 PERCENT ERROR=    .0

     FOR STORM = 5  STORM AREA (SQ MI) =      30.00
      66T66D  MANE         1.01    963.15   1130.25      4.00      5.00    963.15   1130.00        4.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2353E+04 EXCESS= .0000E+00 OUTFLOW= .2353E+04 BASIN STORAGE= .7883E+00 PERCENT ERROR=    .0
```

```
          FOR STORM = 6  STORM AREA (SQ MI) =       60.00
            66T66D  MANE          1.01    954.54    970.96      3.93      5.00    954.53    970.00        3.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2313E+04 EXCESS= .0000E+00 OUTFLOW= .2312E+04 BASIN STORAGE= .7871E+00 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =       90.00
            66T66D  MANE          1.01    950.47    959.68      3.90      5.00    950.47    960.00        3.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2299E+04 EXCESS= .0000E+00 OUTFLOW= .2298E+04 BASIN STORAGE= .7867E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =      120.00
            66T66D  MANE          1.01    947.56    960.29      3.88      5.00    947.56    960.00        3.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2287E+04 EXCESS= .0000E+00 OUTFLOW= .2286E+04 BASIN STORAGE= .7860E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =      150.00
            66T66D  MANE          1.01    945.27    964.78      3.87      5.00    945.27    965.00        3.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2278E+04 EXCESS= .0000E+00 OUTFLOW= .2277E+04 BASIN STORAGE= .7853E+00 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =         .01
             66-66D  MANE         2.16    981.49   1065.16      4.15      5.00    981.48   1065.00        4.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2448E+04 EXCESS= .0000E+00 OUTFLOW= .2446E+04 BASIN STORAGE= .1732E+01 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =        1.00
             66-66D  MANE         2.16    980.23   1074.08      4.14      5.00    980.22   1075.00        4.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2441E+04 EXCESS= .0000E+00 OUTFLOW= .2440E+04 BASIN STORAGE= .1730E+01 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =        5.00
             66-66D  MANE         2.16    975.70   1092.38      4.11      5.00    975.69   1090.00        4.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2421E+04 EXCESS= .0000E+00 OUTFLOW= .2419E+04 BASIN STORAGE= .1724E+01 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =       10.00
             66-66D  MANE         2.17    971.11   1102.07      4.06      5.00    971.07   1105.00        4.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2393E+04 EXCESS= .0000E+00 OUTFLOW= .2392E+04 BASIN STORAGE= .1710E+01 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =       30.00
             66-66D  MANE         2.17    963.12   1129.92      3.99      5.00    963.12   1130.00        3.99
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2352E+04 EXCESS= .0000E+00 OUTFLOW= .2351E+04 BASIN STORAGE= .1699E+01 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
            66-66D  MANE         2.17    954.52    973.35      3.92      5.00    954.51    975.00        3.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2312E+04 EXCESS= .0000E+00 OUTFLOW= .2310E+04 BASIN STORAGE= .1696E+01 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
            66-66D  MANE         2.17    950.47    961.13      3.90      5.00    950.47    960.00        3.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2298E+04 EXCESS= .0000E+00 OUTFLOW= .2297E+04 BASIN STORAGE= .1695E+01 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
            66-66D  MANE         2.18    947.56    961.72      3.88      5.00    947.55    960.00        3.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2286E+04 EXCESS= .0000E+00 OUTFLOW= .2284E+04 BASIN STORAGE= .1694E+01 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
            66-66D  MANE         2.18    945.26    966.54      3.86      5.00    945.26    965.00        3.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2277E+04 EXCESS= .0000E+00 OUTFLOW= .2275E+04 BASIN STORAGE= .1692E+01 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
            66T70B  MANE         1.53    992.79   1066.34      4.07      5.00    992.78   1065.00        4.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2465E+04 EXCESS= .0000E+00 OUTFLOW= .2464E+04 BASIN STORAGE= .1229E+01 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            66T70B  MANE         1.53    991.28   1069.72      4.06      5.00    991.28   1070.00        4.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2460E+04 EXCESS= .0000E+00 OUTFLOW= .2459E+04 BASIN STORAGE= .1228E+01 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            66T70B  MANE         1.53    986.11    919.18      4.02      5.00    986.11    920.00        4.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2437E+04 EXCESS= .0000E+00 OUTFLOW= .2436E+04 BASIN STORAGE= .1223E+01 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            66T70B  MANE         1.53    982.27    919.91      3.98      5.00    982.26    920.00        3.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2408E+04 EXCESS= .0000E+00 OUTFLOW= .2407E+04 BASIN STORAGE= .1214E+01 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
            66T70B  MANE         1.54    975.88    922.63      3.91      5.00    975.83    925.00        3.91
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2366E+04 EXCESS= .0000E+00 OUTFLOW= .2364E+04 BASIN STORAGE= .1206E+01 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =       60.00
            66T70B  MANE          1.54    966.24    975.24      3.84      5.00    966.24    975.00        3.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2323E+04 EXCESS= .0000E+00 OUTFLOW= .2322E+04 BASIN STORAGE= .1204E+01 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =       90.00
            66T70B  MANE          1.54    962.02    960.70      3.81      5.00    962.02    960.00        3.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2309E+04 EXCESS= .0000E+00 OUTFLOW= .2307E+04 BASIN STORAGE= .1203E+01 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =      120.00
            66T70B  MANE          1.54    958.94    964.40      3.79      5.00    958.94    965.00        3.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2296E+04 EXCESS= .0000E+00 OUTFLOW= .2295E+04 BASIN STORAGE= .1202E+01 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =      150.00
            66T70B  MANE          1.54    956.52    966.42      3.78      5.00    956.51    965.00        3.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2287E+04 EXCESS= .0000E+00 OUTFLOW= .2286E+04 BASIN STORAGE= .1201E+01 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
               CULVT  MANE          .33    992.74   1065.12      4.07      5.00    992.74   1065.00        4.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2464E+04 EXCESS= .0000E+00 OUTFLOW= .2464E+04 BASIN STORAGE= .2612E+00 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
               CULVT  MANE          .33    991.25   1069.94      4.06      5.00    991.25   1070.00        4.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2459E+04 EXCESS= .0000E+00 OUTFLOW= .2458E+04 BASIN STORAGE= .2609E+00 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
               CULVT  MANE          .33    986.09    920.05      4.02      5.00    986.09    920.00        4.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2436E+04 EXCESS= .0000E+00 OUTFLOW= .2436E+04 BASIN STORAGE= .2600E+00 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
               CULVT  MANE          .33    982.24    920.06      3.98      5.00    982.24    920.00        3.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2407E+04 EXCESS= .0000E+00 OUTFLOW= .2407E+04 BASIN STORAGE= .2579E+00 PERCENT ERROR=    .0
```

```
          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
             CULVT  MANE          .33    975.82    924.88      3.91      5.00    975.81    925.00        3.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2365E+04 EXCESS= .0000E+00 OUTFLOW= .2365E+04 BASIN STORAGE= .2562E+00 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
             CULVT  MANE          .33    966.23    975.11      3.84      5.00    966.23    975.00        3.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2322E+04 EXCESS= .0000E+00 OUTFLOW= .2322E+04 BASIN STORAGE= .2558E+00 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
             CULVT  MANE          .33    962.01    960.23      3.81      5.00    962.01    960.00        3.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2307E+04 EXCESS= .0000E+00 OUTFLOW= .2307E+04 BASIN STORAGE= .2557E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
             CULVT  MANE          .33    958.94    964.82      3.79      5.00    958.94    965.00        3.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2295E+04 EXCESS= .0000E+00 OUTFLOW= .2294E+04 BASIN STORAGE= .2555E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
             CULVT  MANE          .33    956.51    965.27      3.77      5.00    956.51    965.00        3.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2286E+04 EXCESS= .0000E+00 OUTFLOW= .2285E+04 BASIN STORAGE= .2552E+00 PERCENT ERROR=    .0


*** NORMAL END OF HEC-1 ***


   -----DSS---ZCLOSE Unit:  71,   File: NEBUILD2.DSS
             Pointer Utilization:    .29
             Number of Records:     40
             File Size:     83.5  Kbytes
             Percent Inactive:    .0
```

```
1*************************************                    *************************************
*                                   *                    *                                   *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS    *
*          SEPTEMBER 1990           *                    *   HYDROLOGIC ENGINEERING CENTER   *
*           VERSION 4.0             *                    *         609 SECOND STREET         *
*                                   *                    *      DAVIS, CALIFORNIA 95616      *
* RUN DATE  05/18/2005  TIME  14:02:07 *                    *         (916) 756-1104            *
*                                   *                    *                                   *
*************************************                    *************************************

X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                          PAGE  1

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

    1           ID   Project ID: ELLSWORTH - Major Basin: 01 - Return Period: 10 YEARS
    2           ID   MODIFIED BY AMEC FOR SCOUR ANALYSIS 5-2005
    3           ID   THIS MODEL IS THE FUTURE CONDITIONS MODEL FOR THE ELLSWORTH ROAD IMPROVEMENTS
    4           ID   AND CHANNEL DESIGN PROJECT.  IT HAS BEEN CHANGED FROM THE PREVIOUS MODEL BY
    5           ID   REDIRECTING FLOWS FROM SUBBASINS 61A, 61B, AND 67E TO FOLLOW THEIR EXISTING
    6           ID   CONDITIONS FLOW PATHS - WEST ACROSS ELLSWORTH ROAD.  THE PREVIOUS MODEL HAD
    7           ID   FLOWS FROM THESE SUBBASINS FLOWING SOUTH DOWN ELLSWORTH ROAD TO SUBBASIN 66D.
    8           ID   (cwr 4/17/03)
    9           ID
   10           ID   ***********************************************************************
   11           ID
   12           ID     THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
   13           ID     IT HAS BEEN MODIFIED BY CPE (7/2000)
   14           ID     FOR ALTERNATIVE 2 FOR THE EAST MARICOPA FLOOWAY
   15           ID     CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
   16           ID     TO ROUTE BOTH THE POWERLINE FLOOWAY
   17           ID     AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
   18           ID     INTO THE EMF
   19           ID     JD RECORDS MODIFIED BY AMEC TO ESTABLISH 10-YEAR RUNOFF FOR USE IN
   20           ID     THE SCOUR ANALYSIS OF THE PROPOSED ELLSWORTH CHANNEL (5-2005)
   21           ID    ***************************************************************
   22           ID
   23           ID          Model files changed by Collins/Pina Engineering
   24           ID          to reflect multi-use design concepts (recreation
   25           ID          and environment) proposed throughout the entire
   26           ID          EMF Corridor.    July 2000
   27           ID
   28           ID
   29           ID     VERSION 8.06  CPE 7/31/00
   30           ID
   31           ID  ***********************************************************************
   32           ID
   33           ID
   34           ID  ***********************************************************************
   35           ID   FILENAME: MIDDOUT.DAT
   36           ID
   37           ID   ALL CIP INFRASTRUCTURE IS IN PLACE, FUTURE CONDITIONS LANDUSE IS IN PLACE
   38           ID   FLOW IS ROUTED UP ELLSWORTH ROAD IN A EARTH LINED CHANNEL
   39           ID
   40           ID  ***********************************************************************
   41           ID   PRODUCED BY DIBBLE AND ASSOCIATES AND HOSKIN ENGINEERING CONSULTANTS.
   42           ID   File Name: Final8.Dat
   43           ID   Revised - Jan. 2000 by SZ (Wood/Patel) From Final7.dat - new Z-V & Sideweir
   44           ID   Revised - Jan. 2000 by SZ (Wood/Patel) from Final6.dat - 60% review comments
   45           ID   Revised - Dec. 1999 by SZ (Wood/Patel) from Final5.dat
   46           ID   Revised - Dec. 1999 by SZ (Wood/Patel) from Final4.dat
   47           ID   Revised - Nov. 1999 by SZ (Wood/Patel) from Final3.dat
   48           ID   Revised - June 1999 by SZ (Wood/Patel) for Final Model from Opt1.dat.
   49           ID   Revised - May 1999 by SZ (Wood/Patel) for Option 1, Based on Model SDIB.DAT
   50           ID   REVISED - MAY, 1999 BY VAS TO INCORPORATE INCREASE OF SUBBASIN RETENTION AND
   51           ID             REVISIONS TO THE REGIONAL DETENTION BASIN STORAGE
   52           ID   REVISED - FEB, 1999 BY VALERIE SWICK, FCD OF MARICOPA COUNTY
   53           ID   REVISED - MAY, 1998 BY D&A
   54           ID
   55           ID   REVISED BY VALERIE SWICK, FEB. 26, 1998
1                                          HEC-1 INPUT                                          PAGE  2

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   56           ID
   57           ID   FLOWS FROM DETENTION BASIN LOCATED AT NE CORNER OF ELLIOT AND ELLSWORTH ROADS
```

```
 58          ID   IS ROUTED TO THE SOUTHWEST BY SIPHON DRAW TO SUBBASIN 70A. FROM THERE THEY
 59          ID   WILL BE ROUTED BY A CHANNEL TO THE EMF. FLOWS FROM SUBBASINS ADJACENT TO
 60          ID   SANTAN FREEWAY ALIGNMENT WILL BE ROUTED SOUTH TO SUBBASIN 70A WHERE THEY WILL
 61          ID   BE COMBINED WITH FLOW IN SIPHON DRAW.
 62          ID
 63          ID   EAST MESA AREA DRAINAGE MASTER PLAN
 64          ID   AREA SOUTH OF SUPERSTITION (U.S. HWY 60)
 65          ID   AUGUST 1997
 66          ID   SOUTHEAST MESA HIGH RESOLUTION MODEL
 67          ID
 68          ID   **********FUTURE CONDITION MODEL OF THE WATERSHED************************
 69          ID
 70          ID  ************ATTENTION*************************************************************
 71          ID    SUBBASINS 75, 79A, 79B, 78E,  LANDUSES WERE NOT
 72          ID    CHANGED BECAUSE IT WAS FELT THAT THEIR FUTURE CONDITIONS LANDUSES WOULD BE
 73          ID    SIMILAR TO THE EXISTING CONDITIONS LANDUSES.
 74          ID    RETENTION VOLUMES WILL ALSO NOT BE UTILIZED FOR SUBBASINS 75, 79A, 79B, 78E
 75          ID    SOME QUEEN CREEK SUBBASINS WILL ALSO NOT HAVE RETENTION VOLUMES, EITHER
 76          ID    BECAUSE THEY LIE IN PINAL COUNTY AND WE DONT KNOW PINAL COUNTIES PLANS OR
 77          ID    THEY LIE IN THE SANTAN MOUNTAINS AND WON'T GET DEVELOPED
 78          ID    WILLIAMS GATEWAY AIRPORT (SUBBASINS 80A, 80B, 81A, AND 81B) ARE MODELED AS
 79          ID    FUTURE CONDITIONS AND HAVE RETENTION VOLUMES FOR THE 100YR 2HR STORM
 80          ID  ***********************************************************************************
 81          ID   FILENAME:  SDIBB.DAT
 82          ID
 83          ID   THIS MODEL REPRESENTS THE FUTURE CONDITION OF THE WATERSHED.
 84          ID   TOTAL DRAINAGE AREA IS APPROXIMATELY 213 SQ. MI.
 85          ID   THIS MODEL USES A Kn VALUE OF 0.09 FOR DESERT LAND USE DUE TO SHEET FLOW
 86          ID   CONDITIONS.
 87          ID
 88          ID   10 -YEAR 24-HOUR FREQUENCY
 89          ID   AREAL REDUCTIONS FROM FCD HYDROLOGY MANUAL
 90          ID   THIS MODEL INCLUDES INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY
 91          ID   AND EAST OF THE CAP
 92          ID
 93          ID   DATA FROM THE QUEEN CREEK ADMS HAS BEEN ADDED TO CALCULATE FLOWS INTO THE
 94          ID   EMF.   MUSKINGUM ROUTING NSTEPS WERE ADJUSTED TO BE WITHIN THE SUGGESTED
 95          ID   RANGE.
 96          ID
 97          ID   METHODOLOGY
 98          ID   THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
 99          ID   SCS TYPE II RAINFALL DISTRIBUTION
100          ID   S-GRAPH HYDROGRAPH
101          ID   GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
102          ID   NORMAL DEPTH STORAGE CHANNEL ROUTING
103          ID   APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
104          ID   EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
105          ID   DATED 1994
106          ID   THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS
107          ID
108          ID   ORIGINAL STUDY PERFORMED BY LISA C. YOUNG AND AFSHIN AHOURAIYAN, UPDATED BY
109          ID   DAVID DEGERNESS (OCT-DEC, 1996). REVIEWED BY VALERIE A. SWICK
110          ID   AND AMIR MOTAMEDI OF THE FLOOD CONTROL DISTRICT
1                                        HEC-1 INPUT                                        PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

111          ID   HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
112          ID   DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.
113          ID
114          ID   ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2-3 FT/SEC FOR WASH/NATURAL
115          ID   CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
116          ID
117          ID   VELOCITIES FOR ADMP IMPROVEMENT CHANNELS FROM DIBBLE AND ASSOCIATES
118          ID   SUGGESTED ALTERNATIVES (JULY 1, 1997)
119          ID
120          ID
121          ID   NOTE: MUST USE NDIBF.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
122          ID         SUPERSTITION FREEWAY.
123          ID
124          ID   DDM MCUHP2 SE MESA ADMP - SOUTH OF SUPERSTITION FWY, FUTURE CONDITIONS
             *DIAGRAM
125          IT       5  1APR97    0000     600
126          IO       5
127          IN      15
128          JD    2.30    0.01
129          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
130          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
131          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
132          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
133          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
134          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
135          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
136          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
137          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
138          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
139          JD   2.286     1.0
140          JD   2.231     5.0
141          JD   2.162    10.0
142          JD   2.070    30.0
143          JD   1.978    60.0
144          JD   1.946    90.0
145          JD   1.918   120.0
146          JD   1.898   150.0
             *
             * DDM   ***** Preserved *****

147          KK    SOSS
148          KM   INFLOW FROM SOSSAMAN BASIN VIA SOSSAMAN CHANNEL
```

```
 149          KM   QI CARDS ARE BASED ON THE PEAK OF 1800CFS TO SOSSAMAN CHANNEL
 150          BA   12.50
 151          ZR  =QI A=SOSSAMAN DRAIN B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
              *
              * DDM   ***** Preserved *****

 152          KK   RSOSS
 153          KM   ROUTE FLOWS VIA SOSSAMAN CHANNEL TO BASELINE ROAD
 154          RS       1    FLOW      -1
 155          RC    .030    .025    .030    3500    .005
 156          RX       0       5      10      35      75     110     115     120
 157          RY      10      10      10       4       4      10      10      10
              *
              * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                                    PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 158          KK     59A
 159          KM   BASIN 59A
 160          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 161          KM    L=        .9  Lca=        .3   S=   34.9  Kn= .070  LAG=  29.7
 162          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 163          BA     .26
 164          LG     .23     .25    4.55     .42   33.00
 165          UI     30.     77.    144.    186.    246.    364.    293.    226.    172.    123.
 166          UI     64.     48.     30.     15.      9.      9.      9.      0.      0.      0.
 167          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

 168          KK    R59A
 169          KM   RETAIN THE 100 YEAR 2 HOUR RUNOFF VOLUME
 170          DT    D59A       2
 171          DI       0   10000
 172          DQ       0   10000
              *
              * DDM   ***** Preserved *****

 173          KK    C59A
 174          KM    SOSSAMAN DRAIN AT BASELINE ROAD
 175          HC       2
              * DDM   ***** Preserved *****

 176          KK  59A59B
 177          KM   ROUTE S59A TO 59B VIA SOSSAMAN CHANNEL
 178          KM   BLOCK WALL ON LEFT BANK, SOSSAMAN ROAD ON RIGHT BANK
 179          RS       4    FLOW      -1
 180          RC    .025    .018    .013    6500   .0015
 181          RX       0       3      13      38      78     103     128     203
 182          RY      16      10      10       0       0      10       8      10
              *
              * DDM   ***** Updated *****

 183          KK     59B
 184          KM   BASIN 59B
 185          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 186          KM    L=      1.2  Lca=       .7   S=   33.9  Kn= .087  LAG=  58.3
 187          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 188          BA     .94
 189          LG     .22     .24    4.65     .41   24.00
 190          UI     54.     54.     93.    193.    244.    284.    318.    361.    415.    501.
 191          UI    653.    666.    546.    473.    422.    364.    319.    273.    233.    172.
 192          UI    110.     94.     89.     68.     54.     54.     19.     17.     17.     17.
 193          UI     17.     17.     17.     17.      0.      0.      0.      0.      0.      0.
 194          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                                    PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 195          KK    R59B
 196          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
 197          DT    D59B      63
 198          DI       0   10000
 199          DQ       0   10000
              *
              * DDM   ***** Preserved *****

 200          KK    C59B
 201          KM   SOSSAMAN CHANNEL AT GUADALUPE ROAD
 202          HC       2
              *
              * DDM   ***** Preserved *****

 203          KK  59BT60
 204          KM     ROUTE 59B TO 60 GUADALUPE CHANNEL.  Assumed v=5ft/sec for NSTP calculation
 205          RS       4    FLOW      -1
 206          RC     .02    .013     .02    5500   .0005
 207          RX       0     518     522     522     560     560     580    2580
 208          RY     8.5     8.5     8.5       0       0       8       7       6
              *
              * DDM   ***** Updated *****

 209          KK      60
 210          KM   BASIN 60
```

```
211   KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
212   KM    L=      2.4  Lca=      1.4   S=   31.8  Kn= .087  LAG= 102.0
213   KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
214   BA    2.30
215   LG     .18     .24    4.65     .43   35.00
216   UI     76.     76.     76.     76.    130.    250.    286.    330.    364.    395.
217   UI    422.    452.    484.    522.    571.    607.    689.    820.    915.   1008.
218   UI    865.    793.    723.    669.    626.    591.    536.    496.    459.    424.
219   UI    387.    362.    324.    276.    219.    169.    134.    134.    126.    125.
220   UI    121.     76.     76.     76.     76.     56.     23.     23.     23.     23.
221   UI     23.     23.     23.     23.     23.     23.     23.     23.     23.     23.
222   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
223   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
      *
      * DDM   ***** Preserved *****

224   KK     R60
225   KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
226   DT     D60     170
227   DI       0   10000
228   DQ       0   10000
      *
      * DDM   ***** Preserved *****
```

1 HEC-1 INPUT PAGE 6

```
LINE  ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

229   KK  EMFGUA
230   KM     COMBINE S59 AND S60 AT EMF, GUADALUPE ROAD
231   KO                                      21
232   HC       2
      *
      * DDM   ***** Preserved *****

233   KK  GUATEL
234   KM   ROUTE EMF FLOW FROM GUADALUPE ROAD TO ELLIOT ROAD
235   RS       3    FLOW      -1
236   RC     .03    .022     .03    6000   .0003
237   RX       0     500     520     553     693     726     740     742
238   RY      14      12      11       0       0      11      11      12
      *
      * DDM   ***** Updated *****

239   KK      64
240   KM   BASIN 64
241   KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
242   KM    L=      1.2  Lca=       .6   S=   25.4  Kn= .051  LAG=  34.4
243   KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
244   BA     .81
245   LG     .18     .25    4.70     .41   54.00
246   UI     79.    155.    338.    438.    543.    709.    988.    778.    624.    493.
247   UI    388.    253.    139.    120.     79.     45.     24.     24.     24.     24.
248   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
249   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
      *
      * DDM   ***** Preserved *****

250   KK     R64
251   KM   R64 IS WHAT REMAINS AFTER THE DIVERSION OF FLOW UP TO 67 AC-FT. THIS IS SENT
252   KM   TO TAPE 21 FOR RECALL INTO FCD'S EMF MODELS.  KK BLOCK THERE MUST BE UPDATED
253   KM   TO REFLECT THE CHANGE OF WHAT GETS SENT TO THE TAPE 21.
254   KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
255   KO                                      21
256   DT     D64      67
257   DI       0   10000
258   DQ       0   10000
      *
      * DDM   ***** Preserved *****

259   KK  EMFELL
260   KM     COMBINE EMF FLOW WITH FLOW FROM SUBBASIN 64 AT ELLIOT ROAD
261   HC       2
      *
      * DDM   ***** Preserved *****

262   KK  ELTWAR
263   KM   ROUTE EMF FLOW AT ELLIOT ROAD TO WARNER ROAD VIA THE EMF
264   RS       2    FLOW      -1
265   RC     .03    .022     .03    5500   .0003
266   RX       0     500     520     553     693     726     740     742
267   RY      14      12      11       0       0      11      11      12
      *
      *
```

1 HEC-1 INPUT PAGE 7

```
LINE  ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

268   KK     62B
269   KM   BASIN 62B
270   KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
271   KM    L=       .6  Lca=       .3   S=   47.5  Kn= .021  LAG=   8.0
272   KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
273   BA     .23
274   LG     .11     .25    4.65     .46   78.00
275   UI    334.    940.    431.     83.      0.      0.      0.      0.      0.      0.
276   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
      *
```

```
277          KK    R62B
278          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
279          DT    D62B      19
280          DI       0   10000
281          DQ       0   10000
             *
             * DDM    ***** Preserved *****

282          KK   62BTD
283          KM   ROUTE 62B TO 62D VIA HAWES ROAD
284          RS       6    FLOW      -1
285          RC    .045     .04    .045    5280   .0041
286          RX       0     100     125     127     177     179     224     324
287          RY       3       2    1.50       0       0     1.5       2       3
             *
             * DDM    ***** Updated *****

288          KK     62D
289          KM   BASIN 62D
290          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
291          KM    L=       .9  Lca=       .3   S=   30.7  Kn= .045  LAG=  21.3
292          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
293          BA     .46
294          LG     .23     .25    4.65     .40   50.00
295          UI     76.    300.    519.    753.    475.    369.    286.    203.    163.    111.
296          UI     85.     63.     47.     36.     26.     14.     14.     14.     14.      0.
297          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
298          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM    ***** Preserved *****

299          KK    R62D
300          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
301          DT    D62D      35
302          DI       0   10000
303          DQ       0   10000
             * DDM    ***** Preserved *****
1                                    HEC-1 INPUT                                          PAGE  8

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

304          KK   CP62D
305          KM   COMBINE FLOWS FROM SUBBASINS 62B AND 62D
306          HC       2
             *
             * DDM    ***** Preserved *****

307          KK   62DTF
308          KM   ROUTE 62D TO 62F VIA HAWES ROAD
309          RS       4    FLOW      -1
310          RC    .045    .024    .045    3600   .0033
311          RX       0     500     750     753     793     796    1046    1546
312          RY       3     1.5    1.25       0       0    1.25     1.5       3
             *
             * DDM    ***** Updated *****

313          KK     62F
314          KM   BASIN 62F
315          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
316          KM    L=       .6  Lca=       .4   S=   31.9  Kn= .042  LAG=  18.1
317          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
318          BA     .26
319          LG     .21     .25    4.65     .41   54.00
320          UI     66.    224.    350.    546.    371.    235.     98.     56.     18.     15.
321          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
322          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM    ***** Preserved *****

323          KK    R62F
324          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
325          DT    D62F      18
326          DI       0   10000
327          DQ       0   10000
             *
             * DDM    ***** Preserved *****

328          KK   CP62F
329          KM   COMBINE FLOWS FROM 62D AND 62F
330          HC       2
             *
             * DDM    ***** Preserved *****

331          KK   62T63
332          KM   ROUTE CP62F TO SUBBASIN 63 VIA WASH.
333          KM   WASH CROSSES HAWES, NORTH OF ELLIOT
334          RS       7    FLOW      -1
335          RC    .045     .04    .045    6000  0.0055
336          RX       0     500     750     770     780     800    1050    1550
337          RY       5       4       3       0       0       3       4       5
             *
             * DDM    ***** Inserted *****
1                                    HEC-1 INPUT                                          PAGE  9

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
338          KK      63
339          KM   BASIN 63
340          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
341          KM    L=      1.4  Lca=        .7   S=   28.2  Kn= .035  LAG=  26.8
342          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
343          BA     .91
344          LG     .18      .25     4.65      .43    55.00
345          UI    114.     346.     595.     780.    1159.    1291.     930.     689.     485.     241.
346          UI    170.     113.      35.      35.      35.      35.       0.       0.       0.       0.
347          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *
             * DDM   ***** Preserved *****

348          KK     R63
349          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
350          DT     D63      71
351          DI       0   10000
352          DQ       0   10000
             *
             * DDM   ***** Preserved *****

353          KK    CP63
354          KM   COMBINE FLOWS FROM SUBBASIN 63 AND CP62F
355          HC       2
             *
             * DDM   ***** Preserved *****

356          KK   63T71
357          KM   ROUTE CP63 TO S71 VIA SHEET FLOW
358          KM   SOSSAMAN SOUTH OF ELLIOT
359          RS       6    FLOW      -1
360          RC    .055     .045     .055    5280    .0005
361          RX       0     1000     1005    1010     1013     1043     1543     2043
362          RY       6        5        0       0        3        5        2        5
             *
             *
             * DDM   ***** Updated *****

363          KK     68B
364          KM   BASIN 68B
365          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
366          KM    L=       .6  Lca=        .3   S=   32.3  Kn= .020  LAG=   7.7
367          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
368          BA     .25
369          LG     .10      .25     5.20      .36    80.00
370          UI    377.    1018.     412.      72.       0.       0.       0.       0.       0.       0.
371          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

372          KK     R68
373          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
374          DT    D68B      24
375          DI       0   10000
376          DQ       0   10000
             *

377          KK  68BT69
378          KM   ROUTE S68B TO S69 VIA WASH CROSSING HAWES
379          RS       3    FLOW      -1
380          RC    .045      .04     .045    2750    .0036
381          RX       0      500      950    1003     1007     1057     1511     2011
382          RY       4      3.5        3       0        0        2      2.5        3
             *

383          KK      69
384          KM   BASIN 69
385          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
386          KM    L=       .7  Lca=        .3   S=   22.4  Kn= .020  LAG=   9.0
387          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
388          BA     .09
389          LG     .10      .25     4.70      .45    80.00
390          UI    104.     320.     213.      54.      11.       0.       0.       0.       0.       0.
391          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *
             * DDM   ***** Preserved *****

392          KK     R69
393          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
394          DT     D69       9
395          DI       0   10000
396          DQ       0   10000
             *
             * DDM   ***** Preserved *****

397          KK     C69
398          KM   COMBINE FLOWS FROM SUBBASIN 68B AND 69
399          HC       2
             *
             * DDM   ***** Preserved *****

400          KK   69T71
401          KM   ROUTE S69 TO S71 VIA WASH AND SHEET FLOW, INCREASE OVERBANK N VALUES
402          RS       7    FLOW      -1
403          RC    .055     .045     .055    6000    .0033
404          RX       0      500     1000    1001     1002     1500     2000     2500
```

```
 405          RY       4       3       2       0       0       2       3       4
              *
              * DDM   ***** Inserted *****
1                                   HEC-1 INPUT                                                    PAGE 11

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 406          KK      71
 407          KM   BASIN 71
 408          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 409          KM    L=      1.6  Lca=       .8   S=   26.4  Kn= .020  LAG=  16.8
 410          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 411          BA    1.09
 412          LG     .10     .25    4.65     .47   80.00
 413          UI    331.   1085.   1805.   2349.   1459.    780.    329.    144.     67.     67.
 414          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 415          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

 416          KK     R71
 417          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
 418          DT     D71     106
 419          DI       0   10000
 420          DQ       0   10000
              *
              * DDM   ***** Preserved *****

 421          KK     C71
 422          KM   original wording "COMBINE S71 WITH S69 AND S68B"
 423          KM   was revised by Dibble to be "COMBINE FLOWS FROM S63, S68B, S69 AND S71,
 424          KM   WHICH COMBINES HYDROGRAPHS 63T71, 69T71 AND R71"
 425          KM   CONCENTRATION POINT IS ALONG SOSSAMAN AT THE MESQUITE ST ALIGNMENT
 426          HC       3
              *

 427          KK   71T72
 428          KM   ROUTE C71 TO S72 VIA DIKE
 429          KM    WASH WEST OF INTERSECTION OF SOSSAMAN & WARNER
 430          RS       4    FLOW      -1
 431          RC    .055    .045    .055    3750   .0037
 432          RX       0     500    1000    1007    1017    1025    1530    2030
 433          RY       9     8.5       8       0       0       8     8.5       9
              *
              * DDM   ***** Inserted *****

 434          KK      72
 435          KM   BASIN 72
 436          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 437          KM    L=      1.6  Lca=       .9   S=   13.1  Kn= .020  LAG=  20.3
 438          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 439          BA     .84
 440          LG     .10     .25    5.40     .33   80.00
 441          UI    161.    600.    906.   1496.   1347.    912.    566.    247.    153.     50.
 442          UI     43.     43.      0.      0.      0.      0.      0.      0.      0.      0.
 443          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                                    PAGE 12

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 444          KK     R72
 445          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
 446          DT     D72      83
 447          DI       0   10000
 448          DQ       0   10000
              *
              * CONCENTRATION POINT ADDED PRIOR TO EMF COMBINE SO THAT FLOWS CAN BE SENT TO
              * TAPE21.

 449          KK  CPKNOX
 450          KO                                   21
 451          HC       2
              *
              * DDM   ***** Preserved *****

 452          KK  EMFWAR
 453          KM   COMBINE ROUTED FLOW FROM 71 WITH 72 WITH EMF (HYDROGRAPH ELTWAR)
 454          HC       2
              * DDM   ***** Preserved *****

 455          KK  WARTKN
 456          KM   ROUTE EMF WARNER ROAD FLOW TO KNOX ROAD
 457          RS       1    FLOW      -1
 458          RC     .03    .022     .03    2500   .0003
 459          RX       0     500     520     553     693     726     740     742
 460          RY      14      12      11       0       0      11      11      12
              *

 461          KK     70B
 462          KM   BASIN 70B
 463          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 464          KM    U=      1.6  Lca=      1.1   S=   29.9  Kn= .022  LAG=  20.7
 465          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 466          BA     .38
 467          LG     .11     .15    8.00     .12   76.00
 468          UI     68.    259.    390.    636.    615.    418.    267.    119.     73.     30.
```

```
469          UI     19.     19.      0.      0.      0.      0.      0.      0.      0.      0.
470          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

471          KK    R70B
472          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
473          DT    D70B      38
474          DI       0   10000
475          DQ       0   10000
             *

476          KK  70BT76
477          KM   ROUTE 70B TO 76B VIA WASH CROSSING SOSSAMAN, SOUTH OF WARNER ROAD
478          RS       6    FLOW      -1
479          RC    .045     .04    .045    5500   .0041
480          RX       0     500    1000    1003    1007    1011    1511    2011
481          RY       4     3.5       3       0       0       2     2.5       3
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

482          KK     76B
483          KM   BASIN 76B
484          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
485          KM    L=      1.8  Lca=       .9   S=   27.4  Kn= .021  LAG=  18.9
486          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
487          BA     .64
488          LG     .10     .15    8.80     .09   78.00
489          UI    148.    515.    789.   1294.    957.    629.    303.    157.     70.     35.
490          UI     35.      0.      0.      0.      0.      0.      0.      0.      0.      0.
491          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

492          KK    R76B
493          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
494          DT    D76B      66
495          DI       0   10000
496          DQ       0   10000
             *

497          KK    KNOX
498          KM   COMBINE FLOWS AT KNOX ROAD
499          KO                                     21
500          HC       2
             *

501          KK  EMFKNX
502          KM   COMBINE FLOWS INTO THE EMF AT KNOX ROAD
503          KM   THIS COMBINES HYDROGRAPHS WARTKN, 70BT76 and R76B.
504          HC       2
             *

505          KK  KNXTRY
506          KM   ROUTE EMF KNOX ROAD FLOW TO RAY ROAD
507          RS       1    FLOW      -1
508          RC     .03    .022     .03    3000   .0003
509          RX       0     500     520     553     693     726     740     742
510          RY      14      12      11       0       0      11      11      12
             *

511          KK     65A
512          KM   BASIN 65A
513          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
514          KM    L=      1.6  Lca=       .9   S=   51.2  Kn= .053  LAG=  41.5
515          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
516          BA    2.54
517          LG     .15     .25    5.10     .35   59.00
518          UI    206.    248.    735.   1001.   1188.   1423.   1760.   2487.   2309.   1835.
519          UI   1546.   1269.   1035.    777.    457.    351.    292.    206.    143.     63.
520          UI     63.     63.     63.     63.      0.      0.      0.      0.      0.      0.
521          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

522          KK    R65A
523          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
524          DT    D65A     174
525          DI       0   10000
526          DQ       0   10000
             * DDM   ***** Preserved *****

527          KK   CAP1A
528          KM   INFLOW FROM EAST OF THE CAP THROUGH 2 - 72" PIPE OVERCHUTES
529          KM   STATION #131+90 AND 158+00 SALT-GILA AQUEDUCT REACH 2
530          KM   QI CARDS BASED ON PEAK OUTFLOW FROM OVERCHUTES OF 217 CFS.
531          IN      60
532          BA     .01
533          QI       0      65     217     217     217     217     217     217     217     217
534          QI     217     217     217     217     217     217     217     217     217     217
535          QI     217     217     217     217     217
             *
             * DDM   ***** Preserved *****
```

```
536          KK  RCAP1A
537          KM   ROUTE FLOW FROM CAP OVERCHUTE TO A POINT ON THE MARICOPA/PINAL COUNTY LINE
538          KM   2000 FEET NORTH OF THE GUADALUPE ROAD COUNTY LINE INTERSECTION. ROUTING WILL
539          KM   BE BY A NATURAL CHANNEL.  THIS IS THEN ROUTED FOR 1200 FT
540          KM   IN A CHANNEL (DIBBLE ID MN3) TO THE POINT WERE THE ROUTED CAP1B FLOW
541          KM   INTERCEPTS THE CHANNEL. ORIGINAL SLOPE =.01
542          RS      13    FLOW      -1
543          RC    .045     .04    .045    4900    .010
544          RX       0     500    1000    1006    1026    1032    1511    2011
545          RY       4     3.5       3       0       0       3     3.5       4
             *

546          KK  RRCP1A
547          KM   REACH MN-5 AND CULVERT MNC-1
548          KM   ROUTE FLOW FROM WHERE RCAP1A FLOWS INTO THE NEW CHANNEL ALONG MERIDIAN ROAD
549          KM   USES REVISED ROUTING PARAMETERS. CHANNEL MN-5 SHAPE
550          RS       1    FLOW      -1
551          RC   0.025   0.015   0.025    2350   .0017
552          RX       0       8      16      27      43      53      61      69
553          RY     5.1     5.2     5.3       0       0     5.3     5.2     5.1
             *

554          KK   CAP1B
555          KM   INFLOW FROM EAST OF THE CAP THROUGH 2 - 72" PIPE OVERCHUTES
556          KM   STATION #131+90 AND 158+00 SALT-GILA AQUEDUCT REACH 2
557          KM   QI CARDS BASED ON PEAK OUTFLOW FROM OVERCHUTES OF 217 CFS.
558          IN      60
559          BA     .01
560          QI       0      65     217     217     217     217     217     217     217     217
561          QI     217     217     217     217     217     217     217     217     217     217
562          QI     217     217     217     217     217
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

563          KK  RCAP1B
564          KM   ROUTE FLOW FROM CAP1B OVERCHUTE TO A POINT ALONG THE MARICOPA/PINAL COUNTY
565          KM   LINE 1000 FEET NORTH OF THE INTERSECTION OF GUADALUPE ROAD AND THE COUNTY
566          KM   LINE. ROUTING WILL BE BY A NATURAL CHANNEL. ORIGINAL SLOPE=.01
567          RS      14    FLOW      -1
568          RC    .045     .04    .045    4900    .010
569          RX       0     500    1000    1006    1026    1032    1511    2011
570          RY       4     3.5       3       0       0       3     3.5       4
             *

571          KK   C65A1
572          KM   COMBINE FLOWS FROM SUBBASIN 65A(EAST OF MERIDIAN RD) AND CAP1A AND CAP1B
573          HC       3
             *

574          KK  65ATB1
575          KM   REACH MN-4, MN-3B AND MN-3A
576          KM   ROUTE FLOW FROM BASIN 65A TO OFF-LINE DETENTION BASIN DIVERSION STRUCTURE
577          KM   USES REVISED ROUTING PARAMETERS, CHANNEL MN-3A SHAPE.
578          RS       1    FLOW      -1
579          RC   0.025   0.015   0.025    3760   .0015
580          RX     0.0     8.0    16.0      34      56      74      82      90
581          RY     8.8     8.9     9.0       0       0     9.0     8.9     8.8
             *

582          KK  DIDB65
583          KM   DETENTION BASIN DIVERSION STRUCTURE
584          KM   DIVERT FLOW FROM CHANNEL TO OFF-LINE BASIN
             * KO     2       2
585          DT   DB65A
586          DI       0     100     434     582     854    1206    1624    2096    3188
587          DQ       0       0       0     148     420     772    1190    1662    2754
             *

588          KK  65B1T2
589          KM   REACH MN-2
590          KM   ROUTE FLOW FROM BASIN DIVERSION STRUCTURE TO BASIN OUTLET
591          RS       1    FLOW      -1       0
592          RC    .025    .015    .025     700   .0019
593          RX     0.0     8.0    16.0      25      35      44      52      60
594          RY     8.7     8.8     4.5       0       0     4.5     8.8     8.7
             *

595          KK  DIB65P
596          KM         RETURN DIVERT TO DETENTION BASIN
597          DR   DB65A
             *

598          KK   DB65A
599          KM   SIPHON DRAW BASIN
600          KM   OFF-LINE DETENTION BASIN LOCATED AT ELLIOT AND MERIDIAN ROAD
601          KM   WITH  36" OUTLET PIPE AND 235' WEIR
             * KO    2       2
602          RS       1    STOR       0
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

603          SA       0    4.67   15.05   27.12   37.88   42.12
604          SE      90      91      93      95      97      98
605          SL    91.5    7.07     .62      .5
```

```
606          SS    97.0     235     2.5     1.5
             *

607          KK   C65A2
608          KM   RECOMBINE FLOWS FROM DETENTION BASIN AND SUNLAND SPRINGS CHANNEL.
609          HC       2
             *

610          KK  65AT-1
611          KM   REACH MN-1
612          KM   ROUTE FROM DETENTION BASIN OUTLET TO ELLIOT ROAD AND MERIDIAN ROAD
613          KM   CONCRETE CHANNEL ON EAST SIDE OF MERIDIAN ROAD ALGN.
614          RS       1    FLOW      -1
615          RC    .025    .015    .025     630   .0014
616          RX       0       8      16      26      38      48      56      64
617          RY     4.7     4.8     4.9       0       0     4.9     4.8     4.7
             *

618          KK  65AT-2
619          KM   REACH ET-10, ET-11, ET-12 plus culverts ETC-4 AND ETC-3.
620          KM   ROUTE FROM ELLIOT AND MERIDIAN, ALONG ELLIOT ROAD IN ELLIOT CHANNEL
621          KM   TO ABOUT 0.6 MILES EAST OF CRISMON ROAD.
622          KM   EARTH CHANNEL PORTION ON NORTH SIDE OF ELLIOT
             * KO     1
623          RS       3    FLOW      -1
624          RC    .025    .025    .025    7680   .0005
625          RX       0       8      22      58      71     107     115     123
626          RY     6.1     6.0     5.9       0       0     5.9     6.0     6.1
             *

627          KK    65AW
628          KM   BASIN 65AW
629          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
630          KM    L=       .9  Lca=       .6   S=   54.7  Kn= .049  LAG=  26.1
631          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
632          BA     .43
633          LG     .24     .25    5.30     .29   32.00
634          UI     56.    176.    295.    391.    603.    594.    432.    316.    210.    101.
635          UI     73.     43.     17.     17.     17.      0.      0.      0.      0.      0.
636          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

637          KK   R65AW
638          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
639          DT   D65AW      31
640          DI       0   10000
641          DQ       0   10000
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

642          KK  65AT65
643          KM   ROUTE C65A TO BASIN 65B VIA A WASH,(THIS WASH IS NORTH OF SIPHON DRAW)
644          KM   THIS IS THE PART OF 65A WHICH IS WEST OF THE MERIDIAN RD ALIGNMENT
             * KO     3
645          RS      11    FLOW      -1
646          RC    .045     .04    .045    9500    .007
647          RX       0     500    1000    1003    1053    1056    1511    2011
648          RY       4     3.5       3       0       0       2     2.5       3
             *

649          KK     65B
650          KM   BASIN 65B
651          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
652          KM    L=      2.0  Lca=      1.2   S=   37.5  Kn= .036  LAG=  36.6
653          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
654          BA    1.37
655          LG     .18     .25    6.00     .24   53.00
656          UI    126.    218.    506.    669.    809.   1014.   1468.   1422.   1102.    901.
657          UI    720.    562.    337.    218.    182.    126.     71.     39.     39.     39.
658          UI     39.      0.      0.      0.      0.      0.      0.      0.      0.      0.
659          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

660          KK    R65B
661          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
662          DT    D65B     120
663          DI       0   10000
664          DQ       0   10000
             *

665          KK   CP65B
             * KO     1
666          KM   COMBINE FLOW FROM SUBBASIN 65AW (WEST OF MERIDIAN RD) WITH FLOW FROM
667          KM   SUBBASIN 65B
668          HC       2
             *

669          KK   DI65B
670          KM        DIVERSION STRUCTURE TO ROUTE PEAK FLOW TO NEW
671          KM        ELLIOT BASIN (EAST)
672          KM        By-pass 30 cfs to Elliot Channel, and Divert Remaining to E Basin
             *       The Existing Model By-pass 51 cfs. SZ, 5-17-99
673          DT  DIRS65
674          DI       0    15.0      30   100.0     200   350.0     500     700     900   1500.
675          DQ       0       0       0    70.0     170   320.0     470     670     870   1470.
```

```
                *
 676            KK   CP65A
 677            KM   COMBINE FLOWS FROM ELLIOT CHANNEL AT NON DIVERTED FLOWS (51CFS) FROM
 678            KM   SUBBASIN 65B
 679            HC       2
                *
1                                        HEC-1 INPUT                                          PAGE 18

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 680            KK  65AT-3
                * KM REACH ET-9 plus culvert ETC-2
                * KM ROUTE FROM ABOUT 0.6 MILES EAST OF CRISMON ROAD
                * KM   TO ABOUT 0.18 MILES EAST OF CRISMON ROAD (CP65)
                * KM CONCRETE CHANNEL PORTION ON SOUTH SIDE OF ELLIOT
                * RD  2340  0.0019   0.013            CIRC      7.5
 681            KM        E. 104th St to E. of EA (Sta. 83+10 to Sta. 90+50)
                *       RD card used for routing
 682            RD     740  0.0064   0.012            CIRC      6.5
                *

 683            KK   DR65B
                * KO     1
 684            KM        RETURN DIVERT TO EAST DETENTION BASIN
 685            DR  DIRS65
                *

 686            KK   RS65A
 687            KM   ELLIOT BASIN, EAST
 688            KM        Bleed-off Pipe Size = 12", SZ, 5-17-99
                *       Since the bleed-off pipe length is short, no routing is provided.
                *       The Existing Pipe Size = 24"
                * KO     1
 689            RS       1    STOR       0
 690            SV       0    5.40    9.30   13.90   18.80   24.00   29.50   35.30   41.40   48.00
 691            SE  1429.0  1433.0  1434.0  1435.0  1436.0  1437.0  1438.0  1439.0  1440.0  1441.0
 692            SL  1430.0  0.7854     .62      .5
 693            SS  1439.0     200     2.5     1.5
                *

 694            KK    CP65
                *       "CP65B" changed to "CP65" -- SZ, 5-14, 1999
 695            KM   COMBINE FLOWS FROM EAST ELLIOT BASIN AND ELLIOT CHANNEL
 696            KM   BEFORE COMBINING WITH FLOWS FROM THE BYPASS CRISMON CHANNEL
                * KO     1
 697            HC       2
                *

 698            KK   65T66
                * KM REACH ET-8
                * KM ROUTING IN ELLIOT CHANNEL FROM ABOUT
                * KM   0.18 MILES EAST OF CRISMON ROAD (CP65) TO CRISMON ROAD (CP66).
                *       Moved from "65AT-3" to here
 699            KM        E. of EA to W. of EA (Sta. 76+06 to Sta. 83+10)
                *       RD card used for routing
                * RD   940  0.0060   0.013            CIRC      9.5
 700            RD     704  0.0064   0.012            CIRC      7.5
                *
1                                        HEC-1 INPUT                                          PAGE 19

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 701            KK  65T66A
 702            KM        W. of EA to E. of Crismon Rd. (Sta. 69+00 to Sta. 76+06)
                *       New additional routing operation
                *       RD card used for routing
 703            RD     706  0.0047   0.012            CIRC      7.5
                *

 704            KK  65T66B
 705            KM        E. of Crismon Rd.to W. of Crismon Rd. (Sta. 61+25 to Sta. 69+00)
                *       New additional routing operation
                *       RD card used for routing
 706            RD     775  0.0048   0.012            CIRC      9.5
                *

 707            KK  ADOT-E
 708            KM   INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY ENTERING 67A
 709            KM   FROM EAST ADOT DETENTION BASIN 4105.
                *     KO       1
 710            BA    0.01
 711            ZR  =QI A=ADOT EAST BASIN B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
                *

 712            KK  AET67A
 713            KM   ROUTE SUPERSTITION FLOW THROUGH 67A TO BASELINE ROAD
 714            IN      15
 715            RS       6    FLOW      -1
 716            RC    .045    .040    .045    5500    .010
 717            RX       0     100     110     120     130     140     150     250
 718            RY       5       4       3       1       1       3       4       5
                *

 719            KK     67A
 720            KM   BASIN 67A
 721            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
722          KM    L=      1.0  Lca=       .7   S=   42.9  Kn= .042  LAG=  25.7
723          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
724          BA     .30
725          LG     .21     .25    4.70     .39   43.00
726          UI     39.    126.    208.    277.    433.    400.    292.    213.    134.     67.
727          UI     47.     25.     12.     12.     12.      0.      0.      0.      0.      0.
728          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

729          KK    R67A
730          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
731          DT    D67A      21
732          DI       0   10000
733          DQ       0   10000
             *
1                                        HEC-1 INPUT                                          PAGE 20

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

734          KK    C67A
735          KM    COMBINE FLOWS FROM ADOT-E AND SUBBASIN 67A
736          HC       2
             *

737          KK   67ATC
738          KM   ROUTE 67A TO 67C VIA WASH CROSSING BASELINE
739          RS       7    FLOW      -1
740          RC    .055    .045    .055    6300   .0071
741          RX       0     500     980    1003    1007    1031    1511    2011
742          RY       4     3.5       3       0       0       3     3.5       4
             *

743          KK    SUP2
744          KM   INFLOW FROM NORTH OF SUPERSTITION FREEWAY, DISCHARGING INTO 67B
             *     KO       1
745          BA    0.01
746          ZR  =QI A=ADOT WEST BASIN B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
             *

747          KK   RSUP2
748          KM   ROUTE SUP2 THROUGH SUBBASIN 67B
             * KO                2
749          IN      15
750          RS       5    FLOW      -1
751          RC    .045    .045    .045    4500   .0056
752          RX       0     500    1000    1003    1007    1011    1511    2011
753          RY       4     3.5       3       0       0       2     2.5       3
             *

754          KK     67B
755          KM   BASIN 67B
756          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
757          KM    L=      1.2  Lca=       .9   S=   28.0  Kn= .034  LAG=  26.4
758          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
759          BA     .53
760          LG     .17     .25    4.90     .38   56.00
761          UI     68.    210.    356.    470.    713.    741.    536.    395.    269.    131.
762          UI     94.     59.     21.     21.     21.      0.      0.      0.      0.      0.
763          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

764          KK    R67B
765          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
766          DT    D67B      41
767          DI       0   10000
768          DQ       0   10000
             *
1                                        HEC-1 INPUT                                          PAGE 21

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

769          KK    C67B
770          KM   COMBINE FLOWS FROM SUP2 AND SUBBASIN 67B
             * KO              2
771          HC       2
             *

772          KK   67BTC
773          KM   REACH CN-4, CN-5 plus culvert CNC-4.
774          KM   ROUTE FLOW IN THE CRISMON CHANNEL FROM BASELINE ROAD (C67B) TO
775          KM      GUADALUPE ROAD (C67C)
776          RS       2    FLOW      -1
777          RC    .025    .015    .025    5180   .0019
778          RX       0       8      16    24.4    36.4    44.8    52.8    60.8
779          RY     4.0     4.1     4.2       0       0     4.2     4.1     4.0
             *

780          KK     67C
781          KM   BASIN 67C
782          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
783          KM    L=      1.2  Lca=       .7   S=   40.2  Kn= .049  LAG=  32.3
784          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
785          BA     .93
786          LG     .25     .25    5.10     .32   31.00
787          UI     96.    213.    432.    557.    702.   1006.   1133.    842.    667.    518.
788          UI    365.    193.    157.     96.     59.     30.     30.     30.     30.      0.
789          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
790          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

791          KK    R67C
792          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
793          DT    D67C      67
794          DI       0   10000
795          DQ       0   10000
             *

796          KK    C67C
797          KM   COMBINE SUBBASINS 67C AND 67A AND 67B
798          HC       3
             *

799          KK  67CT67
800          KM   REACH CN-3 plus culvert CNC-3
801          KM   ROUTE FLOW IN THE CRISMON CHANNEL FROM C67C (@ GUADALUPE ROAD & CRISMON ROAD)
802          KM    TO C67D (AT APPROX. 1/2 MILE SOUTH OF GUADALUPE ROAD).
             *       Sta. 39+00 to Guadalupe Rd.
803          RS       1    FLOW      -1
804          RC    .025    .015    .025    2420   .0018
805          RX       0       6      12      24      64      76      82      88
806          RY       4       3       2       0       0       2       3       4
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

807          KK     67D
808          KM   BASIN 67D
809          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
810          KM    L=       .6  Lca=       .4   S=   34.7  Kn= .050  LAG=  20.5
811          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
812          BA     .13
813          LG     .25     .25    5.20     .30   30.00
814          UI     23.     87.    132.    216.    202.    137.     86.     38.     23.      9.
815          UI      6.      6.      0.      0.      0.      0.      0.      0.      0.      0.
816          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

817          KK    R67D
818          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
819          DT    D67D       9
820          DI       0   10000
821          DQ       0   10000
             *

822          KK    C67D
823          KM    COMBINE HYDROGRAPHS AT CP67D
824          HC       2
             *

825          KK  67DT66
826          KM   REACH CN-2 plus culvert CNC-2
827          KM   ROUTE FLOW IN THE CRISMON CHANNEL FROM APPROX. 1/2 MILE SOUTH
828          KM    OF GUADALUPE ROAD TO THE INFLOW SPILLWAY FOR THE ELLIOT DETENTION BASIN.
             *       Sta. 20+00 to Sta. 39+00
829          RS       1    FLOW      -1
830          RC    .032    .032    .032    1900  0.0035
831          RX       0       6      12      24      64      76      82      88
832          RY       4       3       2       0       0       2       3       4
             *

833          KK     66A
834          KM   BASIN 66A
835          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
836          KM    L=       .7  Lca=       .3   S=   55.9  Kn= .047  LAG=  17.1
837          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
838          BA     .26
839          LG     .24     .25    6.00     .22   35.00
840          UI     78.    256.    417.    576.    363.    205.     84.     39.     16.     16.
841          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
842          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

843          KK    R66A
844          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
845          DT    D66A      21
846          DI       0   10000
847          DQ       0   10000
             * DDM   ***** Preserved *****
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

848          KK   66ATB
849          KM   ROUTE S66A TO 66B VIA WASH CROSSING BASELINE
850          RS       7    FLOW      -1
851          RC    .045     .04    .045    7500   .0077
852          RX       0     500     980    1003    1007    1031    1511    2011
853          RY       4     3.5       3       0       0       3     3.5       4
             *
             * DDM   ***** Updated *****

854          KK     66B
```

```
855          KM   BASIN 66B
856          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
857          KM    L=      1.6  Lca=       1.0   S=   43.3  Kn= .050  LAG=  42.8
858          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
859          BA     .67
860          LG     .25      .25     5.00      .33   30.00
861          UI     53.      56.     185.     248.    297.     352.     426.     590.     636.     496.
862          UI    419.     346.     286.     232.    152.      93.      86.      58.      53.      21.
863          UI     16.      16.      16.      16.     16.       0.       0.       0.       0.       0.
864          UI      0.       0.       0.       0.      0.       0.       0.       0.       0.       0.
             *
             * DDM   ***** Preserved *****

865          KK    R66B
866          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
867          DT    D66B      48
868          DI       0   10000
869          DQ       0   10000
             * DDM   ***** Preserved *****

870          KK   CP66B
871          KM   COMBINE S66A AND S66B
872          HC       2
             *
             * DDM   ***** Preserved *****

873          KK   66BTC
874          KM   ROUTE 66B TO 66C VIA WASH
875          RS       7    FLOW      -1
876          RC    .045      .04     .045    6000    .0150
877          RX       0      500      995    1003     1007    1016    1511    2011
878          RY       4      3.5        3       0        0       3     3.5       4
             *
             * DDM   ***** Updated *****

879          KK     66C
880          KM   BASIN 66C
881          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
882          KM    L=      1.1  Lca=        .7   S=   46.5  Kn= .039  LAG=  24.3
883          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
884          BA     .50
885          LG     .19      .25     5.40      .29   48.00
886          UI     69.     243.     385.     528.    817.     635.     463.     325.     159.     103.
887          UI     63.      21.      21.      21.      0.       0.       0.      0.       0.       0.
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

888          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
             *
             * DDM   ***** Preserved *****

889          KK    R66C
890          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
891          DT    D66C      42
892          DI       0   10000
893          DQ       0   10000
             *
             * DDM   ***** Preserved *****

894          KK  CP66C1
895          KM   Split up hydrograph combination in order to separate flows.
896          KM   Combine Hydrographs 66BTC (from Sub. 66A)and R66C (from Sub. 66C)
             * KO     2       2
897          HC       2
             *

898          KK  CP66C2
899          KM   Combine Hydrograph CP66C1 (from Subbasins 66A, 66B and 66C)
900          KM     plus hydrograph 67DT66 ( C67D )
             * KO     1
901          HC       2
             *

902          KK   DI67E
903          KM   DIVERT LOW FLOW FOR 404 PERMITTING TO SUBBASIN 67e WASH
904          DT    404A
905          DI       0      24      76   10000
906          DQ       0      24      76      76
             *

907          KK    DI66
908          KM    DIVERT FLOW TO DETENTION BASIN WA
909          KM    By-pass Flow Reduced to 410 cfs from 458, SZ, 5-17-99
             * KO     1       2
910          DT    DB66
911          DI       0     150     363   411.0   456.0     513     577     643     712    1000
912          DQ       0       0       0    32.0     71.     122     179     239     302     590
             *

913          KK  66C1T2
914          KM    ROUTE FLOW FROM DIVERSION STRUCTURE TO ELLIOT CHANNEL at ELLIOT ROAD.
915          KM    REACH CN-1 plus culvert CNC-1
916          KM        A single pipe size and an overall slope are used to represent this
917          KM        1,070 ft long reach which has pipe sizes of 78", 84" and 90", and
918          KM        about 250' long sideweir and transition open channel.
919          KM        RD card used for routing (Sta. 9+30 to Sta. 20+00)
920          RD    1070  0.0130   0.012            CIRC       7
             *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 921          KK   CP66C
 922          KM   COMBINE FLOWS FROM ELLIOT CHANNEL AND CRISMON BYPASS CHANNEL
              * KO     1
 923          HC       2
              *

 924          KK   66CTD
              * KM REACH ET-7
 925          KM   ROUTE FLOWS FROM INTERSECTION OF CRISMON AND ELLIOT CHANNELS
 926          KM      AT THE INTERSECTION OF ELLIOT ROAD and CRISMON ROAD TO THE ELLIOT BASIN
 927          KM      WA Bleed-off Outlet, WHICH IS ABOUT 390 ft WEST OF CRISMON ROAD.
              *       RD card used for routing (Sta. 57+35 to Sta. 61+25)
 928          RD     390  0.0052   0.012            CIRC     9.5
              *

 929          KK    DR66
              * KO     1
 930          KM         RETURN DIVERT TO DETENTION BASIN FROM DIVERSION STRUCTURE
 931          DR    DB66
              *

 932          KK  RS66D1
              * KO     1
 933          KM   ELLIOT BASIN, WEST A
 934          KM   TWO PONDS OPERATING IN SERIES.
 935          KM        Bottom Elevation Lowered to 1415.0 ft from 1420, and 18" Bleed-off
 936          KM        Pipe Added from WA to Elliot Channel
              *       Since the bleed-off pipe length is short, no routing is provided.
              *       Existing SS = 1423   20   2.5   1.5, SZ, 5-18-99
 937          RS       1    STOR       0
 938          SV       0    1.60   10.00   25.50   34.70   44.20   54.10   64.40   75.10   86.00
 939          SE  1415.0    1417    1419    1421    1422    1423    1424    1425    1426    1427
 940          SL  1416.0  1.7672     .62      .5
 941          SS  1423.5      20     3.0     1.5
              *

 942          KK    B-WA
 943          KM        Bleed-off Flow from WA to Elliot Channel = 18" Pipe, SZ, 6-15-99
 944          KM        Divert Flow to WB by Weir Spillover (SS card on RS66D1)
              *       RS66D1 is the total routed flow = SL + SS
              *       This operation is designed to separate weir flow from pipe flow
 945          DT    D-WB
 946          DI       0       5      10      15   17.59   40.87   80.62  131.76  192.12  260.43
 947          DQ       0       0       0       0       0    21.2    60.0   110.2   169.7   237.2
              *

 948          KK    C-WA
 949          KM        Combine Bleed-off Flow from WA with Flow in Elliot Channel
              *       Added by SZ, 5-17-99
 950          HC       2
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 951          KK   RC-WA
 952          KM        Route Flow from WA Outlet to WB Outlet in Elliot Channel
              *       Added by SZ, 5-17-99
              * RS     1    FLOW      -1
              * RC  .025    .015    .025     800    .0017
              * RX     0       8      16      28      44      56      64      72
              * RY   5.7     5.8     6.0       0       0     6.0     5.8     5.7
 953          KM      WA Bleed-off Outlet to WB Bleed-off Outlet.
              *       RD card used for routing (Sta. 48+80 to Sta. 57+35)
 954          RD     855  0.0052   0.012            CIRC     9.5
              *

 955          KK   DR-WA
 956          KM        Return Diverted Flow (Spillway) to WB from WA, SZ 5-7-99
              * KO     1
 957          DR    D-WB
              *

 958          KK  RS66D2
              * KO     1
 959          KM   ELLIOT BASIN, WEST B
 960          KM   TWO PONDS OPERATING IN SERIES.
 961          KM        Bottom Elevation Lowered to 1413.5 ft from 1414, and 36" Bleed-off
 962          KM        Pipe Reduced to 18" from WB to Elliot Channel
              *       Since the bleed-off pipe length is short, no routing is provided.
              *       Existing SS = 1420.5   80   2.5   1.5, SZ, 5-18-99
 963          RS       1    STOR       0
 964          SV       0    4.40    8.80   14.50   21.00   28.00   35.30   42.90   50.90   59.20
 965          SE  1412.0    1415    1416    1417    1418    1419    1420    1421    1422    1423
 966          SL  1413.0  1.7672     .62      .5
 967          SS  1422.6      50     2.5     1.5
              *

 968          KK   CP66D
 969          KM       COMBINE FLOWS FROM WEST ELLIOT BASIN AND ELLIOT CHANNEL
 970          KM       AT THE OUTLET PIPE.
              * KO     1
 971          HC       2
```

```
                *
 972            KK  66T66D
                * KM REACH ET-6
 973            KM        ROUTE FROM DETENTION BASIN WB OUTLET TO ELLSWORTH RD
 974            KM        2350 -> 3200,  SZ, 5-17-99
                *       First portion
                *       RD card used for routing (Sta. 36+44 to 48+80)
 975            RD    1236  0.0052   0.012            CIRC     9.5
                *
1                                   HEC-1 INPUT                                                    PAGE 27

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 976            KK  66-66D
                * KM REACH ET-6
 977            KM        ROUTE FROM DETENTION BASIN WB OUTLET TO ELLSWORTH RD
 978            KM        2350 -> 3200,  SZ, 5-17-99
                *       Second portion
                *       RD card used for routing (Sta. 12+46 to Sta. 36+44)
 979            RD    2398  0.0040   0.012            CIRC     9.5
                *

 980            KK     66D
 981            KM   BASIN 66D
 982            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 983            KM    L=       1.0  Lca=        .7   S=   28.6  Kn= .020  LAG=  13.2
 984            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 985            BA     .31
 986            LG     .10      .17    6.80     .19   80.00
 987            UI    162.    480.    845.    540.    232.     89.     24.      0.      0.      0.
 988            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
                * DDM   ***** Preserved *****

 989            KK    R66D
 990            KM   RETENTION REDUCED BY 77% FROM 31 TO 7 AC-FT
 991            KM   DUE TO DEVELOPMENT USING DETENTION BASIN
                *   The developer does not participate in the basin so the retention volume
                *   increased to 31 A-F
 992            DT    D66D      31
 993            DI       0   10000
 994            DQ       0   10000
                * DDM   ***** Updated *****
                *

 995            KK    C66D
 996            KM   COMBINE FLOWS FROM SUBBASIN 66D AND FLOWS IN ELLIOT DRAIN
 997            HC       2
                *
                * KK66T70A
 998            KM    THIS ROUTING WAS TAKEN OUT BY DAVE DEGERNESS ON 2/11/00 TO AVOID ROUTING
 999            KM    ERROR PROBLEMS
1000            KM        Pipe Routing, Reach ET-5
                *       SE corner curve of Elliot Rd. & Ellsworth Rd.
                *       RD card used for routing (Junction Structure to Sta. 12+46)
                * RD   253  0.0015   0.012            CIRC     9.5
                *

1001            KK  66T70B
1002            KM        Pipe Routing, Reach ET-5
                *       Elliot Rd. to Culvert along Ellsworth Rd. 2-102" pipe = 144" pipe
                *       RD card used for routing (Sta. 85+65 to Sta. 97+51)
1003            RD    1186  0.0015   0.012            CIRC      12
                *
1                                   HEC-1 INPUT                                                    PAGE 28

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1004            KK   CULVT
1005            KM        Pipe Routing, Culvert
                *       2-102" pipe culvert crossing Ellsworth Rd.
                *       RD card used for routing
1006            RD     196  0.0008   0.012            CIRC      12
                *

1007            KK  66T70C
1008            KM   REACH ET-4, ET-5( COMPRISED OF ET-5A AND ET-5B).
1009            KM   ROUTE FROM ELLSWORTH Culvert TO SANTAN FREEWAY.
1010            RS       2    FLOW      -1
1011            RC    .032    .032    .032    2490   .0008
1012            RX       0      10      20      56      76     112     120     130
1013            RY     6.2     6.1     6.0       0       0     6.0     6.1     6.2
                *

1014            KK     62A
1015            KM   BASIN 62A
1016            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1017            KM    L=       .8  Lca=        .5   S=   30.0  Kn= .020  LAG=  10.2
1018            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1019            BA     .38
1020            LG     .10      .25    4.50     .52   80.00
1021            UI    335.   1057.   1010.    367.     93.     38.      0.      0.      0.      0.
1022            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
                * DDM   ***** Preserved *****
```

```
1023          KK    R62A
1024          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1025          DT    D62A      33
1026          DI       0   10000
1027          DQ       0   10000
              *

1028          KK   62ATC
1029          KM   ROUTE BASIN 62C TO BASIN 62E BY CHANNEL ALONG SANTAN FREEWAY
1030          RS       3    FLOW      -1
1031          RC    .040    .016    .040    5280   .0033
1032          RX      69      74      86     100     112     126     138     143
1033          RY       9     7.2       7       0      .5       7     7.2       9
              *
              * DDM   ***** Preserved *****
              *

1034          KK     62C
1035          KM   BASIN 62C
1036          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1037          KM    L=        .6  Lca=        .3   S=   24.2  Kn= .049  LAG=  19.8
1038          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1039          BA   0.546
1040          LG     .23     .25    4.65     .40   47.00
1041          UI    112.    406.    615.   1024.    853.    571.    330.    154.     83.     28.
1042          UI     28.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                                PAGE 29

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1043          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1044          KK    R62C
1045          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1046          DT    D62C      31
1047          DI       0   10000
1048          DQ       0   10000
              *

1049          KK    C62C
1050          KM   COMBINE FLOWS FROM SUBBASIN 62A AND SUBBASIN 62C
1051          HC       2
              *
              * DDM   ***** Preserved *****

1052          KK   62CTE
1053          KM   ROUTE BASIN 62C TO BASIN 62E BY CHANNEL ON EAST SIDE OF PROPOSED SANTAN
1054          KM   FREEWAY ALIGNMENT
1055          RS       1    FLOW      -1
1056          RC    .040    .016    .040    2000   .0040
1057          RX      67      72      84     100     112     128     140     145
1058          RY      10     8.2       8       0      .5       8     8.2      10
              *
              * DDM   ***** Updated *****

1059          KK     62E
1060          KM   BASIN 62E
1061          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1062          KM    L=        .6  Lca=        .3   S=   31.9  Kn= .050  LAG=  20.4
1063          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1064          BA     .15
1065          LG     .25     .25    4.65     .39   45.00
1066          UI     29.    108.    163.    268.    246.    167.    104.     46.     28.     10.
1067          UI      8.      8.      0.      0.      0.      0.      0.      0.      0.      0.
1068          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1069          KK    R62E
1070          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1071          DT    D62E      12
1072          DI       0   10000
1073          DQ       0   10000
              *
              * DDM   ***** Preserved *****

1074          KK   CP62E
1075          KM   COMBINE FLOWS FROM SUBBASIN 62C AND SUBBASIN 62E
1076          HC       2
              *
1                                          HEC-1 INPUT                                                PAGE 30

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1077          KK     61A
1078          KM   BASIN 61A
1079          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1080          KM    L=        .9  Lca=        .4   S=   36.8  Kn= .037  LAG=  19.1
1081          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1082          BA    .519
1083          LG     .19     .25    4.20     .56   52.00
1084          UI    117.    412.    628.   1037.    786.    517.    261.    132.     62.     28.
1085          UI     28.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1086          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****
```

```
1087          KK    R61A
1088          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1089          DT    D61A      42
1090          DI       0   10000
1091          DQ       0   10000
              * DDM   ***** Preserved *****

1092          KK   61ATB
1093          KM   ROUTING 61A TO 61B VIA ELLSWORTH ROAD
1094          RS       6    FLOW      -1
1095          RC    .035    .024    .035    5280    .005
1096          RX       0     500     750     752     802     852    1102    1602
1097          RY       3       2     1.5     1.2     1.2     1.5       2       3
              * DDM   ***** Updated *****

1098          KK     61B
1099          KM   BASIN 61B
1100          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1101          KM    L=      1.4  Lca=       .7   S=   39.7  Kn= .047  LAG=  33.6
1102          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1103          BA    1.09
1104          LG     .24     .25    4.80     .37   35.00
1105          UI    109.    223.    475.    615.    765.   1049.   1335.   1025.    822.    643.
1106          UI    495.    288.    187.    143.    109.     36.     34.     34.     34.     34.
1107          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1108          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1109          KK    R61B
1110          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1111          DT    D61B      81
1112          DI       0   10000
1113          DQ       0   10000
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1114          KK   CP61B
1115          KM   COMBINE FLOWS FROM S61A AND S61B
1116          HC       2
              * DDM   ***** Preserved *****

1117          KK  61T62E
1118          KM   ROUTE CP61B TO SUBBASIN 62E VIA NATURAL WASH
1119          RS       4    FLOW      -1
1120          RC    .045    .040    .045    3500   .0057
1121          RX       0     500     980    1006    1012    1035    1515    2015
1122          RY       5     4.5       4       0       0       4     4.5       5
              *

1123          KK  CP62E2
1124          KM   COMBINE FLOWS FROM 61A AND 61B AND 62A, B, AND C
1125          HC       2
              * DDM   ***** Preserved *****

1126          KK  62T68A
1127          KM   ROUTE FLOW FROM CP62E TO SUBBASIN 68A BY CHANNEL ALONG PROPOSED ALIGNMENT
1128          KM   OF THE SANTAN FREEWAY
              * ZW   A=62T68A   B=NORTH OF ELLIOT  C=FLOW    F=100YR FUTURE
1129          RS       2    FLOW      -1
1130          RC    .040    .016    .040    3280  .00015
1131          RX      67      72      84     100     112     128     140     145
1132          RY      10     8.2       8       0      .5       8     8.2      10
              *
              * DDM   ***** Updated *****

1133          KK     68A
1134          KM   BASIN 68A
1135          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1136          KM    L=       .7  Lca=       .4   S=   37.7  Kn= .032  LAG=  13.7
1137          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1138          BA     .35
1139          LG     .16     .25    5.70     .27   66.00
1140          UI    168.    506.    914.    635.    301.    114.     34.     26.      0.      0.
1141          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1142          KK    R68A
1143          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1144          DT    D68A      31
1145          DI       0   10000
1146          DQ       0   10000
              *

1147          KK   C68A1
1148          KM   COMBINE FLOWS FROM 68A AND 62E
1149          HC       2
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1150          KK    RD66
1151          KM   RETURN DIVERT FROM SUBBASIN 66 INTO WASH
```

```
1152        DR    404A
            *

1153        KK  RT404A
1154        KM   ROUTE FLOW FROM DIVERSION IN NATURAL WASH
1155        RS       6    FLOW      -1
1156        RC    .045     .04    .045    5300    .007
1157        RX       0     500    1000    1003    1053    1056    1511    2011
1158        RY       4     3.5       3       0       0       2     2.5       3
            *

1159        KK     67E
1160        KM   BASIN 67E
1161        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1162        KM    L=       1.2  Lca=        .7   S=    32.3  Kn= .038  LAG=  26.9
1163        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1164        BA     .58
1165        LG     .19     .25    5.40     .30   50.00
1166        UI     73.    219.    378.    496.    732.    830.    597.    443.    315.    157.
1167        UI    110.     73.     24.     22.     22.     22.      0.      0.      0.      0.
1168        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *

1169        KK    R67E
1170        KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1171        KM   DUE TO DEVELOPMENT USING DETENTION BASIN
1172        DT   D67E       50
1173        DI       0   10000
1174        DQ       0   10000
            *

1175        KK    C67E
1176        KM   COMBINE FLOWS FROM 67E AND 404 DIVERSION
1177        HC       2
            *

1178        KK   67T68
1179        KM   ROUTE 67E AND 404 DIVERSION TO 68A VIA NATURAL WASH
1180        RS       3    FLOW      -1
1181        RC    0.45    0.04    .045    2500   .0068
1182        RX       0     500     950    1003    1007    1057    1511    2011
1183        RY       4     3.5       3       0       0       2     2.5       3
            *

1184        KK   C68A2
1185        KM   COMBINE FLOWS FROM 67E, 404 DIVERSION, AND ROUTED 62E
1186        HC       2
            *
            *
            * DDM   ***** Preserved *****
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1187        KK  68T70A
1188        KM   ROUTE FLOW FROM CP68A AT ELLIOT AND SANTAN FREEWAY ALIGNMENT TO SUBBASIN
1189        KM   70A, AT THE POINT WHERE SIPHON DRAW INTERSECTS THE FREEWAY ALIGNMENT
1190        KM   CHANNEL IS NATURAL AND ONLY APPROXIMATE IN ROUTING PARAMETERS
1191        RS       2    FLOW      -1
1192        RC    .030    .030    .030    3960   .0006
1193        RX       0       5      10      20      30      40      45      50
1194        RY      10       5       4       0       0       4       5      10
            *
            * DDM   ***** Inserted *****

1195        KK     70A
1196        KM   BASIN 70A
1197        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1198        KM    L=        .9  Lca=        .4   S=    23.5  Kn= .025  LAG=  12.7
1199        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1200        BA     .54
1201        LG     .13     .15    7.60     .13   67.00
1202        UI    306.    899.   1524.    903.    346.    120.     44.      0.      0.      0.
1203        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

1204        KK    R70A
1205        KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1206        DT    D70A      52
1207        DI       0   10000
1208        DQ       0   10000
            *
            * DDM   ***** Preserved *****

1209        KK    C70A
1210        KM   COMBINE FLOWS FROM C68A AND SUBBASIN 70A
1211        HC       2
            *
            * DDM   ***** Preserved *****

1212        KK   C70A2
1213        KM   COMBINE FLOWS FROM CONCENTRATION POINT C70A WITH THOSE COMING FROM DETENTION
1214        KM   BASIN 66, LOCATED ON ELLIOT ROAD, ALONG SAN TAN @ 2/3 MILE SO. OF ELLIOT RD.
1215        HC       2
            *

1216        KK  70T76A
```

```
1217          KM   DIBBLE DRAINAGE FACILITY
1218          KM   ROUTE FLOW ALONG NEW SANTAN FREEWAY ALIGNMENT
1219          KM   REACH ET-3A, ET-3B
1220          RS       2    FLOW      -1
1221          RC    .025    .025    .025    4500  0.0005
1222          RX       0       8      16      59      91     134     142     150
1223          RY     7.4     7.3     7.2       0       0     7.2     7.1     7.0
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1224          KK     76A
1225          KM   BASIN 76A
1226          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1227          KM    L=      2.9  Lca=      1.7   S=   24.1  Kn= .030  LAG=  42.9
1228          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1229          BA    1.91
1230          LG     .15     .15    8.80     .08   56.00
1231          UI    150.    159.    528.    707.    847.   1004.   1213.   1673.   1826.   1424.
1232          UI   1201.    992.    822.    667.    444.    266.    247.    171.    150.     65.
1233          UI     46.     46.     46.     46.     46.      0.      0.      0.      0.      0.
1234          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM    ***** Preserved *****

1235          KK    R76A
1236          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1237          DT    D76A     185
1238          DI       0   10000
1239          DQ       0   10000
              *

1240          KK    C76A
1241          KM    COMBINE HYDROGRAPHS 70T76A (SANTAN FREEWAY CHANNEL FLOWS) WITH SUBBASIN 76A
1242          HC       2
              *
              * KK*DBSAN
              * KM DIVERT FROM SANTAN CHANNEL INTO THE RAY DETENTION BASIN
              * KM ADDED BY CPE IN JUNE 2000.
              * KM USES A REALISTIC SIDE-WEIR EQUATION TO FORM POWER CURVE
              * KM WEIR CREST = 4.5 FT; WEIR LENGTH = 200FT; 4.0 FT DIV STRUCTURE.
              * KO      3
              * DT SANDB    1537
              * DI      0     750     772     819     892     999    1356    8138
              * DQ      0       0       7      31      78     154     439    6509
              *

1243          KK  76ATPR
1244          KM   DIBBLE DRAINAGE FACILITY
1245          KM   ROUTE FLOW ALONG NEW SANTAN FREEWAY ALIGNMENT TO NEW POWERLINE FLOODWAY ALGN.
1246          KM   REACH ET-2A, ET-2B
1247          RS       2    FLOW      -1
1248          RC    .025    .025    .025    5750  0.0005
1249          RX       0       8      16      61      93     138     146     154
1250          RY    10.7     7.6     7.5       0       0     7.5     7.4    10.3
              *

1251          KK  EMFSTN
1252          KM   COMBINE FLOWS IN EMF AT SANTAN FREEWAY
1253          HC       2
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1254          KK  KNXTRY
1255          KM   ROUTE EMF KNOX ROAD TO RAY ROAD
1256          RS       1    FLOW      -1
1257          RC     .03    .022     .03    3000   .0003
1258          RX       0     500     520     553     693     726     740     742
1259          RY      14      12      11       0       0      11      11      12
              *

1260          KK     73A
1261          KM   BASIN 73A
1262          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1263          KM    L=      2.3  Lca=      1.0   S=   34.9  Kn= .093  LAG=  94.5
1264          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1265          BA     .95
1266          LG     .35     .36    5.00     .27     .00
1267          UI     34.     34.     34.     34.     84.    117.    134.    158.    171.    185.
1268          UI    197.    214.    232.    254.    274.    317.    381.    429.    424.    369.
1269          UI    332.    303.    282.    263.    240.    220.    202.    185.    169.    157.
1270          UI    134.    107.     90.     60.     60.     57.     55.     54.     34.     34.
1271          UI     34.     34.     16.     10.     10.     10.     10.     10.     10.     10.
1272          UI     10.     10.     10.     10.     10.     10.      0.      0.      0.      0.
1273          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1274          KK   73ATB
1275          KM   ROUTE 73A TO 73B VIA WASH RUNNING DIAGONALLY ACROSS 73B
1276          RS       3    FLOW      -1
1277          RC     .06     .05     .06    2700   .0074
1278          RX       0     500    1000    1003    1007    1011    1511    2011
1279          RY       4     3.5       3       0       0       2     2.5       3
              *
```

```
1280          KK     73B
1281          KM   BASIN 73B
1282          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1283          KM    L=        .6  Lca=        .4   S=    26.3  Kn= .050  LAG=  21.6
1284          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1285          BA     .42
1286          LG     .27     .25    5.30     .27   21.00
1287          UI     67.    268.    402.    621.    719.    486.    332.    162.     94.     50.
1288          UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
1289          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1290          KK    R73B
1291          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1292          DT    D73B      29
1293          DI       0   10000
1294          DQ       0   10000
              *
              * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                                PAGE 36

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1295          KK   CP73B
1296          KM   COMBINE S73A AND S73B
1297          HC       2
              *

1298          KK   73BTC
1299          KM   ROUTE 73B TO 73C VIA WASH CROSSING MOUNTAIN ROAD
1300          KM    THEN ROUTED SOUTH ALONG GENERAL MOTORS BERM TO SW CORNER OF 73C
1301          RS       6    FLOW      -1
1302          RC    .035    .022    .035    5000   .0036
1303          RX       0     500     700     710     720     730     930    1430
1304          RY       8     7.5       5       0       0       5     7.5       8
              *

1305          KK     73C
1306          KM   BASIN 73C
1307          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1308          KM    L=        .6  Lca=        .3   S=    43.7  Kn= .020  LAG=   7.0
1309          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1310          BA     .58
1311          LG     .10     .25    5.30     .34   80.00
1312          UI   1073.   2551.    742.    111.      0.      0.      0.      0.      0.      0.
1313          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1314          KK    R73C
1315          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1316          DT    D73C      58
1317          DI       0   10000
1318          DQ       0   10000
              *
              * DDM   ***** Preserved *****

1319          KK   CP73C
1320          KM   COMBINE 73C AND 73B
1321          HC       2
              *
              * DDM   ***** Preserved *****

1322          KK  73T74C
1223          KM   ROUTE 73C TO 74C VIA GM BERM, WEST EDGE OF 74C
1324          RS       4    FLOW      -1
1325          RC    .035    .022    .035    3500   .0034
1326          RX       0     500    1000    1001    1016    1516    2016    2516
1327          RY       6     5.5       5       2       2     3.5     4.5     5.5
              *
              * DDM   ***** Updated *****

1328          KK     74A
1329          KM   BASIN 74A
1330          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1331          KM    L=       2.4  Lca=       1.0   S=    42.2  Kn= .095  LAG=  92.9
1332          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * KO     2       2
1                                        HEC-1 INPUT                                                PAGE 37

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1333          BA     .75
1334          LG     .35     .36    5.00     .27     .00
1335          UI     27.     27.     27.     27.     73.     96.    111.    129.    140.    151.
1336          UI    163.    175.    193.    208.    228.    268.    317.    362.    327.    287.
1337          UI    260.    239.    222.    206.    187.    171.    160.    142.    132.    118.
1338          UI     99.     79.     56.     48.     47.     45.     45.     32.     27.     27.
1339          UI     27.     19.      8.      8.      8.      8.      8.      8.      8.      8.
1340          UI      8.      8.      8.      8.      8.      0.      0.      0.      0.      0.
1341          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1342          KK   DB74A
1343          KM   NEW BASIN REGRADED ON 18 DEC 97, by Dibble & Associates
1344          KM   revised to be on-line detention basin
1345          KM   DETENTION BASIN LOCATED EAST OF MERIDIAN ROAD & north of Powerline Floodway
```

```
1346        KM   WITH 24-INCH OUTFALL & 350-FT WEIR.
            * KO      2       2
1347        RS        1    STOR       0
1348        SA        0    1.43    5.38   11.14   18.97
1349        SE     76.0      78      80      82      84
1350        SL     77.0    3.14     .62      .5
1351        SS    82.20     350     2.5     1.5
            *

1352        KK   74ATB
1353        KM   ROUTE 74A TO 74B VIA WASH CROSSING COUNTY LINE
1354        RS        4    FLOW      -1
1355        RC     .045     .04    .045    3500   .0054
1356        RX        0     500    1000    1003    1007    1011    1511    2011
1357        RY        4     3.5       3       0       0       2     2.5       3
            *

1358        KK     74B
1359        KM   BASIN 74B
1360        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1361        KM    L=        .6  Lca=        .5   S=   32.1  Kn= .050  LAG=  23.3
1362        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1363        BA     .33
1364        LG     .30     .25    6.00     .18    5.00
1365        UI     48.    177.    273.    388.    563.    406.    289.    188.     87.     58.
1366        UI     28.     15.     15.      0.      0.      0.      0.      0.      0.      0.
1367        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

1368        KK    R74B
1369        KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1370        DT    D74B      22
1371        DI       0   10000
1372        DQ       0   10000
            *
            * DDM   ***** Preserved *****
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1373        KK   CP74B
1374        KM   COMBINE S74A AND S74B
1375        HC       2
            *
            * DDM   ***** Preserved *****

1376        KK   74BTC
1377        KM   ROUTE 74B TO 74C VIA WASH CROSSING MOUNTAIN ROAD
1378        RS        4    FLOW      -1
1379        RC     .045     .04    .045    3500   .0051
1380        RX        0     500     980    1003    1007    1031    1511    2011
1381        RY        4     3.5       3       0       0       3     3.5       4
            *
            * DDM   ***** Updated *****

1382        KK     74C
1383        KM   BASIN 74C
1384        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1385        KM    L=        .7  Lca=        .5   S=   25.4  Kn= .020  LAG=  10.3
1386        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1387        BA     .34
1388        LG     .10     .15    7.00     .17   80.00
1389        UI    303.    950.    940.    348.     92.     35.      0.      0.      0.      0.
1390        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

1391        KK    R74C
1392        KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1393        DT    D74C      35
1394        DI       0   10000
1395        DQ       0   10000
            *
            * DDM   ***** Preserved *****

1396        KK   CP74C
1397        KM   COMBINE 74C AND 74B AND 73C
1398        HC       3
            *
            * DDM   ***** Preserved *****

1399        KK  74CT75
1400        KM    ROUTE CP74C TO S75 VIA POWERLINE FLOODWAY TO ELLSWORTH RD & RAY ROAD.
1401        KM    Vel of 10 ft/sec for NSTP calc.
1402        RS        3    FLOW      -1
1403        RC      .03    .013     .03   10560   .0049
1404        RX        0    1005    1023  1030.5  1036.5    1014    1062    2067
1405        RY        6       5       5       0       0       5       5       6
            *
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1406        KK      75
1407        KM   BASIN 75 , WHICH IS THE GENERAL MOTORS DESERT PROVING GROUNDS
1408        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
1409        KM    L=      4.0  Lca=      3.0   S=    20.0  Kn= .087  LAG= 182.0
1410        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1411        BA    4.01
1412        LG     .20     .35    6.80     .13   35.00
1413        UI     74.     74.     74.     74.     74.     74.     74.     74.    180.    243.
1414        UI    247.    284.    284.    335.    342.    363.    375.    396.    412.    422.
1415        UI    437.    458.    475.    495.    519.    550.    567.    585.    622.    672.
1416        UI    737.    819.    865.    935.   1002.    935.    870.    813.    764.    726.
1417        UI    693.    664.    637.    614.    593.    574.    547.    519.    496.    473.
1418        UI    452.    437.    425.    387.    377.    363.    347.    341.    289.    284.
1419        UI    233.    213.    213.    147.    131.    131.    131.    130.    122.    122.
1420        UI    122.    122.    122.     75.     74.     74.     74.     74.     74.     74.
1421        UI     74.     43.     23.     23.     23.     23.     23.     23.     23.     23.
1422        UI     23.     23.     23.     23.     23.     23.     23.     23.     23.     23.
1423        UI     23.     23.     23.     23.     23.     23.     23.     23.      0.      0.
1424        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *

1425        KK     D75
1426        KM    RETAIN THE 100-YR 2-HR VOLUME. 80% OF VOLUME IS USED.
1427        DT    RET75     308
1428        DI        0   10000
1429        DQ        0   10000
            *

1430        KK     C75
1431        KM    COMBINE FLOWS FROM C74C AND SUBBASIN 75
1432        HC        2
            *
            * DDM    ***** Preserved *****

1433        KK    75TPC
1434        KM    ROUTE 75 THROUGH POWERLINE FLOODWAY TO AIR FORCE CHANNEL
1435        RS        2    FLOW      -1
1436        RC      .03    .013     .03    3900   .0041
1437        RX        0    1005    1023  1030.5  1036.5    1044    1062    2067
1438        RY        6       5       5       0       0       5       5       6
            *
            * DDM    ***** Updated *****

1439        KK     77A
1440        KM    BASIN 77A
1441        KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1442        KM     L=      2.9  Lca=      1.5   S=    31.1  Kn= .092  LAG= 119.0
1443        KM     PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1444        BA    1.74
1445        LG     .35     .36    5.00     .27     .00
1446        UI     49.     49.     49.     49.     49.    108.    162.    185.    205.    230.
1447        UI    244.    264.    278.    293.    311.    333.    358.    380.    406.    462.
1448        UI    537.    584.    659.    601.    541.    496.    461.    430.    407.    385.
1449        UI    362.    334.    311.    293.    273.    252.    238.    226.    189.    161.
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1450        UI    141.    104.     87.     87.     83.     81.     81.     73.     49.     49.
1451        UI     49.     49.     49.     22.     15.     15.     15.     15.     15.     15.
1452        UI     15.     15.     15.     15.     15.     15.     15.     15.     15.     15.
1453        UI     15.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1454        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *

1455        KK    77ATB
1456        KM    ROUTE 77A TO 77B VIA WASH CROSSING COUNTY LINE
1457        RS        3    FLOW      -1
1458        RC     .045     .04    .045    3000    .006
1459        RX        0     500     980    1003    1007    1031    1511    2011
1460        RY        4     3.5       3       0       0       3     3.5       4
            *
            * DDM    ***** Updated *****

1461        KK     77B
1462        KM    BASIN 77B
1463        KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1464        KM     L=       .6  Lca=       .3   S=    26.3  Kn= .050  LAG=  19.3
1465        KM.    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1466        BA     .36
1467        LG     .30     .25    5.30     .24    5.00
1468        UI     78.    277.    421.    700.    544.    360.    189.     93.     46.     19.
1469        UI     19.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1470        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM    ***** Preserved *****

1471        KK     R77B
1472        KM    RETAIN 100 YR 2 HR RUNOFF VOLUME
1473        DT     D77B      16
1474        DI        0   10000
1475        DQ        0   10000
            *
            * DDM    ***** Preserved *****

1476        KK    CP77B
1477        KM    COMBINE S77A AND S77B
1478        HC        2
            *
            * DDM    ***** Preserved *****

1479        KK    77BTC
```

```
1480          KM   ROUTE 77B TO 77C VIA WASH CROSSING MOUNTAIN ROAD, THEN SOUTH ALONG
1481          KM    WESTERN EDGE OF 77C
1482          RS       5    FLOW      -1
1483          RC    .045     .04    .045    4750   .0042
1484          RX       0     500     950    1003    1007    1061    1511    2011
1485          RY       4     3.5       3       0       0       3     3.5       4
              *
              * DDM   ***** Updated *****
1                                   HEC-1 INPUT                                                    PAGE 41

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1486          KK     77C
1487          KM   BASIN 77C
1488          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1489          KM    L=        .5  Lca=        .3   S=   32.3  Kn= .020  LAG=   7.2
1490          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1491          BA     .28
1492          LG     .10     .25    5.80     .27   79.00
1493          UI    492.   1219.    393.     60.      0.      0.      0.      0.      0.      0.
1494          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

1495          KK    R77C
1496          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1497          DT    D77C      28
1498          DI       0   10000
1499          DQ       0   10000
              *
              * DDM   ***** Preserved *****

1500          KK    C77C
1501          KM   COMBINE FLOWS FROM C77B AND SUBBASIN 77C
1502          HC       2
              *
              * DDM   ***** Preserved *****

1503          KK  77CT78
1504          RS       3    FLOW      -1
1505          RC   0.035   0.022   0.035    2400   0.002
1506          RX       0     100     110     115     120     125     130     135
1507          RY       4       3     2.5       0       0     2.5       8       9
              *
              * DDM   ***** Updated *****

1508          KK     78A
1509          KM   BASIN 78A
1510          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1511          KM    L=       3.3  Lca=       1.3   S=   30.2  Kn= .090  LAG= 118.0
1512          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1513          BA    1.88
1514          LG     .35     .36    5.00     .27     .00
1515          UI     54.     54.     54.     54.     54.    124.    176.    203.    227.    252.
1516          UI    268.    290.    305.    322.    342.    366.    396.    417.    451.    515.
1517          UI    612.    641.    716.    643.    579.    531.    494.    464.    437.    417.
1518          UI    385.    356.    334.    315.    290.    270.    255.    233.    206.    159.
1519          UI    153.     95.     95.     95.     88.     88.     88.     65.     54.     54.
1520          UI     54.     54.     45.     16.     16.     16.     16.     16.     16.     16.
1521          UI     16.     16.     16.     16.     16.     16.     16.     16.     16.     16.
1522          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1523          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
1                                   HEC-1 INPUT                                                    PAGE 42

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1524          KK   78ATB
1525          KM   ROUTE FLOW FROM 78A TO 78B VIA WASH CROSSING COUNTY LINE
1526          RS       4    FLOW      -1
1527          RC    .045     .04    .045    3500   .0042
1528          RX       0     500     980    1003    1007    1031    1511    2011
1529          RY     4.5     3.5       3       0       0       3     3.5     4.5
              * DDM   ***** Updated *****

1530          KK     78B
1531          KM   BASIN 78B
1532          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1533          KM    L=        .6  Lca=        .4   S=   31.6  Kn= .050  LAG=  20.9
1534          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1535          KM    FCDMC REPORTS BASIN ALREADY BUILT-OUT, WITH RURAL 1 TO 2 ACRE LOTS
1536          KM    AND THERE IS NO RETENTION FOR THIS BASIN.
1537          BA     .39
1538          LG     .30     .15    8.40     .07    5.00
1539          UI     68.    262.    393.    635.    638.    433.    283.    126.     78.     34.
1540          UI     19.     19.      0.      0.      0.      0.      0.      0.      0.      0.
1541          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1542          KK    C78B
1543          KM   COMBINE FLOW FROM SUBBASIN 78B AND SUBBASIN 78A
1544          HC       2
              *

1545          KK   78BTC
1546          KM   ROUTE 78B TO 78C VIA WASH CROSSING MOUNTAIN ROAD, THEN SOUTH ALONG
1547          KM    WESTERN EDGE OF 78C.
```

```
1548          RS       3    FLOW      -1
1549          RC    .035    .022    .035    4500   .0033
1550          RX       0     100     110     115     120     125     130     135
1551          RY       5       4     3.5       0       0     3.5       8       9
              *

1552          KK     78C
1553          KM   BASIN 78C
1554          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1555          KM    L=        .5  Lca=        .3   S=   31.7  Kn= .026  LAG=   9.0
1556          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1557          BA     .28
1558          LG     .13     .10   11.20     .03   64.00
1559          UI    319.    980.    652.    164.     34.      0.      0.      0.      0.      0.
1560          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1561          KK    R78C
1562          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1563          DT    D78C      24
1564          DI       0   10000
1565          DQ       0   10000
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1566          KK    C78C
1567          KM   COMBINE FLOWS FROM 78B, 78C & 77C @ WILLIAMS FIELD ROAD & SIGNAL BUTTE ROAD.
1568          HC       3
              *

1569          KK  78CT79
1570          KM   ROUTE 78C TO 79A AT ELLSWORTH VIA GM CHANNEL TO
1571          KM    WILLIAMS FIELD RD & ELLSWORTH ROAD.
1572          RS       4    FLOW      -1
1573          RC    .035    .022    .035   10560   .0044
1574          RX       0     500     800     805     820     825    1125    1625
1575          RY       7       6       5       0       0       5       6       7
              *

1576          KK     79A
1577          KM   BASIN 79A
1578          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1579          KM    L=       2.3  Lca=       1.2   S=   23.2  Kn= .090  LAG= 106.0
1580          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * KO     2
1581          BA    2.01
1582          LG     .20     .30    8.00     .08   42.00
1583          UI     64.     64.     64.     64.     82.    209.    232.    262.    299.    321.
1584          UI    347.    367.    390.    421.    458.    489.    527.    610.    726.    792.
1585          UI    825.    727.    655.    600.    557.    523.    495.    451.    417.    390.
1586          UI    361.    328.    308.    285.    244.    190.    169.    113.    113.    109.
1587          UI    105.    105.     85.     64.     64.     64.     64.     37.     20.     20.
1588          UI     20.     20.     20.     20.     20.     20.     20.     20.     20.     20.
1589          UI     20.     20.     20.      0.      0.      0.      0.      0.      0.      0.
1590          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1591          KK    D79A
1592          KM    RETAIN THE 100-YR 2-HR RUNOFF VOLUME. 80% OF VOLUME IS USED
1593          DT  DET79A   171.2
1594          DI       0   10000
1595          DQ       0   10000
              *

1596          KK   C79A1
1597          KM   COMBINE FLOWS FROM 78C AND 79A @ GENERAL MOTORS DPG.
1598          HC       2
              *

1599          KK     79B
1600          KM   BASIN 79B
1601          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1602          KM    L=       1.4  Lca=        .6   S=    9.0  Kn= .090  LAG=  77.7
1603          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * KO     2
1604          BA    1.00
1605          LG     .25     .25    9.70     .05   55.00
1606          UI     43.     43.     43.     85.    150.    179.    207.    232.    250.    275.
1607          UI    306.    335.    388.    479.    557.    515.    444.    396.    360.    331.
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1608          UI    295.    267.    240.    216.    192.    155.    123.     76.     76.     71.
1609          UI     71.     48.     43.     43.     36.     13.     13.     13.     13.     13.
1610          UI     13.     13.     13.     13.     13.     13.      0.      0.      0.      0.
1611          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1612          KK    D79B
1613          KM   RETAIN THE 100-YR 2-HOUR RUNOFF VOLUME. 80% OF VOLUME IS USED
1614          DT  RET79B    92.8
1615          DI       0   10000
1616          DQ       0   10000
              *
```

```
1617        KK   C79A2
1618        KM   COMBINE FLOWS FROM 79A AND 79B @ WILLIAMS FIELD ROAD & ELLSWORTH ROAD.
1619        HC       2
            *

1620        KK     78F
1621        KM   BASIN 78F
1622        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1623        KM    L=      3.7  Lca=       2.1   S=    29.8  Kn= .090  LAG= 147.0
1624        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1625        BA    4.19
1626        LG     .35      .36     5.00      .27      .00
1627        UI     96.      96.      96.      96.      96.      96.     148.     315.     325.     368.
1628        UI    399.     442.     468.     495.     521.     541.     566.     595.     626.     663.
1629        UI    706.     737.     774.     845.     936.    1085.    1119.    1276.    1239.    1127.
1630        UI   1033.     968.     907.     862.     820.     782.     751.     712.     667.     629.
1631        UI    597.     570.     541.     502.     472.     454.     436.     368.     339.     276.
1632        UI    276.     174.     170.     170.     168.     158.     158.     158.     156.      96.
1633        UI     96.      96.      96.      96.      96.      79.      29.      29.      29.      29.
1634        UI     29.      29.      29.      29.      29.      29.      29.      29.      29.      29.
1635        UI     29.      29.      29.      29.      29.      29.      29.       0.       0.       0.
1636        UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
            *

1637        KK    82A1
1638        KM   BASIN 82A1
1639        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1640        KM    L=      3.6  Lca=       .9   S=    33.9  Kn= .090  LAG= 103.0
1641        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1642        BA    3.12
1643        LG     .35      .36     5.00      .27      .00
1644        UI    102.     102.     102.     102.     163.     335.     381.     436.     485.     526.
1645        UI    564.     599.     644.     693.     757.     801.     901.    1048.    1222.    1356.
1646        UI   1223.    1084.     987.     913.     852.     800.     742.     675.     629.     589.
1647        UI    529.     494.     459.     391.     304.     266.     180.     180.     173.     167.
1648        UI    167.     123.     102.     102.     102.     102.      36.      31.      31.      31.
1649        UI     31.      31.      31.      31.      31.      31.      31.      31.      31.      31.
1650        UI     31.       0.       0.       0.       0.       0.       0.       0.       0.       0.
1651        UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
            *
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1652        KK   C82A1
1653        KM   COMBINE FLOWS FROM SUBBASINS 78F AND 82A1 NORTH OF PECOS ROAD AT
1654        KM   NEW DETENTION BASIN
1655        HC       2
            *

1656        KK  DB82A1
1657        KM   PECOS NORTH BASIN
1658        KM   NEW DETENTION BASIN LOCATED EAST OF MERIDIAN ROAD & 660' NORTH OF PECOS RD.
1659        KM   WITH 1-42" RCP OUTLET & 86' SPILLWAY AT ELEV=44
            * KO      2       2
1660        RS        1    STOR       0
1661        SV        0       8      34      73     113     153     195     237     280     346
1662        SE       36      37      38      39      40      41      42      43      44    46.1
1663        SL     33.5     9.6     .62      .5
1664        SS       44     195       3     1.5
            *

1665        KK    PS-9
1666        KM    REACH PS-9
1667        KM    OUTFLOW CHANNEL FROM NEW DETENTION BASIN 82A TO MAIN CHANNEL @ PECOS
1668        RS        1    FLOW      -1
1669        RC     .025    .025    .025     500   .0005
1670        RX        0       8      16      42      46      72      80      88
1671        RY      4.1     4.2     4.3       0       0     4.3     4.2     4.1
            *

1672        KK    CAP2
1673        KM   INFLOW FROM EAST OF THE CAP THROUGH 1 - 36" PIPE OVERCHUTE
1674        KM   STATION #536+00 SALT-GILA AQUEDUCT REACH 2
1675        KM   QI CARDS BASED ON OVERCHUTE CAPACITY OF 64 CFS
1676        IN      60
1677        BA     .01
1678        QI       0      20      64      64      64      64      64      64      64      64
1679        QI      64      64      64      64      64      64      64      64      64      64
1680        QI      64      64      64      64      64
            *

1681        KK   RCAP2
1682        KM   ROUTE CAP2 THROUGH 82A2 VIA WASH TO SUBBASIN 82A2
1683        IN      15
1684        RS      27    FLOW      -1
1685        RC    .045     .04    .045   24000     .05
1686        RX       0     500    1000    1010    1020    1030    1530    2030
1687        RY       8       5       3       0       0       3       5       8
            *

1688        KK    82A2
1689        KM   BASIN 82A2
1690        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1691        KM    L=      4.6  Lca=       2.9   S=    27.2  Kn= .089  LAG= 183.0
1692        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1693        BA    4.13
1694        LG     .35      .36     5.00      .27     1.00
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1695          UI     76.     76.     76.     76.     76.     76.     76.     76.    177.    249.
1696          UI    250.    291.    291.    339.    349.    371.    381.    406.    420.    430.
1697          UI    448.    466.    483.    503.    529.    561.    578.    596.    631.    680.
1698          UI    743.    805.    911.    923.   1027.    979.    901.    845.    794.    751.
1699          UI    717.    686.    659.    635.    613.    594.    570.    540.    514.    487.
1700          UI    470.    455.    437.    407.    393.    372.    362.    349.    315.    291.
1701          UI    263.    218.    218.    179.    134.    134.    134.    134.    128.    125.
1702          UI    125.    125.    125.     96.     76.     76.     76.     76.     76.     76.
1703          UI     76.     67.     23.     23.     23.     23.     23.     23.     23.     23.
1704          UI     23.     23.     23.     23.     23.     23.     23.     23.     23.     23.
1705          UI     23.     23.     23.     23.     23.     23.     23.     23.     23.      0.
1706          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1707          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1708          KK  CP82A2
1709          KM   COMBINE FLOW FROM ROUTED CAP2 AND SUBBASIN 82A2
1710          HC       2
              *

1711          KK    82A4
1712          KM   BASIN 82A4
1713          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1714          KM    L=      3.5  Lca=      1.5   S=   29.1  Kn= .090  LAG= 128.0
1715          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1716          BA    2.13
1717          LG     .35     .36    5.00     .27     .00
1718          UI     56.     56.     56.     56.     56.     70.    184.    193.    214.    248.
1719          UI    265.    281.    302.    316.    332.    352.    374.    401.    424.    447.
1720          UI    494.    557.    650.    691.    742.    667.    606.    560.    523.    490.
1721          UI    466.    443.    419.    389.    364.    343.    325.    299.    281.    267.
1722          UI    251.    214.    182.    161.    126.     99.     99.     97.     92.     92.
1723          UI     92.     69.     56.     56.     56.     56.     56.     27.     17.     17.
1724          UI     17.     17.     17.     17.     17.     17.     17.     17.     17.     17.
1725          UI     17.     17.     17.     17.     17.     17.      0.      0.      0.      0.
1726          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1727          KK  82A4T3
1728          KM   REACH MN-2
1729          KM   ROUTE FLOW FROM SUBBASIN 82A4 TO DETENTION BASIN 82A3
1730          RS       2    FLOW      -1
1731          RC    .025    .025    .025    1050   .0005
1732          RX       0       8      16      47     107     138     146     154
1733          RY     5.0     5.1     5.2       0       0     5.2     5.1     5.0
              *

1734          KK    82A3
1735          KM   BASIN 82A3
1736          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1737          KM    L=      3.6  Lca=      2.0   S=   28.3  Kn= .090  LAG= 145.0
1738          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1739          BA    2.02
1740          LG     .35     .36    5.00     .27     .00
1741          UI     47.     47.     47.     47.     47.     47.     82.    154.    162.    180.
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1742          UI    200.    218.    230.    246.    257.    268.    280.    294.    310.    330.
1743          UI    351.    365.    387.    425.    477.    553.    566.    633.    583.    529.
1744          UI    492.    460.    434.    410.    392.    376.    361.    336.    316.    299.
1745          UI    284.    271.    250.    237.    228.    216.    190.    180.    136.    135.
1746          UI    101.     83.     83.     83.     78.     77.     77.     77.     52.     47.
1747          UI     47.     47.     47.     47.     42.     14.     14.     14.     14.     14.
1748          UI     14.     14.     14.     14.     14.     14.     14.     14.     14.     14.
1749          UI     14.     14.     14.     14.     14.     14.      0.      0.      0.      0.
1750          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1751          KK  CP82A3
1752          KM   COMBINE FLOW FROM SUBBASIN 82A4 AND SUBBASIN 82A3 BEFORE DETENTION BASIN
1753          HC       2
              *

1754          KK  CP82A5
1755          KM   COMBINE FLOWS FROM CAP OVERCHUTE AND SUBBASIN 82A
1756          HC       2
              *

1757          KK   DB82B
1758          KM   PECOS SOUTH BASIN
1759          KM   NEW DETENTION BASIN LOCATED EAST OF MERIDIAN ROAD & 660' SOUTH OF PECOS RD.
1760          KM   WITH 1-66" RCP OUTLET & 80' SPILLWAY AT ELEV 41
              * KO     2       2
1761          RS       1    STOR       0
1762          SV       0     3.5     9.6    25.7    62.7   110.5   158.7   207.5   257.3     320
1763          SE    31.5      33      34      35      36      37      38      39      40    42.1
1764          SL      33    23.7     .62      .5
1765          SS      41      80       3     1.5
              *

1766          KK   MN-1
1767          KM   REACH MN-1  plus culvert PSC-7
1768          KM   ROUTE FLOW FROM NEW DETENTION BASIN 82B TO MAIN LINE CHANNEL @ PECOS
```

```
1769          RS       1    FLOW      -1
1770          RC    .025    .025    .025    1030   .0005
1771          RX       0       8      16      47      55      87      95     103
1772          RY     5.1     5.2     5.3       0       0     5.3     5.2     5.1
              *

1773          KK  CP82A6
1774          KM         COMBINE FLOWS AFTER DETENTION BASINS.
1775          HC       2
              *

1776          KK  82TBOX
1777          KM   REACH PS-8
1778          KM   ROUTE FLOW FROM DETENTION BASIN DB82B TO 1000' FOOT LONG BOX CULVERT (PSC-6).
1779          RS       1    FLOW      -1
1780          RC    .025    .025    .025     750   .0005
1781          RX       0       8      16    47.2      67      98     106     114
1782          RY     5.0     5.1     5.2       0       0     5.2     5.1     5.0
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
              *

1783          KK  BOXCLV
1784          KM   REACH PSC-6
1785          KM   ROUTE FLOW THROUGH BOX CULVERT
1786          RS       1    FLOW      -1
1787          RC    .015    .012    .015    1000   .0020
1788          RX       0       8      16   16.01   28.01   28.02      36      44
1789          RY     4.8     4.9       5       0       0       5     4.9     4.8
              *

1790          KK  BOXT78
1791          KM   REACH PS-5, PS-6, PS-7 plus culverts PSC-5 & PSC-4
1792          KM   ROUTE FLOW FROM 1000' BOX CULVERT TO C78D  (SIGNAL BUTTE ROAD)
1793          RS       1    FLOW      -1
1794          RC    .025    .025    .025    3400   .0005
1795          RX       0       8      16      47      67      98     106     114
1796          RY     5.4     5.3     5.2       0       0     5.2     5.3     5.4
              *

1797          KK     78D
1798          KM   BASIN 78D
1799          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1800          KM    L=      1.2  Lca=       .5   S=   21.7  Kn= .030  LAG=  19.5
1801          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1802          BA     .89
1803          LG     .15     .15    8.00     .11   55.00
1804          UI    189.    678.   1029.   1713.   1367.    909.    496.    240.    123.     47.
1805          UI     47.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1806          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1807          KK    R78D
1808          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1809          DT    D78D      84
1810          DI       0   10000
1811          DQ       0   10000
              *
              * DDM   ***** Updated *****

1812          KK     82B
1813          KM   BASIN 82B
1814          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1815          KM    L=       .9  Lca=       .4   S=   21.2  Kn= .030  LAG=  17.2
1816          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1817          BA     .92
1818          LG     .15     .25    5.00     .36   55.00
1819          UI    266.    879.   1420.   2004.   1268.    727.    294.    142.     55.     55.
1820          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1821          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1822          KK     R82
1823          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1824          DT     D82       1
1825          DI       0   10000
1826          DQ       0   10000
              *

1827          KK   DTTRW
1828          KM    DIVERTING 110.7 ACRE-FEET DUE TO ON-SITE RETENTION
1829          KM   VOLUMES WERE DERIVED FROM DRAINAGE REPORT - REFERENCE 7.
1830          DT     TRW   110.7
1831          DI       0   10000
1832          DQ       0   10000
              *
              * DDM   ***** Preserved *****

1833          KK    C78D
1834          KM    COMBINE FLOWS FROM 78D, 82B AND ROUTED FLOW 82T78D
1835          KM     @ PECOS ROAD AND SIGNAL BUTTE ROAD.
1836          HC       3
              *
```

```
                * DDM   ***** Preserved *****

1837            KK   78DTE
1838            KM   REACH PS-2, PS-3, PS-4 plus culverts PSC-3 AND PSC-2.
1839            KM   ROUTE FLOWS FROM 78D (PECOS RD AND SIGNAL BUTTE RD) TO 78E (PECOS AND CRISMON
1840            RS       2    FLOW      -1
1841            RC    .025   0.025   0.025    5100   .0005
1842            RX       0       8      16    53.2    93.2   130.4   138.4   146.4
1843            RY     6.0     6.1     6.2       0       0     6.3     6.1     6.0
                *

1844            KK     78E
1845            KM   BASIN 78E
1846            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1847            KM    L=      1.1  Lca=       .5   S=   17.4  Kn= .087  LAG=  57.4
1848            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
                * KO     2
1849            BA    1.01
1850            LG     .25     .26    8.80     .06   55.00
1851            UI     59.     59.    108.    212.    271.    313.    351.    402.    460.    565.
1852            UI    741.    698.    577.    502.    447.    382.    335.    289.    241.    166.
1853            UI    104.    100.     97.     60.     59.     45.     18.     18.     18.     18.
1854            UI     18.     18.     18.     18.      0.      0.      0.      0.      0.      0.
1855            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

1856            KK    D78E
1857            KM   RETAIN THE 100-YR 2-HR RUNOFF VOLUME. 80% OF VOLUME IS USED
1858            DT  RET78E    93.6
1859            DI       0   10000
1860            DQ       0   10000
                *
1                                          HEC-1 INPUT                                          PAGE 50

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1861            KK      83
1862            KM   BASIN 83
1863            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1864            KM    L=      2.0  Lca=       .5   S=   15.0  Kn= .030  LAG=  25.8
1865            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1866            BA    1.01
1867            LG     .15     .25    5.00     .36   55.00
1868            UI    131.    423.    700.    931.   1454.   1362.    993.    726.    464.    226.
1869            UI    161.     89.     40.     40.     40.      0.      0.      0.      0.      0.
1870            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

1871            KK     R83
1872            KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1873            DT     D83      83
1874            DI       0   10000
1875            DQ       0   10000
                *

1876            KK    C78E
1877            KM   COMBINE FLOWS FROM 78D AND 78E (CRISMON ROAD)
1878            HC       3
                *

1879            KK  78ET84
1880            KM   REACH PS-1
1881            KM   ROUTE FLOWS WEST ALONG PECOS IN A PROPOSED CHANNEL
1882            KM   ROUTE FLOWS FROM CRISMON ROAD TO ELLSWORTH ROAD.
1883            RS       2    FLOW      -1
1884            RC    .025   0.025   0.025    4840   .0005
1885            RX       0       8      16    53.2    93.2   130.4   138.4   146.4
1886            RY     6.0     6.1     6.2       0       0     6.2     6.1     6.0
                *

1887            KK      84
1888            KM   BASIN 84
1889            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1890            KM    L=      2.0  Lca=       .5   S=   12.5  Kn= .030  LAG=  26.7
1891            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1892            BA     .99
1893            LG     .15     .25    4.70     .40   55.00
1894            UI    125.    380.    651.    855.   1278.   1399.   1008.    747.    520.    258.
1895            UI    182.    120.     38.     38.     38.      0.      0.      0.      0.      0.
1896            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

1897            KK     R84
1898            KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1899            DT     D84      85
1900            DI       0   10000
1901            DQ       0   10000
                *
1                                          HEC-1 INPUT                                          PAGE 51

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1902            KK     C84
1903            KM    COMBINE FLOWS FROM 78E AND 84  AT ELLSWORTH AND PECOS ROAD
1904            KM    CHANNEL EAST SIDE OF GATEWAY WILLIAMS FLOWING TO THE NORTH
1905            HC       2
                *
```

```
                * DDM   ***** Preserved *****

1906            KK    EC-4   ROUTE   REACH
1907            KM   ELLSWORTH ROAD CHANNEL REACH-4
1908            KM   ROUTE FLOWS FROM THE CORNER OF PECOS AND ELLSWORTH ROADS TO
1909            KM   THE POINT 1/2 MILE NORTH OF PECOS WHERE FLOW FROM GM ENTERS
1910            RS       4    FLOW      -1
1911            RC   0.048   0.048   0.048    3000  0.0010    0.00
1912            RX     0.0    16.0    33.3    50.6   125.6   142.9   160.2   176.2
1913            RY     5.5     5.8     2.9     0.0     0.0     2.9     5.8     5.5
                *

1914            KK   C79B3
1915            KM    COMBINE FLOWS FROM SOUTH CHANNEL AND WGA AT ELLSWORTH ROAD.
1916            HC       2
                *

1917            KK    EC-3   ROUTE   REACH
1918            KM   ROUTE FLOWS FROM THE COMBINE POINT OF SUB-BASIN 79B TO
1919            KM   WILLIAMS FIELD ROAD ALIGNMENT AT THE GM MANIFOLD STRUCTURE
1920            RS       5    FLOW      -1
1921            RC   0.048   0.048   0.048    3500  0.0010    0.00
1922            RX     0.0    16.0    36.5    56.9   141.9   162.4   182.9   198.9
1923            RY     6.5     6.8     3.4     0.0     0.0     3.4     6.8     6.5
                *

1924            KK    EC-2   ROUTE   REACH
1925            KM   ROUTE FLOWS THROUGH WILLIAMS-GATEWAY (SUBBASIN 80A) BY WAY OF NEW NORTH
1926            KM   PERIMETER CHANNEL TO A POINT ABOUT 1/2 MILE WEST OF ELLSWORTH ROAD
1927            RS       4    FLOW      -1
1928            RC   0.034   0.034   0.034    4200  0.0010    0.00
1929            RX     0.0    16.0    37.0    57.9   157.9   178.9   199.8   215.8
1930            RY     6.7     7.0     3.5     0.0     0.0     3.5     7.0     6.7
                *

1931            KK    EC-1   ROUTE   REACH
1932            KM   ROUTE FLOWS THROUGH WILLIAMS-GATEWAY (SUBBASIN 80A) BY WAY OF NEW NORTH
1933            KM   FROM A POINT ABOUT 1/2 MILE WEST OF ELLSWORTH ROAD TO POWERLINE FLOODWAY.
1934            RS       3    FLOW      -1
1935            RC   0.034   0.034   0.034    3200  0.0010    0.00
1936            RX     0.0    16.0    37.0    57.9   157.9   178.9   199.8   215.8
1937            RY     6.7     7.0     3.5     0.0     0.0     3.5     7.0     6.7
                *
1                                    HEC-1 INPUT                                          PAGE 52

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1938            KK   CPPWR
1939            KM   COMBINE FLOWS FROM 75 AND 79 IN THE POWERLINE FLOODWAY
1940            KM   AT ABOUT 1 MILE WEST OF ELLSWORTH ROAD
1941            HC       2
                *
                * KK*DBPWR
                * KM DIVERT FROM POWERLINE CHANNEL INTO THE RAY DETENTION BASIN
                * KM USES A REALISTIC SIDE-WEIR EQUATION TO FORM POWER CURVE
                * KM WEIR CREST = 3.25FT; WEIR LENGTH =  750; 4.0FT DIV STRUCTURE.
                * KO     3
                * DT PWRDB    1537
                * DI     0     528     544     576     628     704     955    5730
                * DQ     0       0      11      40      89     162     410    5174
                *

1942            KK   PLF-2
1943            KM   REVISED ROUTING TO RELFECT CHANGES REQUIRED DUE TO THE ELLSWORTH RD
1944            KM   CHANNEL PROJECT.  EXISTING PLF DOES NOT HAVE CAPACITY FOR THESE FLOWS
1945            KM   AND WILL NEED TO BE IMPROVED. -DCF, D&A 2/01
1946            RS       3    FLOW      -1
1947            RC   0.034   0.034   0.034    4710  0.0020    0.00
1948            RX     0.0    16.0    29.8    43.5   123.5   137.3   151.0   167.0
1949            RY     6.6     6.9     3.4     0.0     0.0     3.4     6.9     6.6
                *
                * THE FOLLOWING CODE REMOVED TO MODEL THE IMPROVED PLF
                * KKPWRT80
                * KM REACH PR-3, PR-4, plus culvert PRC-2
                * KM ROUTE FLOWS FROM PLF COMBINE TO CATCH POINT AT 80A VIA PLF IMPROVEMENT
                * RS     1    FLOW      -1
                * RC  .025    .015    .025    3680   .0014
                * RX     0       8      16      34      62      79      87      95
                * RY   8.5     8.6     8.7       0       0     8.7     8.6     8.5
                *

1950            KK     80A
1951            KM   BASIN 80A
1952            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1953            KM    L=       3.8  Lca=      2.2   S=   14.2  Kn= .030  LAG=  58.2
1954            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1955            BA    2.64
1956            LG     .15     .15    9.70     .06   55.00
1957            UI    153.    153.    265.    544.    690.    802.    899.   1020.   1171.   1421.
1958            UI   1851.   1871.   1534.   1330.   1185.   1024.    896.    770.    653.    479.
1959            UI    305.    265.    251.    187.    153.    153.     50.     47.     47.     47.
1960            UI     47.     47.     47.     47.      0.      0.      0.      0.      0.      0.
1961            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

1962            KK    R80A
1963            KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
1964            DT    D80A      33
```

```
1965        DI       0   10000
1966        DQ       0   10000
            *
            *  THE SECTION BELOW COMBINES THE ROUTED FLOW FROM SANTAN AND POWER,
            *  THEN ROUTES THRU THE RAY DB
            * KKDRSNDB
            * KM RETURNS THE DIVERSION FROM THE SANTAN CHANNEL
            * DR SANDB
            *
            * KKDRPWDB
            * KM RETURNS THE DIVERSION FROM THE POWERLINE CHANNEL
            * DR PWRDB
            *
            * KK CPRAY
            * KM COMBINES THE TWO ROUTED FLOWS IN THE RAY DETENTION BASIN
            * HC     2       1
            *
            * KK*RTRAY
            * KM ROUTES THE HYDROGRAPH OUT OF THE RAY BASIN
            * KM Currently incorporates a dummy set of outflow data
            * KO     1
            * RS     1    STOR      -1
            * SV     0     244     493     747    1005    1269    1537
            * SE     0    1.54    3.08    4.63    6.17    7.71    9.25
            * SQ     0       1       2       3       4       5       6
            *
1                                   HEC-1 INPUT                                                    PAGE 53

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1967        KK   CP80A
1968        KM   COMBINE FLOW IN THE POWERLINE FLOODWAY WITH FLOW COMING FROM SUBBASIN 80A
1969        KM   THE LOCATION FOR THIS COMBINATION AT THE NW CORNER OF SUBBASIN 80A
1970        HC       2
            *

1971        KK   PLF-1
1972        KM   REVISED ROUTING TO RELFECT CHANGES REQUIRED DUE TO THE ELLSWORTH RD
1973        KM   CHANNEL PROJECT.  EXISTING PLF DOES NOT HAVE CAPACITY FOR THESE FLOWS
1974        KM   AND WILL NEED TO BE IMPROVED. -DCF, D&A 2/01
1975        RS       2    FLOW      -1
1976        RC   0.034   0.034   0.034    2958  0.0020    0.00
1977        RX     0.0    16.0    29.8    43.7   148.7   162.5   176.3   192.3
1978        RY     6.6     6.9     3.5     0.0     0.0     3.5     6.9     6.6
            *
            * THE FOLLOWING CODE REMOVED TO MODEL THE IMPROVED CONDITION OF THE PLF
            * KKPWRSAN
            * KM REACH PR-1, PR-2 plus culvert PRC-1
            * KM ROUTE FLOWS FROM COMBINE POINT AT 80A VIA PLF RE-ALIGNMENT.
            * RS     1    FLOW      -1
            * RC  .015    .015    .015    3500   .0014
            * RX     0       8      16      74     154     212     220     228
            * RY   9.5     9.6     9.7       0       0     9.7     9.6     9.5
            *
            * KK CPSAN
            * KM COMBINE FLOWS FROM THE POWERLINE FLOODWAY AND THE PROPOSED SANTAN FREEWAY
            * KM DRAINAGE CHANNEL
            * HC     2
            *
            * ****REMOVED BY CPE IN JUNE 2000 IN FAVOR OF SANDB AND PWRDB
            * ****DIVERSIONS LOCATED UPSTREAM.
            * KK*DBRAY
            * KM      BASIN TO WITHDRAW FLOW FROM POWERLINE FLOODWAY
            * KO     3
            * DT RAYDB    1200
            * DI     0    1000    1001    1500    4500   14500
            * DQ     0       0       1     500    3500   13500
            *

1979        KK  PWREMF
1980        KM   ROUTE FLOW FROM RE-ALIGNED POWERLINE FLOODWAY TO EMF VIA
1981        KM   NEW CHANNEL ALONG SANTAN FREEWAY ALIGNMENT
1982        KM   REACH ET-1
1983        KO                                      21
1984        RS       1    FLOW      -1
1985        RC    .025    .025    .025    3850   .0005
1986        RX       0       8      16      74     154     212     220     228
1987        RY     9.5     9.6     9.7       0       0     9.7     9.6     9.5
            *
1                                   HEC-1 INPUT                                                    PAGE 54

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1988        KK  EMFPOW
1989        KM   COMBINE FLOW FROM THE POWERLINE FLOODWAY WITH FLOW IN THE EMF
1990        HC       2
            *

1991        KK  POWTWI
1992        KM   ROUTE EMF FLOW TO WILLIAMS FIELD ROAD VIA THE EMF
1993        KM   THIS SECTION IS CONCRETE LINED TO PAST POWER ROAD BRIDGE
1994        RS       2    FLOW      -1
1995        RC     .03    .012     .03    4750   .0003
1996        RX       0     500     520     553     693     726     740     742
1997        RY      14      12      11       0       0      11      11      12
            *
```

```
1998          KK     80B
1999          KM   BASIN 80B
2000          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2001          KM    L=      1.5  Lca=       .9   S=   18.4  Kn= .044  LAG=  41.9
2002          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2003          KO                                    21
2004          BA    1.12
2005          LG     .13      .17     6.80      .18    48.00
2006          UI     90.     105.     319.     433.     515.     614.     754.    1063.    1032.     814.
2007          UI    687.     563.     464.     359.     213.     155.     136.      90.      73.      28.
2008          UI     28.      28.      28.      28.      28.       0.       0.       0.       0.       0.
2009          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *

2010          KK    R80B
2011          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2012          KO                                    21
2013          DT    D80B       4
2014          DI       0   10000
2015          DQ       0   10000
              *

2016          KK  MFWILL
2017          KM   COMBINE FLOWS INTO THE EMF WEST OF WILLIAMS AFB FROM 80B, EMF POWERLINE AND
2018          KM   EMFRAY
2019          HC       2
              *

2020          KK  WILTSP
2021          KM   ROUTE EMF FLOW FROM WILLIAMS FIELD ROAD TO THE SOUTHERN PACIFIC RAILROAD
2022          KM     (AT RITTENHOUSE ROAD)
2023          RS       3    FLOW      -1
2024          RC     .03    .022      .03     5000   .0003
2025          RX       0     500      520      553     693      726      740      742
2026          RY      14      12       11        0       0       11       11       12
              *
              * DDM   ***** Updated *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2027          KK     81A
2028          KM   BASIN 81A
2029          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2030          KM    L=      3.3  Lca=      1.9   S=   16.4  Kn= .029  LAG=  49.0
2031          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2032          BA    1.81
2033          LG     .14      .25     4.70      .41    58.00
2034          UI    125.     125.     341.     523.     642.     737.     863.    1019.    1359.    1576.
2035          UI   1258.    1066.     922.     777.     656.     545.     386.     222.     209.     177.
2036          UI    125.     117.      38.      38.      38.      38.      38.      38.      38.       0.
2037          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
2038          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *
              * DDM   ***** Preserved *****

2039          KK    R81A
2040          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2041          DT    D81A       5
2042          DI       0   10000
2043          DQ       0   10000
              *

2044          KK   81ATB
2045          KM   ROUTE SUBBASIN 81A TO 81B VIA ROAD NETWORK FOR ON-BASE HOUSING
2046          RS       9    FLOW      -1
2047          RC    .013    .013     .013     8000   .0035
2048          RX       0     500      750      753    1053     1056     1303     1803
2049          RY       3     1.5        1       .6      .6        1      1.5        3
              *

2050          KK     81B
2051          KM   BASIN 81B
2052          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2053          KM    L=      1.1  Lca=       .4   S=    6.9  Kn= .033  LAG=  24.7
2054          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2055          BA     .84
2056          LG     .10      .25     4.70      .45    67.00
2057          UI    115.     393.     631.     857.    1343.    1088.     796.     566.     296.     185.
2058          UI    115.      39.      35.      35.       0.       0.       0.       0.       0.       0.
2059          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *

2060          KK    R81B
2061          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2062          DT    D81B      35
2063          DI       0   10000
2064          DQ       0   10000
              *
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2065          KK     C81
2066          KM   COMBINE FLOWS FROM SUBBASINS 81A AND 81B BEFORE ENTERING INTO THE EMF
2067          KO                                    21
```

```
2068          HC       2
              *
              *
              * DDM   ***** Updated *****

2069          KK  EMFRT1       Hydrograph name changed by Dibble & Associates to avoid two
2070          KM               different hydrographs with the same name.
2071          KM   COMBINE 81A AND 81B AND RITTENHOUSE(HYDROGRAPH WILTSP, WHICH IS FROM EMFWIL)
2072          HC       2
              *
              *
              * THE NEXT KK BLOCKS COME FROM THE QUEEN CREEK ADMS
              *
              * DDM   ***** Preserved *****

2073          KK  SUB258
2074          KM   IN PINAL COUNTY, NO RETENTION
2075          KM        RUNOFF FROM SUBBASIN 258
2076          BA    3.68
2077          LS              78
2078          UD    3.87
              *
              *

2079          KK    R258
2080          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2081          DT    D258     121
2082          DI       0   10000
2083          DQ       0   10000
              *

2084          KK   RO259
2085          KM        ROUTE SUB258 TO CO262
2086          RM       8    1.57    0.20
              *
              * DDM   ***** Preserved *****

2087          KK  SUB260
2088          KM        RUNOFF FROM SUBBASIN 260
2089          BA    0.98
2090          LS              75
2091          UD    1.21
              *

2092          KK    R260
2093          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2094          DT    D260      27
2095          DI       0   10000
2096          DQ       0   10000
              *
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2097          KK   CO262
2098          KM        COMBINE SUB260 AND RO259
2099          HC       2
              * DDM   ***** Preserved *****

2100          KK   RO263
2101          KM        ROUTE CO262 TO CO266
2102          RM       8    1.56    0.20
              *
              * DDM   ***** Preserved *****

2103          KK  SUB264
2104          KM        RUNOFF FROM SUBBASIN 264
2105          BA    0.99
2106          LS              76
2107          UD    1.47
              *
              * DDM   ***** Preserved *****

2108          KK    R264
2109          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2110          DT    D264      29
2111          DI       0   10000
2112          DQ       0   10000
              *
              * DDM   ***** Preserved *****

2113          KK   CO266
2114          KM        COMBINE SUB264 AND RO263
2115          HC       2
              *
              * DDM   ***** Preserved *****

2116          KK   RO267
2117          KM        ROUTE CO266 TO CO270
2118          RM      16    3.31    0.20
              *
              * DDM   ***** Preserved *****

2119          KK  SUB268
2120          KM        RUNOFF FROM SUBBASIN 268
2121          BA    0.96
2122          LS              76
```

```
2123          UD    2.27
              *
              * DDM   ***** Preserved *****

2124          KK    R268
2125          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2126          DT    D268      28
2127          DI       0   10000
2128          DQ       0   10000
              *
              * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                                    PAGE 58

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2129          KK   CO270
2130          KM        COMBINE RUNOFF FROM RO267 AND SUB268
2131          HC       2
              *
              * DDM   ***** Preserved *****

2132          KK   RO283
2133          KM        ROUTE CO282 TO CONCENTRATION POINT AT QUEEN CREEK ROAD
2134          RM      14    2.78    0.20
              *
              * THIS IS THE END OF THE QUEEN CREEK ADMS INSERT
              *
              * DDM   ***** Updated *****

2135          KK     88A
2136          KM   BASIN 88A
2137          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2138          KM    L=       .8  Lca=       .2   S=   13.2  Kn= .020  LAG=   9.2
2139          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2140          BA     .50
2141          LG     .10     .25    5.00     .40   80.00
2142          UI    549.   1709.   1208.    323.     71.      0.      0.      0.      0.      0.
2143          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

2144          KK    R88A
2145          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2146          DT    D88A      50
2147          DI       0   10000
2148          DQ       0   10000
              *

2149          KK  88AT89
2150          KM   REACH RH-2b,RH-2a,RH-1,EXISTING CHANNEL (FCD 97-34), plus culvert RHC-1
2151          KM   ROUTE 88A TO 89A VIA THE PROPOSED CHANNEL ALONG QUEEN CREEK ROAD
2152          KM   FROM CRISMON ROAD TO ELLSWORTH ROAD
2153          RS       1    FLOW      -1
2154          RC    .025    .025    .025    5135   .0010
2155          RX       0       8      16      45      55      85      93     101
2156          RY     4.7     4.8     4.9       0       0     4.9     4.8     4.7
              *

2157          KK     89A
2158          KM   BASIN 89A
2159          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2160          KM    L=      1.0  Lca=       .6   S=   19.0  Kn= .020  LAG=  13.5
2161          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2162          BA     .50
2163          LG     .10     .25    4.65     .47   80.00
2164          UI    247.    742.   1328.    891.    408.    158.     41.     38.      0.      0.
2165          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
1                                        HEC-1 INPUT                                                    PAGE 59

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2166          KK    R89A
2167          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2168          DT    D89A      50
2169          DI       0   10000
2170          DQ       0   10000
              *

2171          KK    C89A
2172          KM   COMBINE FLOWS FROM 88A AND 89A AT QUEEN CREEK ROAD AND ELLSWORTH ROAD
2173          HC       2
              *

2174          KK  89ATRI
2175          KM   ROUTE 89A TO RITTENHOUSE ROAD VIA THE PROPOSED CHANNEL ALONG QUEEN CREEK ROAD
2176          KM    FROM ELLSWORTH ROAD TO RITTENHOUSE ROAD
2177          KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN.
2178          RS       1    FLOW      -1
2179          RC    .025    .025    .025    3145   .0005
2180          RX       0      10      26      39      49      72      78     100
2181          RY    12.2     9.7     5.7       0       0     5.7     9.7    12.2
              *

2182          KK    C283
2183          KM   COMBINE FLOWS FROM QUEEN CREEK ADMS AND EC ADMP AT QUEEN CREEK ROAD AND
2184          KM   RITTENHOUSE ROAD.
```

```
                * KO              2
2185            HC        2
                *

2186            KK  283T90
2187            KM   ROUTE FLOWS FROM CONCENTRATION POINT 283 AT QUEEN CREAK ROAD NORTH IN
2188            KM   RITTENHOUSE CHANNEL TO THE HALF MILE STREET BETWEEN QUEEN CREEK ROAD AND
2189            KM   GERMANN ROAD (RYAN STREET)
2190            KM
2191            KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN (TYPICAL SECTION #5).
2192            KM
                * KO              2
2193            RS        1    FLOW      -1
2194            RC     .025    .025    .025    4400    .0005
2195            RX        0      22      28      51       61      83      90     108
2196            RY     11.2     9.7     5.7       0        0     5.7     9.7    11.2
                *

2197            KK     90A
2198            KM   BASIN 90A
2199            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2200            KM    L=        .6  Lca=        .2   S=    24.2  Kn= .038  LAG=  12.8
2201            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2202            BA     .48
2203            LG     .10     .25    4.60     .49   62.00
2204            UI    269.    789.   1351.    812.    319.    113.     39.      0.      0.      0.
2205            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
1                                                HEC-1 INPUT                                                PAGE 60

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2206            KK    R90A
2207            KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2208            DT    D90A      42
2209            DI       0   10000
2210            DQ       0   10000
                *

2211            KK    C90A
2212            KM   COMBINE FLOWS FLOW C283 AND SUBBASIN 90 AT RYAN STREET ALIGNMENT
                * KO              2
2213            HC        2
                *

2214            KK   90ATB
2215            KM   ROUTE FLOWS FROM SUBBASIN 90A TO 90B VIA CHANNEL
2216            KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN (TYPICAL SECTION #4).
2217            KM
                * KO              2
2218            RS        1    FLOW      -1
2219            RC     .025    .025    .025    4400    .0005
2220            RX        0      22      28      51       61      83      90     108
2221            RY     11.2     9.7     5.7       0        0     5.7     9.7    11.2
                *

2222            KK     87A
2223            KM   BASIN 87A
2224            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2225            KM    L=       1.0  Lca=        .5   S=    24.8  Kn= .020  LAG=  11.7
2226            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2227            BA     .49
2228            LG     .10     .25    5.00     .40   80.00
2229            UI    333.    979.   1448.    720.    221.     66.      0.      0.      0.      0.
2230            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

2231            KK    R87A
2232            KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2233            DT    D87A      49
2234            DI       0   10000
2235            DQ       0   10000
                *

2236            KK   87ATB
2237            KM   ROUTE 87A TO 87B VIA SHEET FLOW
2238            RS        3    FLOW      -1
2239            RC     .040    .040    .040    2640    .0056
2240            RX        0     500    1000    1005    1006    1011    1511    2011
2241            RY        1      .5       0       0       0      .5       1     1.5
                *
1                                                HEC-1 INPUT                                                PAGE 61

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2242            KK     87B
2243            KM   BASIN 87B
2244            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2245            KM    L=        .9  Lca=        .5   S=    11.6  Kn= .020  LAG=  12.8
2246            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2247            BA     .49
2248            LG     .10     .25    5.00     .40   80.00
2249            UI    275.    809.   1385.    833.    327.    116.     40.      0.      0.      0.
2250            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

2251            KK    R87B
```

```
2252          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2253          DT    D87B      49
2254          DI       0   10000
2255          DQ       0   10000
              *

2256          KK     C87
2257          KM   COMBINE FLOW FROM SUBBASINS 87A AND 87B
2258          HC       2
              *

2259          KK  87T88B
2260          KM     ROUTE S87 TO S88 VIA GERMANN ROAD
2261          RS       6    FLOW      -1
2262          RC    .045    .025    .045    5280    .002
2263          RX       0    1000    1005    1010    1050    1060    1560    2060
2264          RY      14      13      18      12      11      14    14.5      15
              *

2265          KK     88B
2266          KM   BASIN 88B
2267          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2268          KM    L=        .9  Lca=        .6   S=   21.2  Kn= .020  LAG=  12.8
2269          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2270          BA     .50
2271          LG     .10     .25    5.00     .40   80.00
2272          UI    279.    819.   1402.    843.    331.    117.     40.      0.      0.      0.
2273          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2274          KK    R88B
2275          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2276          DT    D88B      50
2277          DI       0   10000
2278          DQ       0   10000
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2279          KK    C88B
2280          KM   COMBINE FLOWS FROM SUBBASINS 88A AND 88B
2281          HC       2
              *

2282          KK  88T89B
2283          KM     ROUTE S88 (CRISMON ROAD) TO S89B (ELLSWORTH ROAD) VIA GERMANN ROAD
2284          RS       6    FLOW      -1
2285          RC    .045    .025    .045    5280    .004
2286          RX       0    1000    1005    1010    1050    1060    1560    2060
2287          RY      14      13      18      12      11      14    14.5      15
              *

2288          KK     89B
2289          KM   BASIN 89B
2290          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2291          KM    L=        .9  Lca=        .5   S=   23.2  Kn= .020  LAG=  11.7
2292          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2293          BA     .50
2294          LG     .10     .25    4.80     .43   80.00
2295          UI    336.    987.   1460.    726.    223.     67.      0.      0.      0.      0.
2296          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2297          KK    R89B
2298          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2299          DT    D89B      49
2300          DI       0   10000
2301          DQ       0   10000
              *

2302          KK    C89B
2303          KM   COMBINE FLOWS FROM SUBBASINS 89A AND 89B
2304          HC       2
              *

2305          KK  89T890
2306          KM     ROUTE S89B (ELLSWORTH ROAD) TO S90B (AT RITTENHOUSE ROAD) VIA GERMANN ROAD
2307          RS      10    FLOW      -1
2308          RC    .045    .025    .045    8818   .0045
2309          RX       0    1000    1005    1010    1050    1060    1560    2060
2310          RY      14      13      18      12      11      14    14.5      15
              *
              * DDM   ***** Updated *****

2311          KK     90B
2312          KM   BASIN 90B
2313          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2314          KM    L=       2.0  Lca=       1.2   S=   15.3  Kn= .042  LAG=  49.8
2315          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2316          BA     .82
2317          LG     .22     .25    4.65     .38   31.00
2318          UI     56.     56.    147.    232.    283.    327.    379.    444.    588.    709.
2319          UI    583.    490.    427.    359.    306.    259.    187.    117.     96.     91.
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
2320          UI     56.     56.     28.     17.     17.     17.     17.     17.     17.      0.
2321          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2322          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

2323          KK    R90B
2324          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2325          DT    D90B      23
2326          DI       0   10000
2327          DQ       0   10000
              * DDM   ***** Preserved *****

2328          KK     C90
2329          KM   COMBINE FLOWS FROM 90A AND 90B
2330          HC       3
              *

2331          KK   90T91
2332          KM   REVISED 02.24.98 WITH RITTENHOUSE CHANNEL DESIGN (TYPICAL SECTION #3).
2333          KM
2334          RS       1    FLOW      -1
2335          RC    .025    .025    .025    6400   .0005
2336          RX       0      30      36      60      88     108     114     132
2337          RY     9.7     7.5       6       0       0       6     7.5     9.7
              *

2338          KK      85
2339          KM   BASIN 85
2340          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2341          KM    L=      2.0  Lca=       .5   S=   15.0  Kn= .030  LAG=  25.8
2342          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2343          BA    1.00
2344          LG     .15     .25    4.35     .51   55.00
2345          UI    131.    422.    698.    929.   1452.   1359.    991.    725.    463.    226.
2346          UI    161.     89.     40.     40.     40.      0.      0.      0.      0.      0.
2347          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

2348          KK     R85
2349          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2350          DT     D85      84
2351          DI       0   10000
2352          DQ       0   10000
              * DDM   ***** Preserved *****

2353          KK   85T86
2354          KM     ROUTE S85 TO S86 VIA WAFB SOUTH PERIMETER CHANNEL
2355          RS       4    FLOW      -1
2356          RC   0.055   0.035   0.055    5280   .0039
2357          RX       0     500    1000    1013    1028    1041    1541    2041
2358          RY     5.5       5     4.5       0       0     4.5       5     5.5
              *
              * DDM   ***** Updated *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2359          KK      86
2360          KM   BASIN 86
2361          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2362          KM    L=      2.0  Lca=       .5   S=   15.0  Kn= .030  LAG=  25.8
2363          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2364          BA    1.00
2365          LG     .15     .25    4.55     .45   55.00
2366          UI    131.    420.    695.    925.   1446.   1354.    987.    722.    461.    225.
2367          UI    160.     89.     40.     40.     40.      0.      0.      0.      0.      0.
2368          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

2369          KK     R86
2370          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
2371          DT     D86      85
2372          DI       0   10000
2373          DQ       0   10000
              *
              * DDM   ***** Preserved *****

2374          KK     C86
2375          KM     COMBINE 85 AND 86 AT PECOS ROAD AND SOSSAMAN ROAD
2376          HC       2
              *
              * DDM   ***** Preserved *****

2377          KK   86T91
2378          KM     ROUTE S86 TO S91 VIA WAFB SOUTH PERIMETER CHANNEL. Grassy v=3ft/sec
2379          RS       6    FLOW      -1
2380          RC    0.05   0.035    0.05    5500   .0025
2381          RX       0     500    1000    1013    1028    1041    1541    2041
2382          RY     5.5       5     4.5       0       0     4.5       5     5.5
              *
              * DDM   ***** Updated *****

2383          KK      91
2384          KM   BASIN 91
2385          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
2386          KM    L=      1.4  Lca=       .6   S=   18.4  Kn= .030  LAG=  22.7
2387          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2388          BA     .46
2389          LG     .15     .25    4.65     .42   55.00
2390          UI     68.    262.    399.    586.    792.    554.    390.    234.    116.     73.
2391          UI     28.     21.     21.      0.      0.      0.      0.      0.      0.      0.
2392          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2393          KK   RET91
2394          KM   RETAIN 100YR 2HR VOLUME
2395          DT     D91      38
2396          DI       0   10000
2397          DQ       0   10000
              *
              * DDM   ***** Preserved *****
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2398          KK    CP91
2399          KM     COMBINE 91, 90, AND 86 AT EMF NEAR THE RITTENHOUSE CHANNEL
2400          HC       3
              *
              * DDM   ***** Preserved *****

2401          KK  91TEMF
2402          KM   ROUTE 91 TO EMF
2403          KO                                      21
2404          RS       4    FLOW      -1
2405          RC   0.035   0.022   0.035    4000   0.003
2406          RX       0     200     230     240     270     280     310     410
2407          RY       9       7       6       0       0       6       7       9
              *
              * DDM   ***** Preserved *****

2408          KK  EMFRIT   Revised by Dibble & Associates to remove combination at "RITTEN"
2409          KM   COMBINE HYDROGRAPHS EMFRT1 AND 91TEMF
2410          HC       2
              *
              *
              *
              *
              *   ***********  modifications by Dibble & Associates ***************
              *
              * THE MODEL SEO2ALT2.DAT WAS USED AS A STARTING POINT AND THIS SECTION OF
              * COMMENTS REPLACES THE PERVIOUS COMMENTS. -DCF 5.10.01
              *
              * RAY BASIN REMOVED
              *
              * GM Subbasins updated to reflect future developed conditions.
              *
              *
              * Tuesday, November 20, 2001
2411          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  147       SOSS
               V
               V
  152      RSOSS
               .
               .
  158          .         59A
               .           .
               .           .
  170          .           .-------->    D59A
  168          .        R59A
               .           .
               .           .
  173       C59A............
               V
               V
  176     59A59B
               .
               .
  183          .         59B
               .           .
               .           .
  197          .           .-------->    D59B
  195          .        R59B
               .           .
               .           .
  200       C59B............
               V
               V
  203     59BT60
               .
               .
  209          .          60
               .           .
               .           .
  226          .           .-------->     D60
```

```
224          .        R60
             .          .
             .          .
229     EMFGUA............
             V
             V
233     GUATEL
             .
             .
239          .         64
             .          .
             .          .
256          .          .-------->     D64
250          .        R64
             .          .
             .          .
259     EMFELL............
             V
             V
262     ELTWAR
             .
             .
268          .        62B
             .          .
             .          .
279          .          .-------->    D62B
277          .       R62B
             .          V
             .          V
282          .      62BTD
             .          .
             .          .
288          .          .         62D
             .          .           .
             .          .           .
301          .          .           .-------->    D62D
299          .          .       R62D
             .          .           .
             .          .           .
304          .      CP62D............
             .          V
             .          V
307          .      62DTF
             .          .
             .          .
313          .          .         62F
             .          .           .
             .          .           .
325          .          .           .-------->    D62F
323          .          .       R62F
             .          .           .
             .          .           .
328          .      CP62F............
             .          V
             .          V
331          .      62T63
             .          .
             .          .
338          .          .          63
             .          .           .
             .          .           .
350          .          .           .-------->     D63
348          .          .         R63
             .          .           .
             .          .           .
353          .       CP63............
             .          V
             .          V
356          .      63T71
             .          .
             .          .
363          .          .         68B
             .          .           .
             .          .           .
374          .          .           .-------->    D68B
372          .          .         R68
             .          .           V
             .          .           V
377          .          .     68BT69
             .          .           .
             .          .           .
383          .          .           .          69
             .          .           .           .
             .          .           .           .
394          .          .           .           .-------->     D69
392          .          .           .         R69
             .          .           .           .
             .          .           .           .
397          .          .         C69............
             .          .           V
             .          .           V
400          .          .      69T71
             .          .           .
             .          .           .
406          .          .           .          71
             .          .           .           .
             .          .           .           .
418          .          .           .           .-------->     D71
416          .          .           .         R71
```

```
                .          .          .          .
                .          .          .          .
421             .        C71.......................
                .          V
                .          V
427             .      71T72
                .          .
                .          .
434             .          .          72
                .          .          .
                .          .          .
446             .          .          .-------->     D72
444             .          .        R72
                .          .          .
                .          .          .
449             .     CPKNOX............
                .          .
                .          .
452       EMFWAR............
                V
                V
455       WARTKN
                .
                .
461             .        70B
                .          .
                .          .
473             .          .-------->    D70B
471             .      R70B
                .          V
                .          V
476             .     70BT76
                .          .
                .          .
482             .          .         76B
                .          .          .
                .          .          .
494             .          .          .-------->    D76B
492             .          .       R76B
                .          .          .
                .          .          .
497             .      KNOX............
                .          .
                .          .
501       EMFKNX............
                V
                V
505       KNXTRY
                .
                .
511             .        65A
                .          .
                .          .
524             .          .-------->    D65A
522             .      R65A
                .          .
                .          .
527             .          .      CAP1A
                .          .          V
                .          .          V
536             .          .     RCAP1A
                .          .          V
                .          .          V
546             .          .     RRCP1A
                .          .          .
                .          .          .
554             .          .          .       CAP1B
                .          .          .          V
                .          .          .          V
563             .          .          .     RCAP1B
                .          .          .          .
                .          .          .          .
571             .     C65A1.......................
                .          V
                .          V
574             .     65ATB1
                .          .
                .          .
585             .          .-------->   DB65A
582             .     DIDB65
                .          V
                .          V
588             .     65B1T2
                .          .
                .          .
597             .          .          .<--------   DB65A
595             .          .     DIB65P
                .          .          V
                .          .          V
598             .          .      DB65A
                .          .          .
                .          .          .
607             .     C65A2............
                .          V
                .          V
610             .     65AT-1
                .          V
                .          V
618             .     65AT-2
```

```
                .          .
                .          .
627             .          .        65AW
                .          .          .
                .          .          .
639             .          .          .-------->   D65AW
637             .          .       R65AW
                .          .          V
                .          .          V
642             .          .      65AT65
                .          .          .
                .          .          .
649             .          .          .        65B
                .          .          .          .
                .          .          .          .
662             .          .          .          .-------->    D65B
660             .          .          .       R65B
                .          .          .          .
                .          .          .          .
665             .          .       CP65B............
                .          .          .
                .          .          .
673             .          .          .-------->  DIRS65
669             .          .       DI65B
                .          .          .
                .          .          .
676             .       CP65A............
                .          V
                .          V
680             .      65AT-3
                .          .
                .          .
685             .          .          .<--------  DIRS65
683             .          .       DR65B
                .          .          V
                .          .          V
686             .          .       RS65A
                .          .          .
                .          .          .
694             .        CP65............
                .          V
                .          V
698             .       65T66
                .          V
                .          V
701             .      65T66A
                .          V
                .          V
704             .      65T66B
                .          .
                .          .
707             .          .      ADOT-E
                .          .          V
                .          .          V
712             .          .      AET67A
                .          .          .
                .          .          .
719             .          .          .        67A
                .          .          .          .
                .          .          .          .
731             .          .          .          .-------->    D67A
729             .          .          .       R67A
                .          .          .          .
                .          .          .          .
734             .          .        C67A............
                .          .          V
                .          .          V
737             .          .       67ATC
                .          .          .
                .          .          .
743             .          .          .       SUP2
                .          .          .          V
                .          .          .          V
747             .          .          .      RSUP2
                .          .          .          .
                .          .          .          .
754             .          .          .          .         67B
                .          .          .          .           .
                .          .          .          .           .
766             .          .          .          .           .-------->    D67B
764             .          .          .          .        R67B
                .          .          .          .           .
                .          .          .          .           .
769             .          .          .       C67B............
                .          .          .          V
                .          .          .          V
772             .          .          .      67BTC
                .          .          .          .
                .          .          .          .
780             .          .          .          .         67C
                .          .          .          .           .
                .          .          .          .           .
793             .          .          .          .           .-------->    D67C
791             .          .          .          .        R67C
                .          .          .          .           .
                .          .          .          .           .
796             .          .        C67C........................
                .          .          V
                .          .          V
```

```
799          .           .      67CT67
             .           .          .
             .           .          .
807          .           .          .        67D
             .           .          .          .
             .           .          .          .
819          .           .          .          .-------->    D67D
817          .           .          .       R67D
             .           .          .          .
             .           .          .          .
822          .           .       C67D............
             .           .          V
             .           .          V
825          .           .      67DT66
             .           .          .
             .           .          .
833          .           .          .        66A
             .           .          .          .
             .           .          .          .
845          .           .          .          .-------->    D66A
843          .           .          .       R66A
             .           .          .          V
             .           .          .          V
848          .           .          .      66ATB
             .           .          .          .
             .           .          .          .
854          .           .          .          .         66B
             .           .          .          .          .
             .           .          .          .          .
867          .           .          .          .          .-------->    D66B
865          .           .          .          .        R66B
             .           .          .          .          .
             .           .          .          .          .
870          .           .          .      CP66B............
             .           .          .          V
             .           .          .          V
873          .           .          .      66BTC
             .           .          .          .
             .           .          .          .
879          .           .          .          .         66C
             .           .          .          .          .
             .           .          .          .          .
891          .           .          .          .          .-------->    D66C
889          .           .          .          .        R66C
             .           .          .          .          .
             .           .          .          .          .
894          .           .          .     CP66C1............
             .           .          .          .
             .           .          .          .
898          .           .      CP66C2............
             .           .          .
             .           .          .
904          .           .          .-------->    404A
902          .           .       DI67E
             .           .          .
             .           .          .
910          .           .          .-------->    DB66
907          .           .       DI66
             .           .          V
             .           .          V
913          .           .      66C1T2
             .           .          .
             .           .          .
921          .       CP66C............
             .           V
             .           V
924          .       66CTD
             .           .
             .           .
931          .           .          .<--------    DB66
929          .           .       DR66
             .           .          V
             .           .          V
932          .           .      RS66D1
             .           .          .
             .           .          .
945          .           .          .-------->    D-WB
942          .           .       B-WA
             .           .          .
             .           .          .
948          .        C-WA............
             .           V
             .           V
951          .       RC-WA
             .           .
             .           .
957          .           .          .<--------    D-WB
955          .           .       DR-WA
             .           .          V
             .           .          V
958          .           .      RS66D2
             .           .          .
             .           .          .
968          .       CP66D............
             .           V
             .           V
972          .      66T66D
             .           V
             .           V
```

```
 976          .      66-66D
              .          .
              .          .
 980          .          .         66D
              .          .          .
              .          .          .
 992          .          .          .-------->    D66D
 989          .          .       R66D
              .          .          .
              .          .          .
 995          .       C66D............
              .          V
              .          V
1001          .      66T70B
              .          V
              .          V
1004          .       CULVT
              .          V
              .          V
1007          .      66T70C
              .          .
              .          .
1014          .          .         62A
              .          .          .
              .          .          .
1025          .          .          .-------->    D62A
1023          .          .       R62A
              .          .          V
              .          .          V
1028          .          .      62ATC
              .          .          .
              .          .          .
1034          .          .          .         62C
              .          .          .          .
              .          .          .          .
1046          .          .          .          .-------->    D62C
1044          .          .          .        R62C
              .          .          .          .
              .          .          .          .
1049          .          .       C62C............
              .          .          V
              .          .          V
1052          .          .      62CTE
              .          .          .
              .          .          .
1059          .          .          .         62E
              .          .          .          .
              .          .          .          .
1071          .          .          .          .-------->    D62E
1069          .          .          .        R62E
              .          .          .          .
              .          .          .          .
1074          .          .      CP62E............
              .          .          .
              .          .          .
1077          .          .          .         61A
              .          .          .          .
              .          .          .          .
1089          .          .          .          .-------->    D61A
1087          .          .          .        R61A
              .          .          .          V
              .          .          .          V
1092          .          .          .       61ATB
              .          .          .          .
              .          .          .          .
1098          .          .          .          .         61B
              .          .          .          .          .
              .          .          .          .          .
1111          .          .          .          .          .-------->    D61B
1109          .          .          .          .        R61B
              .          .          .          .          .
              .          .          .          .          .
1114          .          .          .       CP61B............
              .          .          .          V
              .          .          .          V
1117          .          .          .      61T62E
              .          .          .          .
              .          .          .          .
1123          .          .      CP62E2............
              .          .          V
              .          .          V
1126          .          .      62T68A
              .          .          .
              .          .          .
1133          .          .          .         68A
              .          .          .          .
              .          .          .          .
1144          .          .          .          .-------->    D68A
1142          .          .          .        R68A
              .          .          .          .
              .          .          .          .
1147          .          .       C68A1............
              .          .          .
              .          .          .
1152          .          .          .          .<--------    404A
1150          .          .          .        RD66
              .          .          .          V
              .          .          .          V
1153          .          .          .      RT404A
```

```
                .         .         .         .
                .         .         .         .
1159            .         .         .         .        67E
                .         .         .         .         .
                .         .         .         .         .
1172            .         .         .         .         .-------> D67E
1169            .         .         .         .       R67E
                .         .         .         .         .
                .         .         .         .         .
1175            .         .         .       C67E............
                .         .         .         V
                .         .         .         V
1178            .         .         .      67T68
                .         .         .         .
                .         .         .         .
1184            .         .      C68A2............
                .         .         V
                .         .         V
1187            .         .     68T70A
                .         .         .
                .         .         .
1195            .         .         .        70A
                .         .         .         .
                .         .         .         .
1206            .         .         .         .-------> D70A
1204            .         .         .       R70A
                .         .         .         .
                .         .         .         .
1209            .         .       C70A............
                .         .         .
                .         .         .
1212            .      C70A2............
                .         V
                .         V
1216            .     70T76A
                .         .
                .         .
1224            .         .        76A
                .         .         .
                .         .         .
1237            .         .         .-------> D76A
1235            .         .       R76A
                .         .         .
                .         .         .
1240            .      C76A............
                .         V
                .         V
1243            .     76ATPR
                .         .
                .         .
1251      EMFSTN............
                V
                V
1254      KNXTRY
                .
                .
1260            .       73A
                .         V
                .         V
1274            .      73ATB
                .         .
                .         .
1280            .         .        73B
                .         .         .
                .         .         .
1292            .         .         .-------> D73B
1290            .         .       R73B
                .         .         .
                .         .         .
1295            .      CP73B............
                .         V
                .         V
1298            .      73BTC
                .         .
                .         .
1305            .         .        73C
                .         .         .
                .         .         .
1316            .         .         .-------> D73C
1314            .         .       R73C
                .         .         .
                .         .         .
1319            .      CP73C............
                .         V
                .         V
1322            .     73T74C
                .         .
                .         .
1328            .         .        74A
                .         .         V
                .         .         V
1342            .         .      DB74A
                .         .         V
                .         .         V
1352            .         .      74ATB
                .         .         .
                .         .         .
1358            .         .         .        74B
                .         .         .         .
```

```
                                                  .
                                                  .
1370                                              .-------->   D74B
1368                                        R74B
                                                  .
                                                  .
1373                                  CP74B............
                                          V
                                          V
1376                                  74BTC
                                                  .
                                                  .
1382                                          74C
                                                  .
                                                  .
1393                                              .-------->   D74C
1391                                        R74C
                                                  .
                                                  .
1396                            CP74C........................
                                    V
                                    V
1399                            74CT75
                                    .
                                    .
1406                                  75
                                                  .
                                                  .
1427                                              .-------->   RET75
1425                                        D75
                                                  .
                                                  .
1430                              C75............
                                    V
                                    V
1433                            75TPC
                                    .
                                    .
1439                                        77A
                                          V
                                          V
1455                                  77ATB
                                                  .
                                                  .
1461                                          77B
                                                  .
                                                  .
1473                                              .-------->   D77B
1471                                        R77B
                                                  .
                                                  .
1476                                  CP77B............
                                          V
                                          V
1479                                  77BTC
                                                  .
                                                  .
1486                                          77C
                                                  .
                                                  .
1497                                              .-------->   D77C
1495                                        R77C
                                                  .
                                                  .
1500                                   C77C............
                                          V
                                          V
1503                                 77CT78
                                                  .
                                                  .
1508                                          78A
                                                  V
                                                  V
1524                                         78ATB
                                                  .
                                                  .
1530                                                      78B
                                                            .
                                                            .
1542                                         C78B............
                                                  V
                                                  V
1545                                         78BTC
                                                  .
                                                  .
1552                                                      78C
                                                            .
                                                            .
1563                                                        .-------->   D78C
1561                                                    R78C
                                                            .
                                                            .
1566                                   C78C........................
                                          V
                                          V
1569                                 78CT79
                                                  .
                                                  .
1576                                          79A
                                                  .
```

```
1593                                  .-------> DET79A
1591                            D79A
                                  .
                                  .
1596                      C79A1............
                                  .
                                  .
1599                             79B
                                  .
                                  .
1614                                  .-------> RET79B
1612                            D79B
                                  .
                                  .
1617                      C79A2............
                                  .
                                  .
1620                             78F
                                  .
                                  .
1637                                  .       82A1
                                  .          .
                                  .          .
1652                            C82A1............
                                   V
                                   V
1656                            DB82A1
                                   V
                                   V
1665                             PS-9
                                  .
                                  .
1672                                  .       CAP2
                                  .          V
                                  .          V
1681                                  .      RCAP2
                                  .          .
                                  .          .
1688                                  .          .       82A2
                                  .          .          .
                                  .          .          .
1708                                  .     CP82A2............
                                  .          .
                                  .          .
1711                                  .          .       82A4
                                  .          .          V
                                  .          .          V
1727                                  .          .     82A4T3
                                  .          .          .
                                  .          .          .
1734                                  .          .          .       82A3
                                  .          .          .          .
                                  .          .          .          .
1751                                  .          .     CP82A3............
                                  .          .          .
                                  .          .          .
1754                                  .     CP82A5............
                                  .          V
                                  .          V
1757                                  .      DB82B
                                  .          V
                                  .          V
1766                                  .      MN-1
                                  .          .
                                  .          .
1773                            CP82A6............
                                   V
                                   V
1776                            82TBOX
                                   V
                                   V
1783                            BOXCLV
                                   V
                                   V
1790                            BOXT78
                                  .
                                  .
1797                                  .       78D
                                  .          .
                                  .          .
1809                                  .          .-------> D78D
1807                                  .      R78D
                                  .          .
                                  .          .
1812                                  .          .       82B
                                  .          .          .
                                  .          .          .
1824                                  .          .          .-------> D82
1822                                  .          .       R82
                                  .          .          .
                                  .          .          .
1830                                  .          .          .-------> TRW
1827                                  .          .     DTTRW
                                  .          .          .
                                  .          .          .
1833                            C78D........................
                                   V
                                   V
```

```
1837                                  78DTE
                                        .
                                        .
1844                                    .        78E
                                        .         .
                                        .         .
1858                                    .         .-------> RET78E
1856                                    .       D78E
                                        .         .
                                        .         .
1861                                    .         .         83
                                        .         .          .
                                        .         .          .
1873                                    .         .          .------->    D83
1871                                    .         .       R83
                                        .         .          .
                                        .         .          .
1876                                    .       C78E.......................
                                        .         V
                                        .         V
1879                                    .      78ET84
                                        .         .
                                        .         .
1887                                    .         .         84
                                        .         .          .
                                        .         .          .
1899                                    .         .          .------->    D84
1897                                    .         .       R84
                                        .         .          .
                                        .         .          .
1902                                    .       C84............
                                        .         V
                                        .         V
1906                                    .       EC-4
                                        .         .
                                        .         .
1914                                    .     C79B3............
                                        .         V
                                        .         V
1917                                    .       EC-3
                                        .         V
                                        .         V
1924                                    .       EC-2
                                        .         V
                                        .         V
1931                                    .       EC-1
                                        .         .
                                        .         .
1938                                    .     CPPWR............
                                        .         V
                                        .         V
1942                                    .     PLF-2
                                        .         .
                                        .         .
1950                                    .         .       80A
                                        .         .         .
                                        .         .         .
1964                                    .         .-------> D80A
1962                                    .         .       R80A
                                        .         .         .
                                        .         .         .
1967                                    .     CP80A............
                                        .         V
                                        .         V
1971                                    .     PLF-1
                                        .         V
                                        .         V
1979                                    .    PWREMF
                                        .         .
                                        .         .
1988                            EMFPOW............
                                    V
                                    V
1991                            POWTWI
                                    .
                                    .
1998                                    .       80B
                                        .         .
                                        .         .
2013                                    .         .-------> D80B
2010                                    .      R80B
                                        .         .
                                        .         .
2016                            MFWILL............
                                    V
                                    V
2020                            WILTSP
                                    .
                                    .
2027                                    .       81A
                                        .         .
                                        .         .
2041                                    .         .-------> D81A
2039                                    .      R81A
                                        .         V
                                        .         V
2044                                    .     81ATB
                                        .         .
                                        .         .
```

```
2050          .           .         81B
              .           .           .
              .           .           .
2062          .           .           .-------->    D81B
2060          .           .       R81B
              .           .           .
              .           .           .
2065          .         C81............
              .           .
              .           .
2069     EMFRT1............
              .
              .
2073          .      SUB258
              .           .
              .           .
2081          .           .-------->    D258
2079          .        R258
              .           V
              .           V
2084          .       RO259
              .           .
              .           .
2087          .           .      SUB260
              .           .           .
              .           .           .
2094          .           .           .-------->    D260
2092          .           .       R260
              .           .           .
              .           .           .
2097          .       CO262............
              .           V
              .           V
2100          .       RO263
              .           .
              .           .
2103          .           .      SUB264
              .           .           .
              .           .           .
2110          .           .           .-------->    D264
2108          .           .       R264
              .           .           .
              .           .           .
2113          .       CO266............
              .           V
              .           V
2116          .       RO267
              .           .
              .           .
2119          .           .      SUB268
              .           .           .
              .           .           .
2126          .           .           .-------->    D268
2124          .           .       R268
              .           .           .
              .           .           .
2129          .       CO270............
              .           V
              .           V
2132          .       RO283
              .           .
              .           .
2135          .           .         88A
              .           .           .
              .           .           .
2146          .           .           .-------->    D88A
2144          .           .       R88A
              .           .           V
              .           .           V
2149          .           .      88AT89
              .           .           .
              .           .           .
2157          .           .           .         89A
              .           .           .           .
              .           .           .           .
2168          .           .           .           .-------->    D89A
2166          .           .           .        R89A
              .           .           .           .
              .           .           .           .
2171          .           .       C89A............
              .           .           V
              .           .           V
2174          .           .      89ATRI
              .           .           .
              .           .           .
2182          .        C283............
              .           V
              .           V
2186          .      283T90
              .           .
              .           .
2197          .           .         90A
              .           .           .
              .           .           .
2208          .           .           .-------->    D90A
2206          .           .       R90A
              .           .           .
              .           .           .
2211          .        C90A............
```

```
                 .          V
                 .          V
2214             .       90ATB
                 .          .
                 .          .
2222             .          .        87A
                 .          .          .
                 .          .          .
2233             .          .          .-------->    D87A
2231             .          .       R87A
                 .          .          V
                 .          .          V
2236             .          .      87ATB
                 .          .          .
                 .          .          .
2242             .          .          .        87B
                 .          .          .          .
                 .          .          .          .
2253             .          .          .          .-------->    D87B
2251             .          .          .       R87B
                 .          .          .          .
                 .          .          .          .
2256             .          .        C87............
                 .          .          V
                 .          .          V
2259             .          .     87T88B
                 .          .          .
                 .          .          .
2265             .          .          .        88B
                 .          .          .          .
                 .          .          .          .
2276             .          .          .          .-------->    D88B
2274             .          .          .       R88B
                 .          .          .          .
                 .          .          .          .
2279             .          .       C88B............
                 .          .          V
                 .          .          V
2282             .          .     88T89B
                 .          .          .
                 .          .          .
2288             .          .          .        89B
                 .          .          .          .
                 .          .          .          .
2299             .          .          .          .-------->    D89B
2297             .          .          .       R89B
                 .          .          .          .
                 .          .          .          .
2302             .          .       C89B............
                 .          .          V
                 .          .          V
2305             .          .     89TB90
                 .          .          .
                 .          .          .
2311             .          .          .        90B
                 .          .          .          .
                 .          .          .          .
2325             .          .          .          .-------->    D90B
2323             .          .          .       R90B
                 .          .          .          .
                 .          .          .          .
2328             .        C90........................
                 .          V
                 .          V
2331             .       90T91
                 .          .
                 .          .
2338             .          .         85
                 .          .          .
                 .          .          .
2350             .          .          .-------->     D85
2348             .          .        R85
                 .          .          V
                 .          .          V
2353             .          .      85T86
                 .          .          .
                 .          .          .
2359             .          .          .         86
                 .          .          .          .
                 .          .          .          .
2371             .          .          .          .-------->     D86
2369             .          .          .        R86
                 .          .          .          .
                 .          .          .          .
2374             .          .        C86............
                 .          .          V
                 .          .          V
2377             .          .      86T91
                 .          .          .
                 .          .          .
2383             .          .          .         91
                 .          .          .          .
                 .          .          .          .
2395             .          .          .          .-------->     D91
2393             .          .          .      RET91
                 .          .          .          .
                 .          .          .          .
2398             .        CP91........................
                 .          V
```

```
                .          V
 2401           .       91TEMF
                .          .
                .          .
 2408      EMFRIT............

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*          SEPTEMBER 1990           *
*           VERSION 4.0             *
*                                   *
*  RUN DATE  05/18/2005  TIME  14:02:07 *
*                                   *
*************************************

                                    *************************************
                                    *                                   *
                                    *   U.S. ARMY CORPS OF ENGINEERS    *
                                    *   HYDROLOGIC ENGINEERING CENTER   *
                                    *         609 SECOND STREET         *
                                    *      DAVIS, CALIFORNIA 95616      *
                                    *        (916) 756-1104             *
                                    *                                   *
                                    *************************************

Project ID: ELLSWORTH - Major Basin: 01 - Return Period: 10 YEARS
MODIFIED BY AMEC FOR SCOUR ANALYSIS 5-2005
THIS MODEL IS THE FUTURE CONDITIONS MODEL FOR THE ELLSWORTH ROAD IMPROVEMENTS
AND CHANNEL DESIGN PROJECT.  IT HAS BEEN CHANGED FROM THE PREVIOUS MODEL BY
REDIRECTING FLOWS FROM SUBBASINS 61A, 61B, AND 67E TO FOLLOW THEIR EXISTING
CONDITIONS FLOW PATHS - WEST ACROSS ELLSWORTH ROAD.  THE PREVIOUS MODEL HAD
FLOWS FROM THESE SUBBASINS FLOWING SOUTH DOWN ELLSWORTH ROAD TO SUBBASIN 66D.
(cwr 4/17/03)

*************************************************************************

  THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
  IT HAS BEEN MODIFIED BY CPE (7/2000)
  FOR ALTERNATIVE 2 FOR THE EAST MARICOPA FLOOWAY
  CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
  TO ROUTE BOTH THE POWERLINE FLOOWAY
  AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
  INTO THE EMF
  JD RECORDS MODIFIED BY AMEC TO ESTABLISH 10-YEAR RUNOFF FOR USE IN
  THE SCOUR ANALYSIS OF THE PROPOSED ELLSWORTH CHANNEL (5-2005)
 ***************************************************************

      Model files changed by Collins/Pina Engineering
      to reflect multi-use design concepts (recreation
      and environment) proposed throughout the entire
      EMF Corridor.    July 2000

  VERSION 8.06  CPE 7/31/00

*************************************************************************

*************************************************************************
 FILENAME: MIDDOUT.DAT

 ALL CIP INFRASTRUCTURE IS IN PLACE, FUTURE CONDITIONS LANDUSE IS IN PLACE
 FLOW IS ROUTED UP ELLSWORTH ROAD IN A EARTH LINED CHANNEL

*************************************************************************
 PRODUCED BY DIBBLE AND ASSOCIATES AND HOSKIN ENGINEERING CONSULTANTS.
 File Name: Final8.Dat
 Revised - Jan. 2000 by SZ (Wood/Patel) From Final7.dat - new Z-V & Sideweir
 Revised - Jan. 2000 by SZ (Wood/Patel) from Final6.dat - 60% review comments
 Revised - Dec. 1999 by SZ (Wood/Patel) from Final5.dat
 Revised - Dec. 1999 by SZ (Wood/Patel) from Final4.dat
 Revised - Nov. 1999 by SZ (Wood/Patel) from Final3.dat
 Revised - June 1999 by SZ (Wood/Patel) for Final Model from Opt1.dat.
 Revised - May 1999 by SZ (Wood/Patel) for Option 1, Based on Model SDIB.DAT
 REVISED - MAY, 1999 BY VAS TO INCORPORATE INCREASE OF SUBBASIN RETENTION AND
           REVISIONS TO THE REGIONAL DETENTION BASIN STORAGE
 REVISED - FEB, 1999 BY VALERIE SWICK, FCD OF MARICOPA COUNTY
 REVISED - MAY, 1998 BY D&A

 REVISED BY VALERIE SWICK, FEB. 26, 1998

 FLOWS FROM DETENTION BASIN LOCATED AT NE CORNER OF ELLIOT AND ELLSWORTH ROADS
 IS ROUTED TO THE SOUTHWEST BY SIPHON DRAW TO SUBBASIN 70A. FROM THERE THEY
 WILL BE ROUTED BY A CHANNEL TO THE EMF. FLOWS FROM SUBBASINS ADJACENT TO
 SANTAN FREEWAY ALIGNMENT WILL BE ROUTED SOUTH TO SUBBASIN 70A WHERE THEY WILL
 BE COMBINED WITH FLOW IN SIPHON DRAW.

 EAST MESA AREA DRAINAGE MASTER PLAN
 AREA SOUTH OF SUPERSTITION (U.S. HWY 60)
 AUGUST 1997
 SOUTHEAST MESA HIGH RESOLUTION MODEL

 ***********FUTURE CONDITION MODEL OF THE WATERSHED************************

************ATTENTION*****************************************************
  SUBBASINS 75, 79A, 79B, 78E,  LANDUSES WERE NOT
  CHANGED BECAUSE IT WAS FELT THAT THEIR FUTURE CONDITIONS LANDUSES WOULD BE
  SIMILAR TO THE EXISTING CONDITIONS LANDUSES.
  RETENTION VOLUMES WILL ALSO NOT BE UTILIZED FOR SUBBASINS 75, 79A, 79B, 78E
  SOME QUEEN CREEK SUBBASINS WILL ALSO NOT HAVE RETENTION VOLUMES, EITHER
  BECAUSE THEY LIE IN PINAL COUNTY AND WE DONT KNOW PINAL COUNTIES PLANS OR
  THEY LIE IN THE SANTAN MOUNTAINS AND WON'T GET DEVELOPED
  WILLIAMS GATEWAY AIRPORT (SUBBASINS 80A, 80B, 81A, AND 81B) ARE MODELED AS
```

```
                    FUTURE CONDITIONS AND HAVE RETENTION VOLUMES FOR THE 100YR 2HR STORM
                    ***********************************************************************
                    FILENAME:  SDIBB.DAT

                    THIS MODEL REPRESENTS THE FUTURE CONDITION OF THE WATERSHED.
                    TOTAL DRAINAGE AREA IS APPROXIMATELY 213 SQ. MI.
                    THIS MODEL USES A Kn VALUE OF 0.09 FOR DESERT LAND USE DUE TO SHEET FLOW
                    CONDITIONS.

                    10 -YEAR 24-HOUR FREQUENCY
                    AREAL REDUCTIONS FROM FCD HYDROLOGY MANUAL
                    THIS MODEL INCLUDES INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY
                    AND EAST OF THE CAP

                    DATA FROM THE QUEEN CREEK ADMS HAS BEEN ADDED TO CALCULATE FLOWS INTO THE
                    EMF.   MUSKINGUM ROUTING NSTEPS WERE ADJUSTED TO BE WITHIN THE SUGGESTED
                    RANGE.

                    METHODOLOGY
                    THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
                    SCS TYPE II RAINFALL DISTRIBUTION
                    S-GRAPH HYDROGRAPH
                    GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
                    NORMAL DEPTH STORAGE CHANNEL ROUTING
                    APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
                    EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
                    DATED 1994
                    THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS

                    ORIGINAL STUDY PERFORMED BY LISA C. YOUNG AND AFSHIN AHOURAIYAN, UPDATED BY
                    DAVID DEGERNESS (OCT-DEC, 1996). REVIEWED BY VALERIE A. SWICK
                    AND AMIR MOTAMEDI OF THE FLOOD CONTROL DISTRICT
                    HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
                    DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.

                    ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2-3 FT/SEC FOR WASH/NATURAL
                    CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL

                    VELOCITIES FOR ADMP IMPROVEMENT CHANNELS FROM DIBBLE AND ASSOCIATES
                    SUGGESTED ALTERNATIVES (JULY 1, 1997)


                    NOTE: MUST USE NDIBF.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
                          SUPERSTITION FREEWAY.

                    DDM MCUHP2 SE MESA ADMP - SOUTH OF SUPERSTITION FWY, FUTURE CONDITIONS

*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

 126 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1APR97  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2APR97  ENDING DATE
                      NDTIME        0055  ENDING TIME
                       ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT

 128 JD          INDEX STORM NO. 1
                        STRM       2.30  PRECIPITATION DEPTH
                        TRDA        .01  TRANSPOSITION DRAINAGE AREA

 129 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                      .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

139 JD INDEX STORM NO. 2

STRM 2.29 PRECIPITATION DEPTH
TRDA 1.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

140 JD INDEX STORM NO. 3

STRM 2.23 PRECIPITATION DEPTH
TRDA 5.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

141 JD INDEX STORM NO. 4

STRM 2.16 PRECIPITATION DEPTH
TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01

```
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00
142 JD        INDEX STORM NO. 5
                 STRM        2.07  PRECIPITATION DEPTH
                 TRDA       30.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00
143 JD        INDEX STORM NO. 6
                 STRM        1.98  PRECIPITATION DEPTH
                 TRDA       60.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00
144 JD        INDEX STORM NO. 7
                 STRM        1.95  PRECIPITATION DEPTH
                 TRDA       90.00  TRANSPOSITION DRAINAGE AREA

  0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

145 JD INDEX STORM NO. 8
STRM 1.92 PRECIPITATION DEPTH
TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

146 JD INDEX STORM NO. 9
STRM 1.90 PRECIPITATION DEPTH
TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

-----DSS---ZOPEN: Version: 6-EA; New File Opened
Unit: 71, File: ELLS10.DSS
-----DSS*** ZRRTS: CAUTION - Data block not found in file. Unit: 71
Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
-----DSS*** ZRRTS: CAUTION - Data block not found in file. Unit: 71
Pathname: /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/

****** WARNING RDTIMS - MISSING FLOW IN DSS FILE - READ AND INTERPOLATED VALUES SET TO ZERO ******

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 229 KK     *    EMFGUA  *
            *            *
            **************

 231 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .083  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 250 KK     *       R64  *
            *            *
            **************

 255 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .083  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 449 KK     *    CPKNOX  *
            *            *
            **************

 450 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .083  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 497 KK     *      KNOX  *
            *            *
            **************

 499 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .083  TIME INTERVAL IN HOURS

-----DSS*** ZRRTS:  CAUTION - Data block not found in file.  Unit:  71
Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
-----DSS*** ZRRTS:  CAUTION - Data block not found in file.  Unit:  71
Pathname: /ADOT EAST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
```

****** WARNING RDTIMS - MISSING FLOW IN DSS FILE - READ AND INTERPOLATED VALUES SET TO ZERO ******

```
-----DSS*** ZRRTS:  CAUTION - Data block not found in file.  Unit:  71
Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
-----DSS*** ZRRTS:  CAUTION - Data block not found in file.  Unit:  71
Pathname: /ADOT WEST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/

****** WARNING RDTIMS - MISSING FLOW                IN DSS FILE - READ AND INTERPOLATED VALUES SET TO ZERO ******

        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
1979 KK     *    PWREMF  *
            *            *
            **************

1983 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
1998 KK     *       80B  *
            *            *
            **************

2003 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
2010 KK     *      R80B  *
            *            *
            **************

2012 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
2065 KK     *       C81  *
            *            *
            **************

2067 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         300  LAST ORDINATE PUNCHED OR SAVED
```

```
                TIMINT        .083  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            *************
            *           *
2401 KK     *   91TEMF  *
            *           *
            *************

2403 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        300  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .083  TIME INTERVAL IN HOURS
                !
1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
                                   TIME IN HOURS,  AREA IN SQUARE MILES
```

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SOSS	0.	.08	0.	0.	0.	12.50		
+	ROUTED TO	RSOSS	0.	.08	0.	0.	0.	12.50		
+	HYDROGRAPH AT	59A	158.	12.33	22.	7.	7.	.26		
+	DIVERSION TO	D59A	5.	10.58	3.	1.	1.	.26		
+	HYDROGRAPH AT	R59A	158.	12.33	22.	6.	6.	.26		
+	2 COMBINED AT	C59A	142.	12.33	20.	6.	5.	12.76		
+	ROUTED TO	59A59B	91.	12.83	20.	6.	5.	12.76		
+	HYDROGRAPH AT	59B	322.	12.83	68.	21.	20.	.94		
+	DIVERSION TO	D59B	322.	12.83	68.	21.	20.	.94		
+	HYDROGRAPH AT	R59B	0.	.08	0.	0.	0.	.94		
+	2 COMBINED AT	C59B	91.	12.83	20.	6.	5.	13.70		
+	ROUTED TO	59BT60	77.	13.42	20.	5.	5.	13.70		
+	HYDROGRAPH AT	60	570.	13.50	197.	63.	61.	2.30		
+	DIVERSION TO	D60	570.	13.50	197.	63.	61.	2.30		
+	HYDROGRAPH AT	R60	0.	.08	0.	0.	0.	2.30		
+	2 COMBINED AT	EMFGUA	77.	13.42	20.	5.	5.	16.00		
+	ROUTED TO	GUATEL	36.	15.00	19.	5.	5.	16.00		
+	HYDROGRAPH AT	64	525.	12.42	91.	31.	30.	.81		
+	DIVERSION TO	D64	525.	12.42	91.	31.	30.	.81		
+	HYDROGRAPH AT	R64	0.	.08	0.	0.	0.	.81		
+	2 COMBINED AT	EMFELL	36.	15.00	19.	5.	5.	16.81		
+	ROUTED TO	ELTWAR	27.	16.67	18.	5.	5.	16.81		

+	HYDROGRAPH AT	62B	332.	12.00	33.	12.	11.	.23
+	DIVERSION TO	D62B	332.	12.00	33.	10.	9.	.23
+	HYDROGRAPH AT	R62B	10.	14.08	6.	2.	2.	.23
+	ROUTED TO	62BTD	7.	16.42	5.	2.	2.	.23
+	HYDROGRAPH AT	62D	341.	12.17	50.	17.	16.	.46
+	DIVERSION TO	D62D	341.	12.17	50.	17.	16.	.46
+	HYDROGRAPH AT	R62D	0.	.08	0.	0.	0.	.46
+	2 COMBINED AT	CP62D	7.	16.42	5.	2.	2.	.69
+	ROUTED TO	62DTF	6.	17.83	5.	2.	2.	.69
+	HYDROGRAPH AT	62F	240.	12.17	29.	10.	9.	.26
+	DIVERSION TO	D62F	240.	12.17	29.	9.	9.	.26
+	HYDROGRAPH AT	R62F	3.	18.83	2.	1.	1.	.26
+	2 COMBINED AT	CP62F	9.	18.83	7.	2.	2.	.95
+	ROUTED TO	62T63	9.	20.25	7.	2.	2.	.95
+	HYDROGRAPH AT	63	680.	12.33	104.	35.	34.	.91
+	DIVERSION TO	D63	680.	12.33	104.	35.	34.	.91
+	HYDROGRAPH AT	R63	0.	.08	0.	0.	0.	.91
+	2 COMBINED AT	CP63	9.	20.25	7.	2.	2.	1.86
+	ROUTED TO	63T71	7.	21.83	5.	1.	1.	1.86
+	HYDROGRAPH AT	68B	359.	12.00	36.	12.	12.	.25
+	DIVERSION TO	D68B	359.	12.00	36.	12.	12.	.25
+	HYDROGRAPH AT	R68	3.	21.58	2.	0.	0.	.25
+	ROUTED TO	68BT69	3.	23.83	1.	0.	0.	.25
+	HYDROGRAPH AT	69	128.	12.00	13.	5.	4.	.09
+	DIVERSION TO	D69	128.	12.00	13.	5.	4.	.09
+	HYDROGRAPH AT	R69	1.	22.25	0.	0.	0.	.09
+	2 COMBINED AT	C69	5.	23.75	2.	0.	0.	.34
+	ROUTED TO	69T71	1.	24.92	0.	0.	0.	.34
+	HYDROGRAPH AT	71	1199.	12.17	160.	55.	53.	1.09
+	DIVERSION TO	D71	1199.	12.17	160.	53.	51.	1.09
+	HYDROGRAPH AT	R71	15.	23.08	8.	2.	2.	1.09
+	3 COMBINED AT	C71	22.	23.75	9.	2.	2.	3.29
+	ROUTED TO	71T72	22.	24.00	8.	2.	2.	3.29

+	HYDROGRAPH AT	72	871.	12.17	125.	43.	42.	.84
+	DIVERSION TO	D72	871.	12.17	125.	42.	40.	.84
+	HYDROGRAPH AT	R72	12.	21.33	6.	2.	1.	.84
+	2 COMBINED AT	CPKNOX	33.	23.83	9.	2.	2.	4.13
+	2 COMBINED AT	EMFWAR	27.	16.67	18.	5.	5.	20.94
+	ROUTED TO	WARTKN	24.	17.42	17.	5.	5.	20.94
+	HYDROGRAPH AT	70B	403.	12.17	57.	19.	19.	.38
+	DIVERSION TO	D70B	403.	12.17	57.	19.	18.	.38
+	HYDROGRAPH AT	R70B	5.	23.67	1.	0.	0.	.38
+	ROUTED TO	70BT76	3.	24.75	0.	0.	0.	.38
+	HYDROGRAPH AT	76B	726.	12.17	98.	33.	32.	.64
+	DIVERSION TO	D76B	726.	12.17	98.	33.	32.	.64
+	HYDROGRAPH AT	R76B	8.	23.92	1.	0.	0.	.64
+	2 COMBINED AT	KNOX	8.	23.92	1.	0.	0.	1.02
+	2 COMBINED AT	EMFKNX	24.	17.42	17.	5.	5.	21.96
+	ROUTED TO	KNXTRY	22.	18.25	16.	5.	5.	21.96
+	HYDROGRAPH AT	65A	1497.	12.50	301.	101.	98.	2.54
+	DIVERSION TO	D65A	1497.	12.50	300.	88.	84.	2.54
+	HYDROGRAPH AT	R65A	57.	15.92	39.	14.	13.	2.54
+	HYDROGRAPH AT	CAP1A	217.	2.00	217.	213.	207.	.01
+	ROUTED TO	RCAP1A	218.	2.33	217.	212.	204.	.01
+	ROUTED TO	RRCP1A	217.	2.67	217.	211.	203.	.01
+	HYDROGRAPH AT	CAP1B	217.	2.00	217.	213.	207.	.01
+	ROUTED TO	RCAP1B	218.	2.33	217.	212.	204.	.01
+	3 COMBINED AT	C65A1	491.	15.92	473.	436.	421.	2.56
+	ROUTED TO	65ATB1	488.	16.17	473.	434.	418.	2.56
+	DIVERSION TO	DB65A	54.	16.17	39.	14.	13.	2.56
+	HYDROGRAPH AT	DIDB65	434.	3.58	434.	420.	404.	2.56
+	ROUTED TO	65B1T2	434.	3.42	434.	419.	404.	2.56
+	HYDROGRAPH AT	DIB65P	54.	16.17	39.	14.	13.	2.56
+	ROUTED TO	DB65A	25.	24.08	24.	7.	7.	2.56
+	2 COMBINED AT	C65A2	459.	24.08	458.	427.	411.	2.56
	ROUTED TO	65AT-1	459.	24.17	458.	426.	410.	2.56

+	ROUTED TO	65AT-2	459.	24.58	457.	410.	395.	2.56
+	HYDROGRAPH AT	65AW	296.	12.33	38.	12.	11.	.43
+	DIVERSION TO	D65AW	296.	12.33	38.	12.	11.	.43
+	HYDROGRAPH AT	R65AW	0.	.08	0.	0.	0.	.43
+	ROUTED TO	65AT65	0.	.08	0.	0.	0.	.43
+	HYDROGRAPH AT	65B	889.	12.50	159.	52.	51.	1.37
+	DIVERSION TO	D65B	889.	12.50	159.	52.	51.	1.37
+	HYDROGRAPH AT	R65B	0.	.08	0.	0.	0.	1.37
+	2 COMBINED AT	CP65B	0.	.08	0.	0.	0.	1.80
+	DIVERSION TO	DIRS65	0.	.08	0.	0.	0.	1.80
+	HYDROGRAPH AT	DI65B	0.	.08	0.	0.	0.	1.80
+	2 COMBINED AT	CP65A	459.	24.58	457.	410.	395.	4.36
+	ROUTED TO	65AT-3	458.	24.67	455.	409.	394.	4.36
+	HYDROGRAPH AT	DR65B	0.	.08	0.	0.	0.	1.80
+	ROUTED TO	RS65A	0.	.08	0.	0.	0.	1.80
+	2 COMBINED AT	CP65	458.	24.67	455.	409.	394.	4.36
+	ROUTED TO	65T66	458.	24.67	455.	409.	394.	4.36
+	ROUTED TO	65T66A	458.	24.67	455.	409.	394.	4.36
+	ROUTED TO	65T66B	458.	24.75	455.	408.	393.	4.36
+	HYDROGRAPH AT	ADOT-E	0.	.08	0.	0.	0.	.01
+	ROUTED TO	AET67A	0.	.08	0.	0.	0.	.01
+	HYDROGRAPH AT	67A	211.	12.25	29.	10.	9.	.30
+	DIVERSION TO	D67A	211.	12.25	29.	10.	9.	.30
+	HYDROGRAPH AT	R67A	0.	.08	0.	0.	0.	.30
+	2 COMBINED AT	C67A	0.	.08	0.	0.	0.	.31
+	ROUTED TO	67ATC	0.	.08	0.	0.	0.	.31
+	HYDROGRAPH AT	SUP2	0.	.08	0.	0.	0.	.01
+	ROUTED TO	RSUP2	0.	.08	0.	0.	0.	.01
+	HYDROGRAPH AT	67B	409.	12.33	62.	21.	20.	.53
+	DIVERSION TO	D67B	409.	12.33	62.	21.	20.	.53
+	HYDROGRAPH AT	R67B	4.	24.17	0.	0.	0.	.53
+	2 COMBINED AT	C67B	4.	24.17	0.	0.	0.	.54
+	ROUTED TO	67BTC	1.	24.83	0.	0.	0.	.54

+	HYDROGRAPH AT 67C	540.	12.42	78.	25.	24.	.93
+	DIVERSION TO D67C	540.	12.42	78.	25.	24.	.93
+	HYDROGRAPH AT R67C	0.	.08	0.	0.	0.	.93
+	3 COMBINED AT C67C	2.	24.92	0.	0.	0.	1.78
+	ROUTED TO 67CT67	0.	24.92	0.	0.	0.	1.78
+	HYDROGRAPH AT 67D	97.	12.17	11.	3.	3.	.13
+	DIVERSION TO D67D	97.	12.17	11.	3.	3.	.13
+	HYDROGRAPH AT R67D	0.	.08	0.	0.	0.	.13
+	2 COMBINED AT C67D	0.	24.92	0.	0.	0.	1.91
+	ROUTED TO 67DT66	0.	24.92	0.	0.	0.	1.91
+	HYDROGRAPH AT 66A	251.	12.17	25.	8.	8.	.26
+	DIVERSION TO D66A	251.	12.17	25.	8.	8.	.26
+	HYDROGRAPH AT R66A	0.	.08	0.	0.	0.	.26
+	ROUTED TO 66ATB	0.	.08	0.	0.	0.	.26
+	HYDROGRAPH AT 66B	317.	12.58	55.	17.	17.	.67
+	DIVERSION TO D66B	317.	12.58	55.	17.	17.	.67
+	HYDROGRAPH AT R66B	0.	.08	0.	0.	0.	.67
+	2 COMBINED AT CP66B	0.	.08	0.	0.	0.	.93
+	ROUTED TO 66BTC	0.	.08	0.	0.	0.	.93
+	HYDROGRAPH AT 66C	400.	12.25	54.	18.	17.	.50
+	DIVERSION TO D66C	400.	12.25	54.	18.	17.	.50
+	HYDROGRAPH AT R66C	0.	.08	0.	0.	0.	.50
+	2 COMBINED AT CP66C1	0.	.08	0.	0.	0.	1.43
+	2 COMBINED AT CP66C2	0.	24.92	0.	0.	0.	3.34
+	DIVERSION TO 404A	0.	24.92	0.	0.	0.	3.34
+	HYDROGRAPH AT DI67E	0.	.08	0.	0.	0.	3.34
+	DIVERSION TO DB66	0.	.08	0.	0.	0.	3.34
+	HYDROGRAPH AT DI66	0.	.08	0.	0.	0.	3.34
+	ROUTED TO 66C1T2	0.	.08	0.	0.	0.	3.34
+	2 COMBINED AT CP66C	458.	24.67	455.	408.	393.	7.70
+	ROUTED TO 66CTD	455.	24.92	449.	407.	392.	7.70
+	HYDROGRAPH AT DR66	0.	.08	0.	0.	0.	3.34
+	ROUTED TO RS66D1	0.	.08	0.	0.	0.	3.34

+	DIVERSION TO	D-WB	0.	.08	0.	0.	0.	3.34
+	HYDROGRAPH AT	B-WA	0.	.08	0.	0.	0.	3.34
+	2 COMBINED AT	C-WA	457.	24.75	450.	407.	392.	11.04
+	ROUTED TO	RC-WA	452.	24.92	445.	405.	390.	11.04
+	HYDROGRAPH AT	DR-WA	0.	.08	0.	0.	0.	3.34
+	ROUTED TO	RS66D2	0.	.08	0.	0.	0.	3.34
+	2 COMBINED AT	CP66D	452.	24.92	445.	405.	390.	11.04
+	ROUTED TO	66T66D	452.	24.92	445.	405.	390.	11.04
+	ROUTED TO	66-66D	452.	24.92	445.	404.	389.	11.04
+	HYDROGRAPH AT	66D	406.	12.08	47.	16.	16.	.31
+	DIVERSION TO	D66D	406.	12.08	47.	16.	15.	.31
+	HYDROGRAPH AT	R66D	4.	21.83	2.	0.	0.	.31
+	2 COMBINED AT	C66D	452.	24.92	445.	404.	389.	11.35
+	ROUTED TO	66T70B	452.	24.92	445.	403.	388.	11.35
+	ROUTED TO	CULVT	452.	24.92	445.	403.	388.	11.35
+	ROUTED TO	66T70C	452.	24.92	444.	398.	383.	11.35
+	HYDROGRAPH AT	62A	491.	12.00	55.	19.	18.	.38
+	DIVERSION TO	D62A	491.	12.00	55.	17.	16.	.38
+	HYDROGRAPH AT	R62A	11.	15.67	8.	2.	2.	.38
+	ROUTED TO	62ATC	11.	16.67	7.	2.	2.	.38
+	HYDROGRAPH AT	62C	463.	12.17	56.	19.	18.	.55
+	DIVERSION TO	D62C	463.	12.17	55.	16.	15.	.55
+	HYDROGRAPH AT	R62C	17.	14.00	9.	3.	3.	.55
+	2 COMBINED AT	C62C	19.	16.58	14.	5.	5.	.93
+	ROUTED TO	62CTE	19.	16.67	14.	5.	5.	.93
+	HYDROGRAPH AT	62E	126.	12.17	16.	5.	5.	.15
+	DIVERSION TO	D62E	126.	12.17	16.	5.	5.	.15
+	HYDROGRAPH AT	R62E	0.	.08	0.	0.	0.	.15
+	2 COMBINED AT	CP62E	19.	16.67	14.	5.	5.	1.08
+	HYDROGRAPH AT	61A	441.	12.17	55.	19.	18.	.52
+	DIVERSION TO	D61A	441.	12.17	55.	19.	18.	.52
+	HYDROGRAPH AT	R61A	0.	.08	0.	0.	0.	.52
+	ROUTED TO	61ATB	0.	.08	0.	0.	0.	.52

+	HYDROGRAPH AT	61B	624.	12.42	96.	31.	30.	1.09
+	DIVERSION TO	D61B	624.	12.42	96.	31.	30.	1.09
+	HYDROGRAPH AT	R61B	0.	.08	0.	0.	0.	1.09
+	2 COMBINED AT	CP61B	0.	.08	0.	0.	0.	1.61
+	ROUTED TO	61T62E	0.	.08	0.	0.	0.	1.61
+	2 COMBINED AT	CP62E2	19.	16.67	14.	5.	5.	2.68
+	ROUTED TO	62T68A	15.	18.25	12.	4.	4.	2.68
+	HYDROGRAPH AT	68A	418.	12.08	46.	16.	15.	.35
+	DIVERSION TO	D68A	418.	12.08	46.	16.	15.	.35
+	HYDROGRAPH AT	R68A	1.	23.83	0.	0.	0.	.35
+	2 COMBINED AT	C68A1	15.	18.25	12.	4.	4.	3.03
+	HYDROGRAPH AT	RD66	0.	24.92	0.	0.	0.	3.34
+	ROUTED TO	RT404A	0.	.08	0.	0.	0.	3.34
+	HYDROGRAPH AT	67E	440.	12.33	64.	21.	21.	.58
+	DIVERSION TO	D67E	440.	12.33	64.	21.	21.	.58
+	HYDROGRAPH AT	R67E	0.	.08	0.	0.	0.	.58
+	2 COMBINED AT	C67E	0.	24.92	0.	0.	0.	.58
+	ROUTED TO	67T68	0.	.08	0.	0.	0.	.58
+	2 COMBINED AT	C68A2	15.	18.25	12.	4.	4.	3.61
+	ROUTED TO	68T70A	14.	19.17	12.	4.	4.	3.61
+	HYDROGRAPH AT	70A	710.	12.08	76.	25.	24.	.54
+	DIVERSION TO	D70A	710.	12.08	76.	25.	24.	.54
+	HYDROGRAPH AT	R70A	0.	.08	0.	0.	0.	.54
+	2 COMBINED AT	C70A	14.	19.17	12.	4.	4.	4.15
+	2 COMBINED AT	C70A2	457.	24.92	448.	399.	384.	15.51
+	ROUTED TO	70T76A	456.	24.92	447.	389.	375.	15.51
+	HYDROGRAPH AT	76A	1301.	12.58	254.	82.	79.	1.91
+	DIVERSION TO	D76A	1301.	12.58	254.	82.	79.	1.91
+	HYDROGRAPH AT	R76A	0.	.08	0.	0.	0.	1.91
+	2 COMBINED AT	C76A	456.	24.92	447.	389.	375.	17.42
+	ROUTED TO	76ATPR	453.	24.92	444.	376.	363.	17.42
+	2 COMBINED AT	EMFSTN	455.	18.25	450.	379.	365.	39.38
+	ROUTED TO	KNXTRY	455.	18.58	449.	370.	356.	39.38

+	HYDROGRAPH AT	73A	156.	13.33	39.	10.	9.	.95
+	ROUTED TO	73ATB	116.	14.00	39.	10.	9.	.95
+	HYDROGRAPH AT	73B	308.	12.25	31.	9.	9.	.42
+	DIVERSION TO	D73B	308.	12.25	31.	9.	9.	.42
+	HYDROGRAPH AT	R73B	0.	.08	0.	0.	0.	.42
+	2 COMBINED AT	CP73B	116.	14.00	39.	10.	9.	1.37
+	ROUTED TO	73BTC	113.	14.25	38.	10.	9.	1.37
+	HYDROGRAPH AT	73C	865.	12.00	86.	30.	29.	.58
+	DIVERSION TO	D73C	865.	12.00	86.	29.	28.	.58
+	HYDROGRAPH AT	R73C	8.	22.67	2.	1.	0.	.58
+	2 COMBINED AT	CP73C	113.	14.25	38.	10.	10.	1.95
+	ROUTED TO	73T74C	107.	14.67	38.	10.	9.	1.95
+	HYDROGRAPH AT	74A	127.	13.33	31.	8.	7.	.75
+	ROUTED TO	DB74A	29.	14.50	25.	8.	7.	.75
+	ROUTED TO	74ATB	29.	14.75	25.	8.	7.	.75
+	HYDROGRAPH AT	74B	232.	12.25	20.	5.	5.	.33
+	DIVERSION TO	D74B	232.	12.25	20.	5.	5.	.33
+	HYDROGRAPH AT	R74B	0.	.08	0.	0.	0.	.33
+	2 COMBINED AT	CP74B	29.	14.75	25.	8.	7.	1.08
+	ROUTED TO	74BTC	28.	15.17	25.	8.	7.	1.08
+	HYDROGRAPH AT	74C	481.	12.00	53.	18.	18.	.34
+	DIVERSION TO	D74C	481.	12.00	53.	18.	17.	.34
+	HYDROGRAPH AT	R74C	5.	21.75	2.	1.	1.	.34
+	3 COMBINED AT	CP74C	132.	14.67	61.	17.	16.	3.37
+	ROUTED TO	74CT75	131.	14.92	61.	17.	16.	3.37
+	HYDROGRAPH AT	75	721.	14.75	368.	119.	114.	4.01
+	DIVERSION TO	RET75	721.	14.75	368.	119.	114.	4.01
+	HYDROGRAPH AT	D75	0.	.08	0.	0.	0.	4.01
+	2 COMBINED AT	C75	132.	14.92	61.	17.	16.	7.38
+	ROUTED TO	75TPC	124.	15.08	58.	16.	15.	7.38
+	HYDROGRAPH AT	77A	228.	13.75	69.	17.	17.	1.74
+	ROUTED TO	77ATB	219.	13.92	69.	17.	17.	1.74
+	HYDROGRAPH AT	77B	262.	12.17	20.	5.	5.	.36

+	DIVERSION TO	D77B	262.	12.17	20.	5.	5.	.36
+	HYDROGRAPH AT	R77B	0.	.08	0.	0.	0.	.36
+	2 COMBINED AT	CP77B	219.	13.92	69.	17.	17.	2.10
+	ROUTED TO	77BTC	200.	14.33	68.	17.	17.	2.10
+	HYDROGRAPH AT	77C	420.	12.00	42.	14.	14.	.28
+	DIVERSION TO	D77C	420.	12.00	42.	14.	14.	.28
+	HYDROGRAPH AT	R77C	4.	22.92	1.	0.	0.	.28
+	2 COMBINED AT	C77C	200.	14.33	68.	17.	17.	2.38
+	ROUTED TO	77CT78	195.	14.50	68.	17.	17.	2.38
+	HYDROGRAPH AT	78A	247.	13.75	75.	19.	18.	1.88
+	ROUTED TO	78ATB	234.	14.00	75.	19.	18.	1.88
+	HYDROGRAPH AT	78B	368.	12.17	34.	9.	9.	.39
+	2 COMBINED AT	C78B	362.	12.17	107.	27.	26.	2.27
+	ROUTED TO	78BTC	322.	12.42	106.	27.	26.	2.27
+	HYDROGRAPH AT	78C	420.	12.00	43.	14.	13.	.28
+	DIVERSION TO	D78C	420.	12.00	43.	12.	12.	.28
+	HYDROGRAPH AT	R78C	7.	14.75	5.	2.	2.	.28
+	3 COMBINED AT	C78C	380.	14.25	170.	45.	43.	4.93
+	ROUTED TO	78CT79	375.	14.58	168.	45.	43.	4.93
+	HYDROGRAPH AT	79A	640.	13.50	226.	71.	69.	2.01
+	DIVERSION TO	DET79A	640.	13.50	226.	71.	69.	2.01
+	HYDROGRAPH AT	D79A	0.	.08	0.	0.	0.	2.01
+	2 COMBINED AT	C79A1	375.	14.58	168.	45.	43.	6.94
+	HYDROGRAPH AT	79B	451.	13.08	132.	43.	41.	1.00
+	DIVERSION TO	RET79B	451.	13.08	132.	43.	41.	1.00
+	HYDROGRAPH AT	D79B	0.	.08	0.	0.	0.	1.00
+	2 COMBINED AT	C79A2	375.	14.58	168.	45.	43.	7.94
+	HYDROGRAPH AT	78F	439.	14.25	160.	41.	39.	4.19
+	HYDROGRAPH AT	82A1	462.	13.50	122.	31.	29.	3.12
+	2 COMBINED AT	C82A1	664.	13.50	268.	68.	65.	7.31
+	ROUTED TO	DB82A1	117.	16.00	113.	92.	91.	7.31
+	ROUTED TO	PS-9	117.	16.00	113.	92.	91.	7.31
	HYDROGRAPH AT	CAP2	64.	20.00	64.	35.	33.	.01

+	ROUTED TO	RCAP2	64.	21.17	63.	32.	31.	.01
+	HYDROGRAPH AT	82A2	360.	14.75	158.	42.	40.	4.13
+	2 COMBINED AT	CP82A2	397.	14.75	199.	74.	71.	4.14
+	HYDROGRAPH AT	82A4	259.	13.92	84.	21.	20.	2.13
+	ROUTED TO	82A4T3	253.	14.00	84.	21.	20.	2.13
+	HYDROGRAPH AT	82A3	220.	14.17	79.	20.	19.	2.02
+	2 COMBINED AT	CP82A3	452.	14.08	159.	40.	39.	4.15
+	2 COMBINED AT	CP82A5	662.	14.08	338.	109.	105.	8.29
+	ROUTED TO	DB82B	224.	16.50	214.	101.	98.	8.29
+	ROUTED TO	MN-1	224.	16.67	214.	100.	97.	8.29
+	2 COMBINED AT	CP82A6	333.	16.42	320.	188.	184.	15.60
+	ROUTED TO	82TBOX	333.	16.42	320.	187.	183.	15.60
+	ROUTED TO	BOXCLV	333.	16.50	320.	187.	183.	15.60
+	ROUTED TO	BOXT78	332.	16.83	320.	185.	181.	15.60
+	HYDROGRAPH AT	78D	945.	12.17	116.	38.	36.	.89
+	DIVERSION TO	D78D	945.	12.17	116.	38.	36.	.89
+	HYDROGRAPH AT	R78D	0.	.08	0.	0.	0.	.89
+	HYDROGRAPH AT	82B	903.	12.17	106.	36.	34.	.92
+	DIVERSION TO	D82	9.	1.08	2.	1.	0.	.92
+	HYDROGRAPH AT	R82	903.	12.17	106.	35.	34.	.92
+	DIVERSION TO	TRW	903.	12.17	106.	35.	34.	.92
+	HYDROGRAPH AT	DTTRW	0.	.08	0.	0.	0.	.92
+	3 COMBINED AT	C78D	332.	16.83	320.	185.	181.	17.41
+	ROUTED TO	78DTE	331.	17.33	318.	180.	176.	17.41
+	HYDROGRAPH AT	78E	555.	12.75	131.	43.	41.	1.01
+	DIVERSION TO	RET78E	555.	12.75	131.	43.	41.	1.01
+	HYDROGRAPH AT	D78E	0.	.08	0.	0.	0.	1.01
+	HYDROGRAPH AT	83	786.	12.25	116.	39.	37.	1.01
+	DIVERSION TO	D83	786.	12.25	116.	39.	37.	1.01
+	HYDROGRAPH AT	R83	0.	.08	0.	0.	0.	1.01
+	3 COMBINED AT	C78E	331.	17.33	318.	180.	176.	19.43
+	ROUTED TO	78ET84	329.	17.75	316.	176.	172.	19.43
+	HYDROGRAPH AT	84	751.	12.33	113.	38.	37.	.99

+	DIVERSION TO	D84	751.	12.33	113.	38.	37.	.99
+	HYDROGRAPH AT	R84	0.	.08	0.	0.	0.	.99
+	2 COMBINED AT	C84	329.	17.75	316.	176.	172.	20.42
+	ROUTED TO	EC-4	329.	18.17	316.	172.	169.	20.42
+	2 COMBINED AT	C79B3	482.	14.83	383.	208.	203.	28.36
+	ROUTED TO	EC-3	477.	15.25	382.	204.	199.	28.36
+	ROUTED TO	EC-2	471.	15.67	380.	199.	195.	28.36
+	ROUTED TO	EC-1	467.	16.00	379.	196.	192.	28.36
+	2 COMBINED AT	CPPWR	533.	15.83	409.	206.	202.	35.74
+	ROUTED TO	PLF-2	527.	16.17	409.	203.	198.	35.74
+	HYDROGRAPH AT	80A	1471.	12.83	353.	114.	109.	2.64
+	DIVERSION TO	D80A	87.	11.00	48.	17.	16.	2.64
+	HYDROGRAPH AT	R80A	1471.	12.83	348.	97.	93.	2.64
+	2 COMBINED AT	CP80A	1389.	12.83	586.	287.	279.	38.38
+	ROUTED TO	PLF-1	1343.	12.92	584.	284.	276.	38.38
+	ROUTED TO	PWREMF	1161.	13.17	574.	280.	272.	38.38
+	2 COMBINED AT	EMFPOW	1541.	13.17	981.	636.	615.	77.76
+	ROUTED TO	POWTWI	1491.	13.42	978.	625.	605.	77.76
+	HYDROGRAPH AT	80B	700.	12.50	132.	42.	41.	1.12
+	DIVERSION TO	D80B	13.	5.50	8.	2.	2.	1.12
+	HYDROGRAPH AT	R80B	700.	12.50	132.	40.	39.	1.12
+	2 COMBINED AT	MFWILL	1600.	13.33	1045.	658.	637.	78.88
+	ROUTED TO	WILTSP	1548.	13.67	1041.	642.	622.	78.88
+	HYDROGRAPH AT	81A	956.	12.67	213.	72.	69.	1.81
+	DIVERSION TO	D81A	19.	4.08	10.	3.	2.	1.81
+	HYDROGRAPH AT	R81A	956.	12.67	213.	69.	67.	1.81
+	ROUTED TO	81ATB	872.	13.08	212.	68.	66.	1.81
+	HYDROGRAPH AT	81B	717.	12.25	109.	37.	36.	.84
+	DIVERSION TO	D81B	665.	12.17	60.	18.	17.	.84
+	HYDROGRAPH AT	R81B	691.	12.33	67.	20.	19.	.84
+	2 COMBINED AT	C81	957.	13.00	274.	87.	84.	2.65
+	2 COMBINED AT	EMFRT1	2083.	13.17	1251.	713.	690.	81.53
+	HYDROGRAPH AT	SUB258	184.	16.42	149.	54.	52.	3.68

+	DIVERSION TO	D258	184.	16.42	149.	54.	52.	3.68
+	HYDROGRAPH AT	R258	0.	.08	0.	0.	0.	3.68
+	ROUTED TO	RO259	0.	.08	0.	0.	0.	3.68
+	HYDROGRAPH AT	SUB260	92.	13.33	42.	14.	13.	.98
+	DIVERSION TO	D260	92.	13.33	42.	14.	13.	.98
+	HYDROGRAPH AT	R260	8.	24.75	0.	0.	0.	.98
+	2 COMBINED AT	CO262	0.	24.75	0.	0.	0.	4.66
+	ROUTED TO	RO263	0.	.08	0.	0.	0.	4.66
+	HYDROGRAPH AT	SUB264	89.	13.58	45.	15.	14.	.99
+	DIVERSION TO	D264	89.	13.58	45.	15.	14.	.99
+	HYDROGRAPH AT	R264	9.	24.67	0.	0.	0.	.99
+	2 COMBINED AT	CO266	0.	.08	0.	0.	0.	5.65
+	ROUTED TO	RO267	0.	.08	0.	0.	0.	5.65
+	HYDROGRAPH AT	SUB268	63.	14.58	41.	14.	13.	.96
+	DIVERSION TO	D268	63.	14.58	41.	14.	13.	.96
+	HYDROGRAPH AT	R268	0.	.08	0.	0.	0.	.96
+	2 COMBINED AT	CO270	0.	.08	0.	0.	0.	6.61
+	ROUTED TO	RO283	0.	.08	0.	0.	0.	6.61
+	HYDROGRAPH AT	88A	699.	12.00	74.	26.	25.	.50
+	DIVERSION TO	D88A	699.	12.00	74.	25.	24.	.50
+	HYDROGRAPH AT	R88A	7.	22.92	2.	0.	0.	.50
+	ROUTED TO	88AT89	4.	24.08	1.	0.	0.	.50
+	HYDROGRAPH AT	89A	616.	12.08	73.	25.	25.	.50
+	DIVERSION TO	D89A	616.	12.08	73.	25.	24.	.50
+	HYDROGRAPH AT	R89A	7.	23.42	1.	0.	0.	.50
+	2 COMBINED AT	C89A	10.	23.83	2.	0.	0.	1.00
+	ROUTED TO	89ATRI	5.	24.25	1.	0.	0.	1.00
+	2 COMBINED AT	C283	0.	.08	0.	0.	0.	7.61
+	ROUTED TO	283T90	0.	.08	0.	0.	0.	7.61
+	HYDROGRAPH AT	90A	547.	12.08	59.	20.	19.	.48
+	DIVERSION TO	D90A	547.	12.08	59.	20.	19.	.48
+	HYDROGRAPH AT	R90A	0.	.08	0.	0.	0.	.48
+	2 COMBINED AT	C90A	0.	.08	0.	0.	0.	8.09

+	ROUTED TO	90ATB	0.	.08	0.	0.	0.	8.09
+	HYDROGRAPH AT	87A	640.	12.08	72.	25.	24.	.49
+	DIVERSION TO	D87A	640.	12.08	72.	25.	24.	.49
+	HYDROGRAPH AT	R87A	7.	23.33	1.	0.	0.	.49
+	ROUTED TO	87ATB	3.	24.67	0.	0.	0.	.49
+	HYDROGRAPH AT	87B	627.	12.08	72.	25.	24.	.49
+	DIVERSION TO	D87B	627.	12.08	72.	25.	24.	.49
+	HYDROGRAPH AT	R87B	7.	23.00	2.	0.	0.	.49
+	2 COMBINED AT	C87	7.	23.75	2.	0.	0.	.98
+	ROUTED TO	87T88B	6.	24.58	1.	0.	0.	.98
+	HYDROGRAPH AT	88B	635.	12.08	73.	25.	24.	.50
+	DIVERSION TO	D88B	635.	12.08	73.	25.	24.	.50
+	HYDROGRAPH AT	R88B	7.	23.67	1.	0.	0.	.50
+	2 COMBINED AT	C88B	6.	23.92	1.	0.	0.	1.48
+	ROUTED TO	88T89B	5.	24.92	0.	0.	0.	1.48
+	HYDROGRAPH AT	89B	643.	12.08	73.	25.	24.	.50
+	DIVERSION TO	D89B	643.	12.08	73.	25.	24.	.50
+	HYDROGRAPH AT	R89B	7.	22.75	2.	0.	0.	.50
+	2 COMBINED AT	C89B	5.	23.75	2.	0.	0.	1.98
+	ROUTED TO	89TB90	4.	24.67	0.	0.	0.	1.98
+	HYDROGRAPH AT	90B	349.	12.67	69.	22.	21.	.82
+	DIVERSION TO	D90B	349.	12.67	41.	12.	11.	.82
+	HYDROGRAPH AT	R90B	288.	12.83	35.	10.	10.	.82
+	3 COMBINED AT	C90	228.	12.92	29.	9.	8.	10.89
+	ROUTED TO	90T91	63.	13.58	26.	8.	8.	10.89
+	HYDROGRAPH AT	85	749.	12.25	113.	38.	37.	1.00
+	DIVERSION TO	D85	749.	12.25	113.	38.	37.	1.00
+	HYDROGRAPH AT	R85	0.	.08	0.	0.	0.	1.00
+	ROUTED TO	85T86	0.	.08	0.	0.	0.	1.00
+	HYDROGRAPH AT	86	761.	12.25	114.	38.	37.	1.00
+	DIVERSION TO	D86	761.	12.25	114.	38.	37.	1.00
+	HYDROGRAPH AT	R86	0.	.08	0.	0.	0.	1.00
+	2 COMBINED AT	C86	0.	.08	0.	0.	0.	2.00

```
          ROUTED TO
+                        86T91        0.     .08          0.          0.          0.       2.00

          HYDROGRAPH AT
+                           91      382.   12.25         52.         18.         17.        .46

          DIVERSION TO
+                          D91      382.   12.25         52.         18.         17.        .46

          HYDROGRAPH AT
+                        RET91        0.     .08          0.          0.          0.        .46

          3 COMBINED AT
+                         CP91       63.   13.58         26.          8.          8.      13.35

          ROUTED TO
+                       91TEMF       59.   13.83         25.          8.          8.      13.35

          2 COMBINED AT
+                       EMFRIT     2083.   13.17       1266.        719.        695.      94.88
1
                                   SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                       (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                          INTERPOLATED TO
                                                                       COMPUTATION INTERVAL
           ISTAQ    ELEMENT      DT        PEAK    TIME TO     VOLUME      DT        PEAK    TIME TO     VOLUME
                                                     PEAK                                              PEAK

                                (MIN)      (CFS)     (MIN)      (IN)    (MIN)      (CFS)     (MIN)       (IN)

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
            65AT-3  MANE          .68    462.48   1295.65      3.51     5.00    462.48   1295.00       3.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8172E+03 EXCESS= .0000E+00 OUTFLOW= .8168E+03 BASIN STORAGE= .4674E+00 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            65AT-3  MANE          .68    461.33   1315.22      3.51     5.00    461.33   1315.00       3.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8162E+03 EXCESS= .0000E+00 OUTFLOW= .8157E+03 BASIN STORAGE= .4668E+00 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            65AT-3  MANE          .68    457.95   1481.59      3.49     5.00    457.95   1485.00       3.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8115E+03 EXCESS= .0000E+00 OUTFLOW= .8110E+03 BASIN STORAGE= .4646E+00 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            65AT-3  MANE          .68    453.32   1494.85      3.47     5.00    453.32   1495.00       3.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8066E+03 EXCESS= .0000E+00 OUTFLOW= .8061E+03 BASIN STORAGE= .4608E+00 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
            65AT-3  MANE          .68    442.72   1494.36      3.44     5.00    442.72   1495.00       3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8011E+03 EXCESS= .0000E+00 OUTFLOW= .8006E+03 BASIN STORAGE= .4522E+00 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
            65AT-3  MANE          .68    434.00    389.29      3.44     5.00    434.00    390.00       3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8005E+03 EXCESS= .0000E+00 OUTFLOW= .8001E+03 BASIN STORAGE= .4451E+00 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
            65AT-3  MANE          .68    434.00    389.29      3.44     5.00    434.00    390.00       3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8005E+03 EXCESS= .0000E+00 OUTFLOW= .8001E+03 BASIN STORAGE= .4451E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
            65AT-3  MANE          .68    434.00    389.29      3.44     5.00    434.00    390.00       3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8005E+03 EXCESS= .0000E+00 OUTFLOW= .8001E+03 BASIN STORAGE= .4451E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
            65AT-3  MANE          .68    434.00    389.29      3.44     5.00    434.00    390.00       3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8005E+03 EXCESS= .0000E+00 OUTFLOW= .8001E+03 BASIN STORAGE= .4451E+00 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
            65T66   MANE          .63    462.48   1296.33      3.51     5.00    462.48   1300.00       3.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8168E+03 EXCESS= .0000E+00 OUTFLOW= .8164E+03 BASIN STORAGE= .4362E+00 PERCENT ERROR=    .0
```

```
FOR STORM = 2  STORM AREA (SQ MI) =       1.00
   65T66  MANE          .63    461.33   1315.26      3.50      5.00    461.33   1315.00        3.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8153E+03 EXCESS= .0000E+00 OUTFLOW= .8149E+03 BASIN STORAGE= .4357E+00 PERCENT ERROR=    .0

FOR STORM = 3  STORM AREA (SQ MI) =       5.00
   65T66  MANE          .63    457.95   1484.64      3.49      5.00    457.95   1485.00        3.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8112E+03 EXCESS= .0000E+00 OUTFLOW= .8108E+03 BASIN STORAGE= .4336E+00 PERCENT ERROR=    .0

FOR STORM = 4  STORM AREA (SQ MI) =      10.00
   65T66  MANE          .63    453.32   1494.60      3.46      5.00    453.32   1495.00        3.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8060E+03 EXCESS= .0000E+00 OUTFLOW= .8056E+03 BASIN STORAGE= .4301E+00 PERCENT ERROR=    .0

FOR STORM = 5  STORM AREA (SQ MI) =      30.00
   65T66  MANE          .64    442.69   1494.73      3.44      5.00    442.69   1495.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8008E+03 EXCESS= .0000E+00 OUTFLOW= .8004E+03 BASIN STORAGE= .4220E+00 PERCENT ERROR=    .0

FOR STORM = 6  STORM AREA (SQ MI) =      60.00
   65T66  MANE          .64    434.00    386.98      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8001E+03 EXCESS= .0000E+00 OUTFLOW= .7997E+03 BASIN STORAGE= .4154E+00 PERCENT ERROR=    .0

FOR STORM = 7  STORM AREA (SQ MI) =      90.00
   65T66  MANE          .64    434.00    386.98      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8001E+03 EXCESS= .0000E+00 OUTFLOW= .7997E+03 BASIN STORAGE= .4154E+00 PERCENT ERROR=    .0

FOR STORM = 8  STORM AREA (SQ MI) =     120.00
   65T66  MANE          .64    434.00    386.98      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8001E+03 EXCESS= .0000E+00 OUTFLOW= .7997E+03 BASIN STORAGE= .4154E+00 PERCENT ERROR=    .0

FOR STORM = 9  STORM AREA (SQ MI) =     150.00
   65T66  MANE          .64    434.00    386.98      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8001E+03 EXCESS= .0000E+00 OUTFLOW= .7997E+03 BASIN STORAGE= .4154E+00 PERCENT ERROR=    .0

FOR STORM = 1  STORM AREA (SQ MI) =        .01
  65T66A  MANE          .72    462.48   1299.91      3.51      5.00    462.48   1300.00        3.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8161E+03 EXCESS= .0000E+00 OUTFLOW= .8157E+03 BASIN STORAGE= .4950E+00 PERCENT ERROR=    .0

FOR STORM = 2  STORM AREA (SQ MI) =       1.00
  65T66A  MANE          .72    461.33   1315.56      3.50      5.00    461.33   1315.00        3.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8150E+03 EXCESS= .0000E+00 OUTFLOW= .8145E+03 BASIN STORAGE= .4944E+00 PERCENT ERROR=    .0

FOR STORM = 3  STORM AREA (SQ MI) =       5.00
  65T66A  MANE          .72    457.95   1485.23      3.48      5.00    457.95   1485.00        3.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8107E+03 EXCESS= .0000E+00 OUTFLOW= .8102E+03 BASIN STORAGE= .4920E+00 PERCENT ERROR=    .0

FOR STORM = 4  STORM AREA (SQ MI) =      10.00
  65T66A  MANE          .72    453.31   1494.73      3.46      5.00    453.31   1495.00        3.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8057E+03 EXCESS= .0000E+00 OUTFLOW= .8052E+03 BASIN STORAGE= .4880E+00 PERCENT ERROR=    .0

FOR STORM = 5  STORM AREA (SQ MI) =      30.00
  65T66A  MANE          .72    442.65   1494.65      3.44      5.00    442.65   1495.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8004E+03 EXCESS= .0000E+00 OUTFLOW= .8000E+03 BASIN STORAGE= .4788E+00 PERCENT ERROR=    .0

FOR STORM = 6  STORM AREA (SQ MI) =      60.00
  65T66A  MANE          .72    434.00    388.37      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7997E+03 EXCESS= .0000E+00 OUTFLOW= .7992E+03 BASIN STORAGE= .4713E+00 PERCENT ERROR=    .0
```

```
FOR STORM = 7  STORM AREA (SQ MI) =      90.00
  65T66A  MANE          .72    434.00    388.37      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7997E+03 EXCESS= .0000E+00 OUTFLOW= .7992E+03 BASIN STORAGE= .4713E+00 PERCENT ERROR=    .0

FOR STORM = 8  STORM AREA (SQ MI) =     120.00
  65T66A  MANE          .72    434.00    388.37      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7997E+03 EXCESS= .0000E+00 OUTFLOW= .7992E+03 BASIN STORAGE= .4713E+00 PERCENT ERROR=    .0

FOR STORM = 9  STORM AREA (SQ MI) =     150.00
  65T66A  MANE          .72    434.00    388.37      3.44      5.00    434.00    390.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7997E+03 EXCESS= .0000E+00 OUTFLOW= .7992E+03 BASIN STORAGE= .4713E+00 PERCENT ERROR=    .0

FOR STORM = 1  STORM AREA (SQ MI) =        .01
  65T66B  MANE          .75    462.48   1300.13      3.51      5.00    462.48   1300.00        3.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8159E+03 EXCESS= .0000E+00 OUTFLOW= .8154E+03 BASIN STORAGE= .5221E+00 PERCENT ERROR=    .0

FOR STORM = 2  STORM AREA (SQ MI) =       1.00
  65T66B  MANE          .75    461.33   1315.88      3.50      5.00    461.33   1315.00        3.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8147E+03 EXCESS= .0000E+00 OUTFLOW= .8143E+03 BASIN STORAGE= .5215E+00 PERCENT ERROR=    .0

FOR STORM = 3  STORM AREA (SQ MI) =       5.00
  65T66B  MANE          .76    457.95   1484.94      3.48      5.00    457.95   1485.00        3.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8104E+03 EXCESS= .0000E+00 OUTFLOW= .8099E+03 BASIN STORAGE= .5189E+00 PERCENT ERROR=    .0

FOR STORM = 4  STORM AREA (SQ MI) =      10.00
  65T66B  MANE          .76    453.30   1494.74      3.46      5.00    453.30   1495.00        3.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8053E+03 EXCESS= .0000E+00 OUTFLOW= .8048E+03 BASIN STORAGE= .5148E+00 PERCENT ERROR=    .0

FOR STORM = 5  STORM AREA (SQ MI) =      30.00
  65T66B  MANE          .76    442.61   1494.25      3.44      5.00    442.61   1495.00        3.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7998E+03 EXCESS= .0000E+00 OUTFLOW= .7993E+03 BASIN STORAGE= .5050E+00 PERCENT ERROR=    .0

FOR STORM = 6  STORM AREA (SQ MI) =      60.00
  65T66B  MANE          .76    434.00    390.52      3.43      5.00    434.00    395.00        3.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7993E+03 EXCESS= .0000E+00 OUTFLOW= .7988E+03 BASIN STORAGE= .4971E+00 PERCENT ERROR=    .0

FOR STORM = 7  STORM AREA (SQ MI) =      90.00
  65T66B  MANE          .76    434.00    390.52      3.43      5.00    434.00    395.00        3.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7993E+03 EXCESS= .0000E+00 OUTFLOW= .7988E+03 BASIN STORAGE= .4971E+00 PERCENT ERROR=    .0

FOR STORM = 8  STORM AREA (SQ MI) =     120.00
  65T66B  MANE          .76    434.00    390.52      3.43      5.00    434.00    395.00        3.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7993E+03 EXCESS= .0000E+00 OUTFLOW= .7988E+03 BASIN STORAGE= .4971E+00 PERCENT ERROR=    .0

FOR STORM = 9  STORM AREA (SQ MI) =     150.00
  65T66B  MANE          .76    434.00    390.52      3.43      5.00    434.00    395.00        3.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7993E+03 EXCESS= .0000E+00 OUTFLOW= .7988E+03 BASIN STORAGE= .4971E+00 PERCENT ERROR=    .0

FOR STORM = 1  STORM AREA (SQ MI) =        .01
  66C1T2  MANE         1.50       .00   1138.50       .00      5.00       .00   1140.00         .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1586E-14 EXCESS= .0000E+00 OUTFLOW= .1339E-14 BASIN STORAGE= .5421E-13 PERCENT ERROR=******

FOR STORM = 2  STORM AREA (SQ MI) =       1.00
  66C1T2  MANE         1.50       .00   1309.50       .00      5.00       .00   1310.00         .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1278E-14 EXCESS= .0000E+00 OUTFLOW= .9840E-15 BASIN STORAGE= .5421E-13 PERCENT ERROR=******

FOR STORM = 3  STORM AREA (SQ MI) =       5.00
```

```
  66C1T2  MANE          .75        .00    879.75        .00       5.00        .00    880.00          .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1345E-14 EXCESS= .0000E+00 OUTFLOW= .1149E-14 BASIN STORAGE= .5421E-13 PERCENT ERROR=******

     FOR STORM = 4  STORM AREA (SQ MI) =      10.00
  66C1T2  MANE         1.50        .00   1167.00        .00       5.00        .00   1165.00          .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2000E-14 EXCESS= .0000E+00 OUTFLOW= .1724E-14 BASIN STORAGE= .9439E-13 PERCENT ERROR=******

     FOR STORM = 5  STORM AREA (SQ MI) =      30.00
  66C1T2  MANE         1.00        .00    919.00        .00       5.00        .00    920.00          .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5505E-15 EXCESS= .0000E+00 OUTFLOW= .5260E-15 BASIN STORAGE= .3114E-13 PERCENT ERROR=******

     FOR STORM = 6  STORM AREA (SQ MI) =      60.00
  66C1T2  MANE          .75        .00    979.50        .00       5.00        .00    980.00          .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3779E-14 EXCESS= .0000E+00 OUTFLOW= .3742E-14 BASIN STORAGE= .1643E-12 PERCENT ERROR=******

     FOR STORM = 7  STORM AREA (SQ MI) =      90.00
  66C1T2  MANE         1.75        .00   1172.50        .00       5.00        .00   1175.00          .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3100E-14 EXCESS= .0000E+00 OUTFLOW= .2827E-14 BASIN STORAGE= .9439E-13 PERCENT ERROR=******

     FOR STORM = 8  STORM AREA (SQ MI) =     120.00
  66C1T2  MANE         1.25        .00   1098.75        .00       5.00        .00   1100.00          .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1606E-14 EXCESS= .0000E+00 OUTFLOW= .1483E-14 BASIN STORAGE= .9439E-13 PERCENT ERROR=******

     FOR STORM = 9  STORM AREA (SQ MI) =     150.00
  66C1T2  MANE         1.00        .00    970.00        .00       5.00        .00    970.00          .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6570E-14 EXCESS= .0000E+00 OUTFLOW= .6545E-14 BASIN STORAGE= .2861E-12 PERCENT ERROR=******

     FOR STORM = 1  STORM AREA (SQ MI) =        .01
    66CTD  MANE          .37     462.48   1300.03       1.98       5.00     462.48   1300.00         1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8154E+03 EXCESS= .0000E+00 OUTFLOW= .8151E+03 BASIN STORAGE= .2545E+00 PERCENT ERROR=    .0

     FOR STORM = 2  STORM AREA (SQ MI) =       1.00
    66CTD  MANE          .37     461.33   1315.45       1.98       5.00     461.33   1315.00         1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8142E+03 EXCESS= .0000E+00 OUTFLOW= .8140E+03 BASIN STORAGE= .2542E+00 PERCENT ERROR=    .0

     FOR STORM = 3  STORM AREA (SQ MI) =       5.00
    66CTD  MANE          .37     457.95   1485.01       1.97       5.00     457.95   1485.00         1.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8099E+03 EXCESS= .0000E+00 OUTFLOW= .8096E+03 BASIN STORAGE= .2529E+00 PERCENT ERROR=    .0

     FOR STORM = 4  STORM AREA (SQ MI) =      10.00
    66CTD  MANE          .37     453.30   1494.76       1.96       5.00     453.30   1495.00         1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8046E+03 EXCESS= .0000E+00 OUTFLOW= .8044E+03 BASIN STORAGE= .2509E+00 PERCENT ERROR=    .0

     FOR STORM = 5  STORM AREA (SQ MI) =      30.00
    66CTD  MANE          .37     442.59   1494.77       1.95       5.00     442.59   1495.00         1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7995E+03 EXCESS= .0000E+00 OUTFLOW= .7992E+03 BASIN STORAGE= .2461E+00 PERCENT ERROR=    .0

     FOR STORM = 6  STORM AREA (SQ MI) =      60.00
    66CTD  MANE          .37     434.00    388.85       1.94       5.00     434.00    390.00         1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7986E+03 EXCESS= .0000E+00 OUTFLOW= .7984E+03 BASIN STORAGE= .2423E+00 PERCENT ERROR=    .0

     FOR STORM = 7  STORM AREA (SQ MI) =      90.00
    66CTD  MANE          .37     434.00    388.85       1.94       5.00     434.00    390.00         1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7986E+03 EXCESS= .0000E+00 OUTFLOW= .7984E+03 BASIN STORAGE= .2423E+00 PERCENT ERROR=    .0

     FOR STORM = 8  STORM AREA (SQ MI) =     120.00
    66CTD  MANE          .37     434.00    388.85       1.94       5.00     434.00    390.00         1.94
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .7986E+03 EXCESS= .0000E+00 OUTFLOW= .7984E+03 BASIN STORAGE= .2423E+00 PERCENT ERROR=    .0

        FOR STORM = 9  STORM AREA (SQ MI) =      150.00
           66CTD  MANE          .37    434.00    388.85      1.94      5.00    434.00    390.00        1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7986E+03 EXCESS= .0000E+00 OUTFLOW= .7984E+03 BASIN STORAGE= .2423E+00 PERCENT ERROR=    .0

        FOR STORM = 1  STORM AREA (SQ MI) =          .01
           RC-WA  MANE          .81    462.48   1300.48      1.38      5.00    462.48   1300.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8151E+03 EXCESS= .0000E+00 OUTFLOW= .8146E+03 BASIN STORAGE= .5578E+00 PERCENT ERROR=    .0

        FOR STORM = 2  STORM AREA (SQ MI) =         1.00
           RC-WA  MANE          .81    461.33   1316.44      1.38      5.00    461.33   1320.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8140E+03 EXCESS= .0000E+00 OUTFLOW= .8134E+03 BASIN STORAGE= .5572E+00 PERCENT ERROR=    .0

        FOR STORM = 3  STORM AREA (SQ MI) =         5.00
           RC-WA  MANE          .81    457.95   1485.59      1.37      5.00    457.94   1485.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8095E+03 EXCESS= .0000E+00 OUTFLOW= .8089E+03 BASIN STORAGE= .5545E+00 PERCENT ERROR=    .0

        FOR STORM = 4  STORM AREA (SQ MI) =        10.00
           RC-WA  MANE          .81    453.29   1494.33      1.36      5.00    453.29   1495.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8043E+03 EXCESS= .0000E+00 OUTFLOW= .8037E+03 BASIN STORAGE= .5500E+00 PERCENT ERROR=    .0

        FOR STORM = 5  STORM AREA (SQ MI) =        30.00
           RC-WA  MANE          .81    442.56   1494.98      1.36      5.00    442.56   1495.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7995E+03 EXCESS= .0000E+00 OUTFLOW= .7990E+03 BASIN STORAGE= .5395E+00 PERCENT ERROR=    .0

        FOR STORM = 6  STORM AREA (SQ MI) =        60.00
           RC-WA  MANE          .82    434.00    389.50      1.35      5.00    434.00    390.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7983E+03 EXCESS= .0000E+00 OUTFLOW= .7978E+03 BASIN STORAGE= .5312E+00 PERCENT ERROR=    .0

        FOR STORM = 7  STORM AREA (SQ MI) =        90.00
           RC-WA  MANE          .82    434.00    389.50      1.35      5.00    434.00    390.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7983E+03 EXCESS= .0000E+00 OUTFLOW= .7978E+03 BASIN STORAGE= .5312E+00 PERCENT ERROR=    .0

        FOR STORM = 8  STORM AREA (SQ MI) =       120.00
           RC-WA  MANE          .82    434.00    389.50      1.35      5.00    434.00    390.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7983E+03 EXCESS= .0000E+00 OUTFLOW= .7978E+03 BASIN STORAGE= .5312E+00 PERCENT ERROR=    .0

        FOR STORM = 9  STORM AREA (SQ MI) =       150.00
           RC-WA  MANE          .82    434.00    389.50      1.35      5.00    434.00    390.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7983E+03 EXCESS= .0000E+00 OUTFLOW= .7978E+03 BASIN STORAGE= .5312E+00 PERCENT ERROR=    .0

        FOR STORM = 1  STORM AREA (SQ MI) =          .01
          66T66D  MANE         1.17    462.48   1300.71      1.38      5.00    462.48   1300.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8143E+03 EXCESS= .0000E+00 OUTFLOW= .8135E+03 BASIN STORAGE= .8065E+00 PERCENT ERROR=    .0

        FOR STORM = 2  STORM AREA (SQ MI) =         1.00
          66T66D  MANE         1.17    461.33   1320.03      1.38      5.00    461.33   1320.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8137E+03 EXCESS= .0000E+00 OUTFLOW= .8129E+03 BASIN STORAGE= .8056E+00 PERCENT ERROR=    .0

        FOR STORM = 3  STORM AREA (SQ MI) =         5.00
          66T66D  MANE         1.17    457.94   1486.65      1.37      5.00    457.94   1485.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8092E+03 EXCESS= .0000E+00 OUTFLOW= .8084E+03 BASIN STORAGE= .8016E+00 PERCENT ERROR=    .0

        FOR STORM = 4  STORM AREA (SQ MI) =        10.00
          66T66D  MANE         1.17    453.27   1494.34      1.36      5.00    453.27   1495.00        1.36
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8039E+03 EXCESS= .0000E+00 OUTFLOW= .8031E+03 BASIN STORAGE= .7950E+00 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
            66T66D  MANE         1.18    442.51   1494.47      1.35      5.00    442.51   1495.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7988E+03 EXCESS= .0000E+00 OUTFLOW= .7980E+03 BASIN STORAGE= .7799E+00 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
            66T66D  MANE         1.18    434.00    390.72      1.35      5.00    434.00    395.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7979E+03 EXCESS= .0000E+00 OUTFLOW= .7972E+03 BASIN STORAGE= .7679E+00 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
            66T66D  MANE         1.18    434.00    390.72      1.35      5.00    434.00    395.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7979E+03 EXCESS= .0000E+00 OUTFLOW= .7972E+03 BASIN STORAGE= .7679E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
            66T66D  MANE         1.18    434.00    390.72      1.35      5.00    434.00    395.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7979E+03 EXCESS= .0000E+00 OUTFLOW= .7972E+03 BASIN STORAGE= .7679E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
            66T66D  MANE         1.18    434.00    390.72      1.35      5.00    434.00    395.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7979E+03 EXCESS= .0000E+00 OUTFLOW= .7972E+03 BASIN STORAGE= .7679E+00 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
            66-66D  MANE         2.51    462.48   1303.45      1.38      5.00    462.47   1305.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8140E+03 EXCESS= .0000E+00 OUTFLOW= .8123E+03 BASIN STORAGE= .1738E+01 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            66-66D  MANE         2.51    461.33   1321.69      1.37      5.00    461.33   1320.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8118E+03 EXCESS= .0000E+00 OUTFLOW= .8101E+03 BASIN STORAGE= .1736E+01 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            66-66D  MANE         2.52    457.94   1487.20      1.37      5.00    457.94   1490.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8088E+03 EXCESS= .0000E+00 OUTFLOW= .8071E+03 BASIN STORAGE= .1727E+01 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            66-66D  MANE         2.52    453.24   1492.79      1.36      5.00    453.24   1495.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8025E+03 EXCESS= .0000E+00 OUTFLOW= .8008E+03 BASIN STORAGE= .1713E+01 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
            66-66D  MANE         2.53    442.42   1494.90      1.35      5.00    442.42   1495.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7987E+03 EXCESS= .0000E+00 OUTFLOW= .7970E+03 BASIN STORAGE= .1680E+01 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
            66-66D  MANE         2.54    434.00    399.34      1.35      5.00    434.00    400.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7968E+03 EXCESS= .0000E+00 OUTFLOW= .7951E+03 BASIN STORAGE= .1655E+01 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
            66-66D  MANE         2.54    434.00    399.34      1.35      5.00    434.00    400.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7968E+03 EXCESS= .0000E+00 OUTFLOW= .7951E+03 BASIN STORAGE= .1655E+01 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
            66-66D  MANE         2.54    434.00    399.34      1.35      5.00    434.00    400.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7968E+03 EXCESS= .0000E+00 OUTFLOW= .7951E+03 BASIN STORAGE= .1655E+01 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
            66-66D  MANE         2.54    434.00    399.34      1.35      5.00    434.00    400.00        1.35
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .7968E+03 EXCESS= .0000E+00 OUTFLOW= .7951E+03 BASIN STORAGE= .1655E+01 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
            66T70B  MANE         1.78    466.84   1305.90      1.34      5.00    466.84   1305.00        1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8132E+03 EXCESS= .0000E+00 OUTFLOW= .8120E+03 BASIN STORAGE= .1233E+01 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
            66T70B  MANE         1.78    465.66   1324.35      1.34      5.00    465.66   1325.00        1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8113E+03 EXCESS= .0000E+00 OUTFLOW= .8101E+03 BASIN STORAGE= .1232E+01 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
            66T70B  MANE         1.78    460.62   1442.94      1.33      5.00    460.58   1445.00        1.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8069E+03 EXCESS= .0000E+00 OUTFLOW= .8057E+03 BASIN STORAGE= .1226E+01 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
            66T70B  MANE         1.79    453.22   1494.40      1.32      5.00    453.22   1495.00        1.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8016E+03 EXCESS= .0000E+00 OUTFLOW= .8004E+03 BASIN STORAGE= .1216E+01 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
            66T70B  MANE         1.80    442.33   1494.43      1.31      5.00    442.33   1495.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7965E+03 EXCESS= .0000E+00 OUTFLOW= .7953E+03 BASIN STORAGE= .1192E+01 PERCENT ERROR=    .0

          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
            66T70B  MANE         1.81    434.00    400.77      1.31      5.00    434.00    400.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7959E+03 EXCESS= .0000E+00 OUTFLOW= .7948E+03 BASIN STORAGE= .1174E+01 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
            66T70B  MANE         1.81    434.00    713.08      1.31      5.00    434.00    715.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7959E+03 EXCESS= .0000E+00 OUTFLOW= .7948E+03 BASIN STORAGE= .1174E+01 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
            66T70B  MANE         1.81    434.00    400.77      1.31      5.00    434.00    400.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7959E+03 EXCESS= .0000E+00 OUTFLOW= .7948E+03 BASIN STORAGE= .1174E+01 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
            66T70B  MANE         1.81    434.00    732.94      1.31      5.00    434.00    735.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7959E+03 EXCESS= .0000E+00 OUTFLOW= .7948E+03 BASIN STORAGE= .1174E+01 PERCENT ERROR=    .0

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
               CULVT  MANE          .38    466.84   1305.13      1.34      5.00    466.84   1305.00        1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8119E+03 EXCESS= .0000E+00 OUTFLOW= .8116E+03 BASIN STORAGE= .2621E+00 PERCENT ERROR=    .0

          FOR STORM = 2  STORM AREA (SQ MI) =       1.00
               CULVT  MANE          .38    465.66   1326.93      1.34      5.00    465.66   1330.00        1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8105E+03 EXCESS= .0000E+00 OUTFLOW= .8103E+03 BASIN STORAGE= .2618E+00 PERCENT ERROR=    .0

          FOR STORM = 3  STORM AREA (SQ MI) =       5.00
               CULVT  MANE          .38    460.51   1445.07      1.33      5.00    460.51   1445.00        1.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8053E+03 EXCESS= .0000E+00 OUTFLOW= .8051E+03 BASIN STORAGE= .2605E+00 PERCENT ERROR=    .0

          FOR STORM = 4  STORM AREA (SQ MI) =      10.00
               CULVT  MANE          .38    453.22   1494.72      1.32      5.00    453.22   1495.00        1.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8001E+03 EXCESS= .0000E+00 OUTFLOW= .7999E+03 BASIN STORAGE= .2584E+00 PERCENT ERROR=    .0

          FOR STORM = 5  STORM AREA (SQ MI) =      30.00
               CULVT  MANE          .38    442.32   1494.65      1.31      5.00    442.32   1495.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7951E+03 EXCESS= .0000E+00 OUTFLOW= .7948E+03 BASIN STORAGE= .2534E+00 PERCENT ERROR=    .0
```

```
          FOR STORM = 6  STORM AREA (SQ MI) =      60.00
             CULVT  MANE          .38    434.00    397.82      1.31      5.00    434.00    400.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7943E+03 EXCESS= .0000E+00 OUTFLOW= .7940E+03 BASIN STORAGE= .2496E+00 PERCENT ERROR=    .0

          FOR STORM = 7  STORM AREA (SQ MI) =      90.00
             CULVT  MANE          .38    434.00    712.79      1.31      5.00    434.00    715.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7943E+03 EXCESS= .0000E+00 OUTFLOW= .7940E+03 BASIN STORAGE= .2496E+00 PERCENT ERROR=    .0

          FOR STORM = 8  STORM AREA (SQ MI) =     120.00
             CULVT  MANE          .38    434.00    397.82      1.31      5.00    434.00    400.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7943E+03 EXCESS= .0000E+00 OUTFLOW= .7940E+03 BASIN STORAGE= .2496E+00 PERCENT ERROR=    .0

          FOR STORM = 9  STORM AREA (SQ MI) =     150.00
             CULVT  MANE          .38    434.00    732.74      1.31      5.00    434.00    735.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7943E+03 EXCESS= .0000E+00 OUTFLOW= .7940E+03 BASIN STORAGE= .2496E+00 PERCENT ERROR=    .0


*** NORMAL END OF HEC-1 ***


   -----DSS---ZCLOSE Unit:  71,   File: ELLS10.DSS
            Pointer Utilization:    .00
            Number of Records:       0
            File Size:      10.8  Kbytes
            Percent Inactive:    .00
```

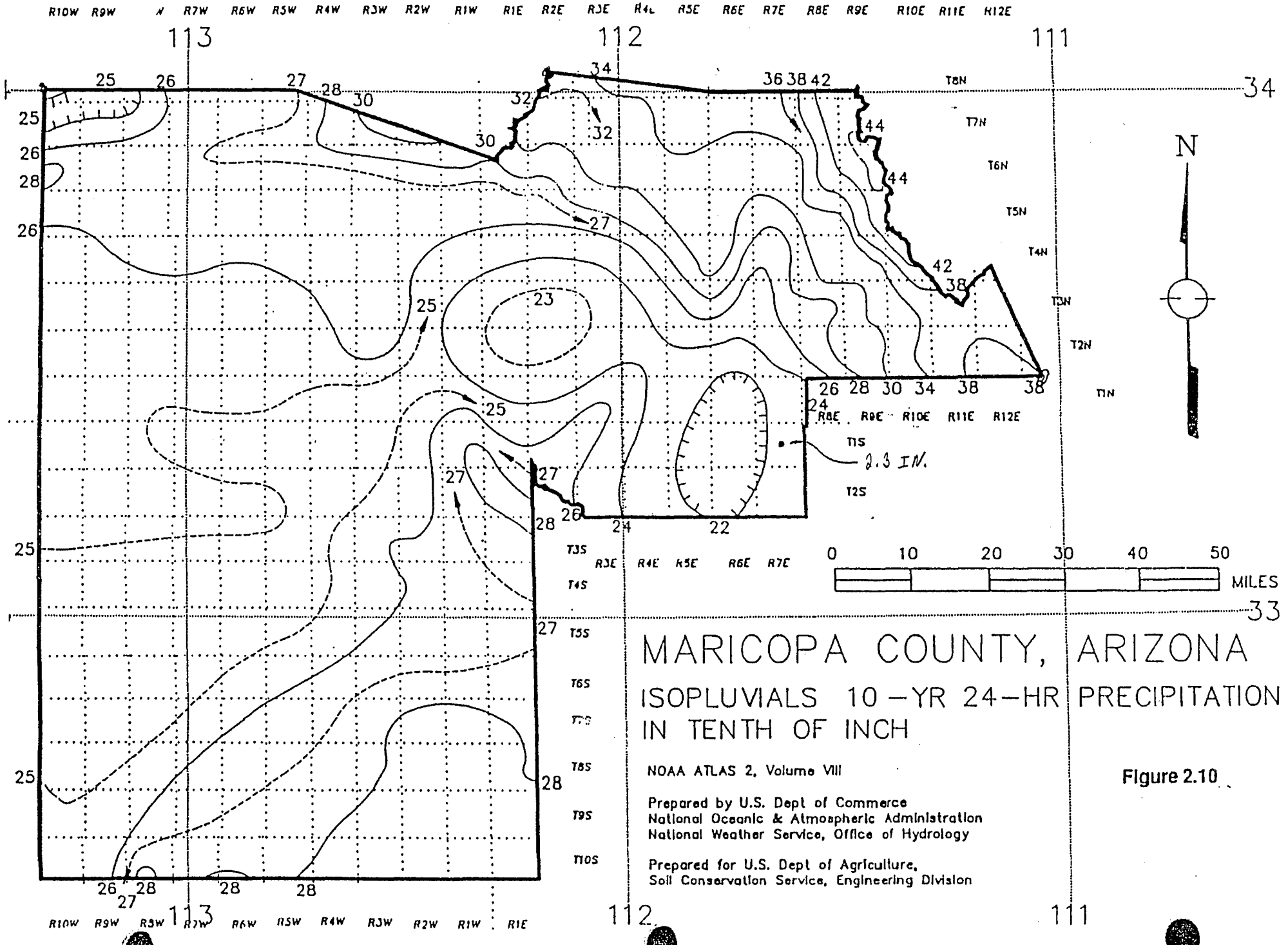

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 10-YR 24-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILES
2.3 IN.
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
113 112 111
34 33

Figure 2.10

Table 2.1a
Depth-Area Reduction Factors for 24-Hour Duration Rainfall

Area Square Miles	Ratio to Point Rainfall
0	1
10	0.94
20	0.91
30	0.90
40	0.88
50	0.87
60	0.86
70	0.856
80	0.855
90	0.846
100	0.842
110	0.838
120	0.834
130	0.833
140	0.829
150	0.825
200	0.817
300	0.80
400	0.79
500	0.78

APPENDIX E

Stable Channel Design Calculations

- Summary of Stable Channel Design
- HEC-RAS outputs for Stable Channel Design
- Backup Data for Angle of Repose
- Backup Data for Manning's "n"
- HEC-RAS Stable Channel Design Descriptions

Client: Flood Control District of Maricopa County **Date:** 12/07/2004
Project Ellworth Channel Design
Subject Stable Channel Design using HEC-RAS
Prepared By: GL **Checked By:** RLM **File Name** Stable_channel.xls

Ellsworth Channel was designed using the stable channel design function provided in HEC-RAS. Tractive force method was used. Channel was divided into seven reaches based on discharge, channel dimension, and channel slope. Angle of respose was chosen based on "Principles of Geotechnical Engineering" (Braja M. Das, Third Edition). Manning's " n" was chosen based on Maricopa County's Drainage Design Manual. Gravel mulch will be used for channel slope lining. The calculated D50 and D50 used for gravel mulch are listed in the table below. Safety factor of 1.3 was used for stable channel design. HEC-RAS outputs for stable channel design are included in this appendix.

Summary of Stable Channel Design

Channel Reach	From Station	to Station	Design Discharge	Channel Bottom Width	Channel Slope	Calculated D50		D50 for SF=1.3	D50 Used
			(cfs)	(ft)		(mm)	(in)	(in)	(in)
Reach 1	44723	46442	600.00	10.17	0.0006	5.26	0.21	0.27	0.30
Reach 2	46701	47823	600.00	10.17	0.0008	6.38	0.25	0.33	0.35
Reach 3	47823	52200	600.00	30.18	0.0008	8.17	0.32	0.42	0.45
Reach 4	52300	53100	1172.00	70.20	0.0008	8.85	0.35	0.45	0.45
Reach 5	53100	55244	1744.00	70.20	0.0008	11.00	0.43	0.56	0.60
Reach 6	55311	58413	1744.00	70.20	0.0014	16.50	0.65	0.84	0.85
Reach 7	58450	61695	1744.00	70.20	0.0030	24.00	0.95	1.22	1.25

Stable Channel Design Results for Ellsworth Channel

Channel Reach 1: Station 44723 to Station 46442

Hydraulic Design Data
Stable Channel Design Results - Tractive Force Method

Solution Method - Shields

Discharge (cfs)	600
Temp (F)	55

	Left	Bed	Right
Particle Diameter (mm)	5.26	5.12	5.26
Roughness Eq	Manning	Manning	Manning
Roughness Value	0.03	0.022	0.03
Specific Gravity	2.65	2.65	2.65
Angle of Repose	40	40	40
Shield's Parameter	0.055	0.055	0.055
Side Slope	4		4

Output Variables

Depth (ft)	8.22
Width (ft)	10.17
Slope (ft/ft)	0.0006

Station Elevation Data

Station	Elevation	Equation	Value
-37.98	8.22	Manning	0.03
-5.09	0	Manning	0.022
5.09	0	Manning	0.03
37.98	8.22		0

Stable Channel Design Results for Ellsworth Channel

Channel Reach 2: Station 46701 to Station 47823

Stable Channel Design Results - Tractive Force Method

Solution Method - Shields

Discharge (cfs)	600			
Temp (F)	55			
		Left	Bed	Right
Particle Diameter (mm)		6.38	6.15	6.38
Roughness Eq		Manning	Manning	Manning
Roughness Value		0.03	0.022	0.03
Specific Gravity		2.65	2.65	2.65
Angle of Repose		40	40	40
Shield's Parameter		0.055	0.055	0.055
Side Slope		4		4

Output Variables

Depth (ft)	7.53
Width (ft)	10.17
Slope (ft/ft)	0.0008

Station Elevation Data

Station	Elevation	Equation	Value
-35.2	7.53	Manning	0.03
-5.09	0	Manning	0.022
5.09	0	Manning	0.03
35.2	7.53		0

Stable Channel Design Results for Ellsworth Channel

Channel Reach 3: Station 47823 to Station 52200

Hydraulic Design Data.
Stable Channel Design Results - Tractive Force Method

Solution Method - Shields

Discharge (cfs)	600			
Temp (F)	55			
		Left	Bed	Right
Particle Diameter (mm)		7.03	8.17	7.03
Roughness Eq		Manning	Manning	Manning
Roughness Value		0.03	0.022	0.03
Specific Gravity		2.65	2.65	2.65
Angle of Repose		40	40	40
Shield's Parameter		0.055	0.055	0.055
Side Slope		4		4

Output Variables

Depth (ft)	3.99
Width (ft)	30.18
Slope (ft/ft)	0.0008

Station Elevation Data

Station	Elevation	Equation	Value
-31.07	3.99	Manning	0.03
-15.09	0	Manning	0.022
15.09	0	Manning	0.03
31.07	3.99		0

Stable Channel Design Results for Ellsworth Channel

Channel Reach 4: Station 52300 to Station 53100

Hydraulic Design Data
Stable Channel Design Results - Tractive Force Method

Solution Method - Shields

Discharge (cfs)	1172			
Temp (F)	55			
		Left	Bed	Right
Particle Diameter (mm)		7.46	8.85	7.46
Roughness Eq		Manning	Manning	Manning
Roughness Value		0.03	0.022	0.03
Specific Gravity		2.65	2.65	2.65
Angle of Repose		40	40	40
Shield's Parameter		0.055	0.055	0.055
Side Slope		4		4

Output Variables

Depth (ft)	3.64
Width (ft)	70.2
Slope (ft/ft)	0.0008

Station Elevation Data

Station	Elevation	Equation	Value
-49.65	3.64	Manning	0.03
-35.1	0	Manning	0.022
35.1	0	Manning	0.03
49.65	3.64		0

Stable Channel Design Results for Ellsworth Channel

Channel Reach 5: Station 53100 to Station 55244

Hydraulic Design Data
Stable Channel Design Results - Tractive Force Method

Solution Method - Shields

Discharge (cfs)	1744
Temp (F)	55

	Left	Bed	Right
Particle Diameter (mm)	13.9	16.5	13.9
Roughness Eq	Manning	Manning	Manning
Roughness Value	0.03	0.022	0.03
Specific Gravity	2.65	2.65	2.65
Angle of Repose	40	40	40
Shield's Parameter	0.055	0.055	0.055
Side Slope	4		4

Output Variables

Depth (ft)	3.9
Width (ft)	70.2
Slope (ft/ft)	0.0008

Station Elevation Data

Station	Elevation	Equation	Value
-50.72	3.9	Manning	0.03
-35.1	0	Manning	0.022
35.1	0	Manning	0.03
50.72	3.9		0

Stable Channel Design Results for Ellsworth Channel

Channel Reach 6: Station 55311 to Station 58413

Hydraulic Design Data
Stable Channel Design Results - Tractive Force Method

Solution Method - Shields

Discharge (cfs)	1744			
Temp (F)	55			
		Left	Bed	Right
Particle Diameter (mm)		20.2	24	20.2
Roughness Eq		Manning	Manning	Manning
Roughness Value		0.03	0.022	0.03
Specific Gravity		2.65	2.65	2.65
Angle of Repose		40	40	40
Shield's Parameter		0.055	0.055	0.055
Side Slope		4		4

Output Variables

Depth (ft)	3.34
Width (ft)	70.2
Slope (ft/ft)	0.00234

Station Elevation Data

Station	Elevation	Equation	Value
-48.47	3.34	Manning	0.03
-35.1	0	Manning	0.022
35.1	0	Manning	0.03
48.47	3.34		0

Stable Channel Design Results for Ellsworth Channel

Channel Reach 7: Station 58450 to Station 61695

Hydraulic Design Data
Stable Channel Design Results - Tractive Force Method

Solution Method - Shields

Discharge (cfs)	1744			
Temp (F)	55			
		Left	Bed	Right
Particle Diameter (mm)		20.2	24	20.2
Roughness Eq		Manning	Manning	Manning
Roughness Value		0.03	0.022	0.03
Specific Gravity		2.65	2.65	2.65
Angle of Repose		40	40	40
Shield's Parameter		0.055	0.055	0.055
Side Slope		4		4

Output Variables

Depth (ft)	3.34
Width (ft)	70.2
Slope (ft/ft)	0.00234

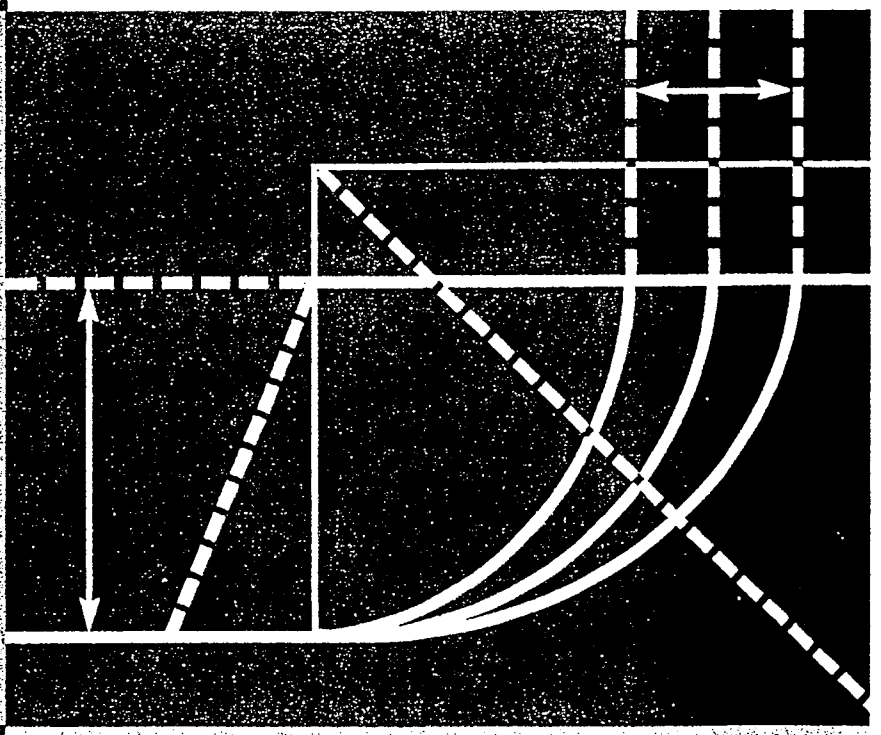
Station Elevation Data

Station	Elevation	Equation	Value
-48.47	3.34	Manning	0.03
-35.1	0	Manning	0.022
35.1	0	Manning	0.03
48.47	3.34	0	

BRAJA M. DAS

Principles of Geotechnical Engineering

Third Edition



FALL 97
ROTHER'S
NO REFUND IF RECEIVED
$23.40

▼ **TABLE 9.1 Typical Values of Drained Angle of Friction for Sands and Silts**

Soil type	ϕ (deg)
Sand: Rounded grains:	
Loose	27–30
Medium	30–35
Dense	35–38
Sand: Angular grains	
Loose	30–35
Medium	35–40
Dense	40–45
Gravel with some sand	34–48
Silts	26–35

Shear Failure Law in Saturated Soil

In saturated soil, the total normal stress at a point is the sum of the effective the pore water pressure, or

$$\sigma = \sigma' + u$$

The effective stress, σ', is carried by the soil solids. So, to apply to soil mech Eq. (9.2) needs to be rewritten as

$$\boxed{\tau_f = c + (\sigma - u) \tan \phi = c + \sigma' \tan \phi}$$

The value of c for sand and inorganic silt is 0. For normally consolidated c can be approximated at 0. Overconsolidated clays have values of c that are greate 0. The angle of friction, ϕ, is sometimes referred to as the *drained angle of fr* Typical values of ϕ for some granular soils are given in Table 9.1.

9.2 DETERMINATION OF SHEAR STRENGTH PARAMETERS FOR SOILS IN THE LABORATORY

The shear strength parameters of a soil can be determined in the laboratory b marily two types of tests: direct shear test and triaxial test. The procedures for co ing each of these tests are explained in some detail in the following sections.

TABLE 6.1
MANNING'S ROUGHNESS COEFFICIENTS (1)

Channel Material	Roughness Coefficient (n)		
	Minimum	Normal	Maximum
Concrete:			
Trowel finish	0.011	0.013	0.015
Float finish	0.013	0.015	0.016
Unfinished	0.014	0.017	0.020
Shotcrete, good section	0.016	0.019	0.023
Shotcrete, wavy section	0.018	0.022	0.025
Soil cement	0.018	0.020	0.025
Constructed channels with earthen bed			
Clean earth; straight	0.018	0.022	0.025
Earth with grass and forbs	0.020	0.025	0.030
Earth with sparse trees and shrubs	0.024	0.032	0.040
Shotcrete	0.018	0.022	0.025
Soil cement	0.022	0.025	0.028
Concrete	0.017	0.020	0.024
Riprap	0.023	0.032	0.036

use 0.022 for channel bottom

use 0.03 for side

1. From: Simons, Li and Associates, 1988. Adapted from Chow (1959) and Aldridge and Garret (1973)

6.3.5 Uniform Flow

Manning's Equation

The most commonly used equations for analysis of open channel flow express mean velocity of flow as a function of the roughness of the channel, the hydraulic radius, and the slope of the energy gradient. They are empirical equations in which the values of constants and exponents have been derived from experimental data. Manning's equation is one of the most widely accepted and commonly used of the open channel equations:

CHAPTER 12

Stable Channel Design Functions

The stable channel design functions are based upon the methods used in the SAM Hydraulic Design Package for Channels, developed by the U.S. Army Corps of Engineers Waterways Experiment Station. This chapter presents the methods and equations used for designing stable channels, including channel geometry, and sediment transport capacity.

Much of the material in this chapter directly references the SAM Hydraulic Design Package for Channels User's Guide (USACE, 1998) and EM 1110-2-1601. There have been a number of alterations to the general approach used in SAM in order to expand its capabilities and to fit within the framework of HEC-RAS. For information on how to enter data for stable channel design and sediment transport capacity analysis, and how to view results, see Chapter 15 of the HEC-RAS user's manual.

Contents

- Uniform Flow Computations
- Stable Channel Design
- Sediment Transport Capacity

silt to fine sand. In addition, Blench suggests that the regime equations be applied only under the following circumstances:

- Sides behave as if hydraulically smooth (i.e. friction due only to viscous forces).
- Bed width exceeds three times the depth.
- Side slopes are consistent with those of a cohesive nature.
- Discharges are steady.
- Sediment load is steady.
- Bed load is non-cohesive, and moves in dune formation.
- Subcritical flow.
- Sediment size is small compared with the depth of water.
- Regime has been achieved by the channel.

These circumstances seem very confining, and in reality, no one channel or canal can claim to behave strictly in this manner. However, if the channel can be adequately approximated by these conditions, without deviating significantly from its true nature, the regime equations may be applicable. At a minimum, the Blench Regime method is a quick way of obtaining "ball-park" figures for results.

Tractive Force Method

Essentially an analytical stable design method, the tractive force approach utilizes a critical shear stress to define when initiation of motion begins, the point at which the channel becomes unstable. In HEC-RAS, this concept is followed to allow the user to solve for two dependant variables when two others are given. The dependant variables are depth, width, slope, and a representative grain size (either d_{50} or d_{75}, depending on the solution method selected). For example, width and grain size can be entered, and HEC-RAS will solve for depth and slope.

The tractive force can be defined as the force that is resisted by friction force and, while in equilibrium, is equal and opposite in magnitude and direction. It is also called shear stress or drag force and can be represented as:

$$\tau_o = \gamma R S \qquad (12\text{-}38)$$

Where: τ_o = Tractive force per unit wetted area
γ = Unit weight of water
R = Hydraulic radius
S = Slope

For very wide channels (B/D > 10), equation 12-38 is very representative of the shearing force felt on the bed. Because τ_o is the average tractive force over the wetted area, the shear distribution becomes more non-uniform as the channel becomes narrower and more trapezoidal. As a result, the maximum

tractive force is actually less than that predicted by equation 12-38 by some reduction factor. In addition, the channel walls, due to their inclination, have an even greater reduction effect on the maximum tractive force felt on the side slopes. For typical trapezoidal sections, it has been determined experimentally by Lane (1953) that the adjustment factor for both the bed and side slopes is largely dependent on the width to depth ratio and the side slope angle. Figure 12.5 presents the curves used to determine the adjustment factors for both the bed and side slopes.

The channel is considered stable if the tractive force at any given location in the cross section is less than the critical shear force. There are currently three methods for determining the critical shear stress in HEC-RAS. They are the Lane, Shields, and user-entered methods.

Lane Method:

Lane conducted experiments on canals in the San Luis Valley of Colorado to develop a method for predicting the critical shear stress. The canals tested were stable, straight, and regular in section, with a wide range of coarse particle sizes from about 0.3 inches to 3 inches in diameter. The results

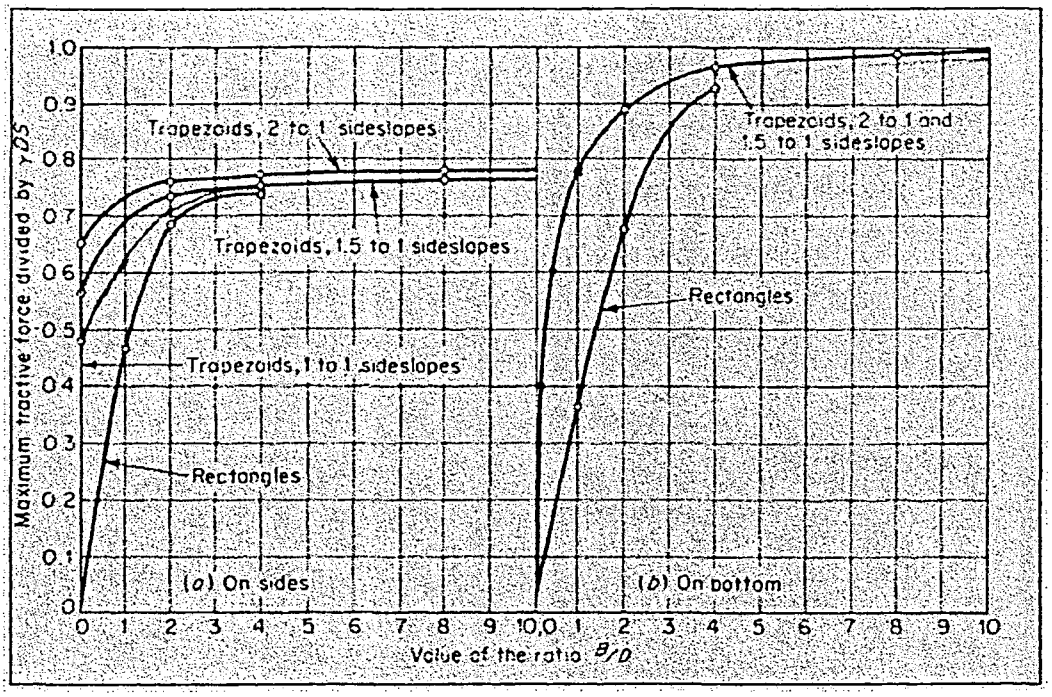


Figure 12.5 Maximum Shear Stress in a Channel (Lane, 1953)

indicated that the critical shear stress was more or less linearly related to the diameter of the particle as follows:

$$\tau_{cr} = 0.4 d_{75} \tag{12-39}$$

The particle size, d_{75}(inches) was used because Lane noticed that throughout the experiments, the smaller particles were consistently shielded by the larger ones. By using a particle size in which only 25% of the particles were larger by weight, the initiation of motion was better represented.

The Shields method has historically been much more widely used to determine the initiation of motion. Shields (1936) developed a relationship between the shear Reynolds number, Re_* and the critical mobility parameter, θ_{cr} from a wide range of experimental data. Shield's diagram is presented in Figure 12.6. The Shear Reynolds number is a representation of the ratio of inertial forces to viscous forces *at the bed* and is given as:

$$Re_* = \frac{u_* d}{\nu} \tag{12-40}$$

$\nu \Rightarrow$ function of particle size

Where: u_* = Shear velocity, which is a representation of the intensity of turbulent fluctuations in the boundary layer.
d = Representative particle size (d_{50} is used in HEC-RAS)
ν = Kinematic viscosity

$$u_* = \sqrt{gDS} \tag{12-41}$$

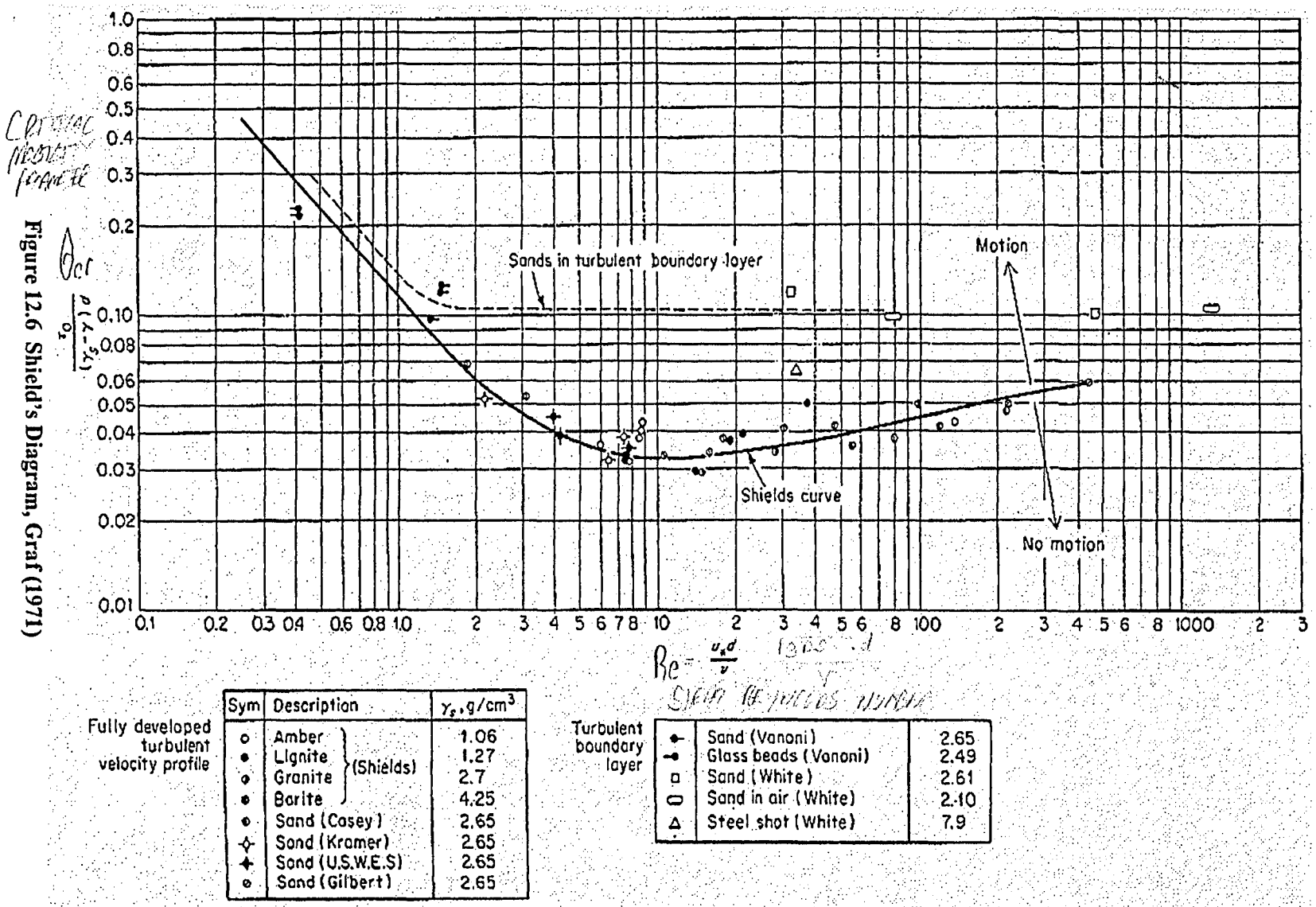
Where: D = Water depth
S = Channel slope

The critical mobility parameter is also known as the dimensionless shear stress and is given as:

$$\theta_{cr} = \frac{\tau_{cr}}{(\gamma_s - \gamma)d} \tag{12-42}$$

Where: γ_s = Unit weight of the particles
γ = Unit weight of water

From reviewing Shield's diagram, a number of things become clear. First, it is evident that the critical mobility parameter never drops below about 0.03. If the specific gravity of the sediments and the unit weight of water are assumed to be 2.65 and 62.4 lb/ft^3, respectively, then the critical shear stress in lb/ft^2 is never less than about 3 times the particle diameter (in feet). Also, if the shear Reynolds number exceeds about 450, the viscous forces in the sublayer no



Sym	Description	γ_s, g/cm³
○	Amber (Shields)	1.06
●	Lignite (Shields)	1.27
◐	Granite (Shields)	2.7
◉	Barite (Shields)	4.25
◐	Sand (Casey)	2.65
✧	Sand (Kramer)	2.65
✦	Sand (U.S.W.E.S)	2.65
⊙	Sand (Gilbert)	2.65

Sym	Description	γ_s, g/cm³
◆	Sand (Vanoni)	2.65
●—	Glass beads (Vanoni)	2.49
□	Sand (White)	2.61
⬭	Sand in air (White)	2.10
△	Steel shot (White)	7.9

Figure 12.6 Shield's Diagram, Graf (1971)

longer have an effect on the shearing force and the Shield's curve levels off with a critical mobility parameter of about 0.055. At this point, the critical shear stress is purely a function of the particle characteristics (size, weight). Likewise, when the shear Reynolds number drops below about 2.0, the inertial forces in the sublayer are negligible and the critical shear stress becomes linearly related to the particle characteristics and the inverse of the viscosity. However, in most natural stream conditions, the shear Reynolds number is high and inertial forces are dominant. HEC-RAS, however, will solve for the critical mobility parameter throughout the full range of Shield's diagram.

A third solution option provided in HEC-RAS allows the user to enter in a value for the critical mobility parameter. This option is given due to the wide range of research on initiation of motion and the varying definitions of what exactly *initiation of motion* means. Although the Shield's curve is meant to represent the initiation of motion, more recent research indicates that this curve more accurately represents permanent grain movement at all locations of the bed. This can be quite different from the shearing required to initiate motion of one or a few particles. Figure 12.7 presents the Shield's curve overlain on seven qualitative curves developed by Delft Hydraulics (1972) describing particle movement. It is evident that the critical shear stress found with Shield's curve can be as much as twice the value required to cause occasional particle movement at some locations.

Because of the variety of opinions on this matter, the user is able to supply HEC-RAS with his/her own value for the critical mobility parameter. This value should be selected such that it represents not only the type of conditions present, but also the type of results desired (i.e. is the design based on permanent particle movement, infrequent particle movement, no particle movement, total suspension, etc?). Many curves present the critical shear stress as the dependent parameter in the initiation of motion curves. A collection of these types of curves is shown in Figure 12.8. **It is important for the user to know that the value entered into RAS must be in the form of the Critical Mobility Parameter, or dimensionless shear stress shown as equation 12-42.**

In HEC-RAS, a reduction factor is applied to the critical shear stress on the side slopes to account for the greater effect of gravity on the particle stability.

$$\tau_{cr,s} = k_{\alpha}\tau_{cr} \tag{12-43}$$

Where: $\tau_{cr,s}$ = Critical shear stress on the side slope
τ_{cr} = Critical shear stress on the bed
k_{α} = Reduction factor

Tractive Force Method

To use the Tractive Force Method, select the tab named "Tractive Force." The window shown in figure 15.11 becomes active. Enter in all required input which are:

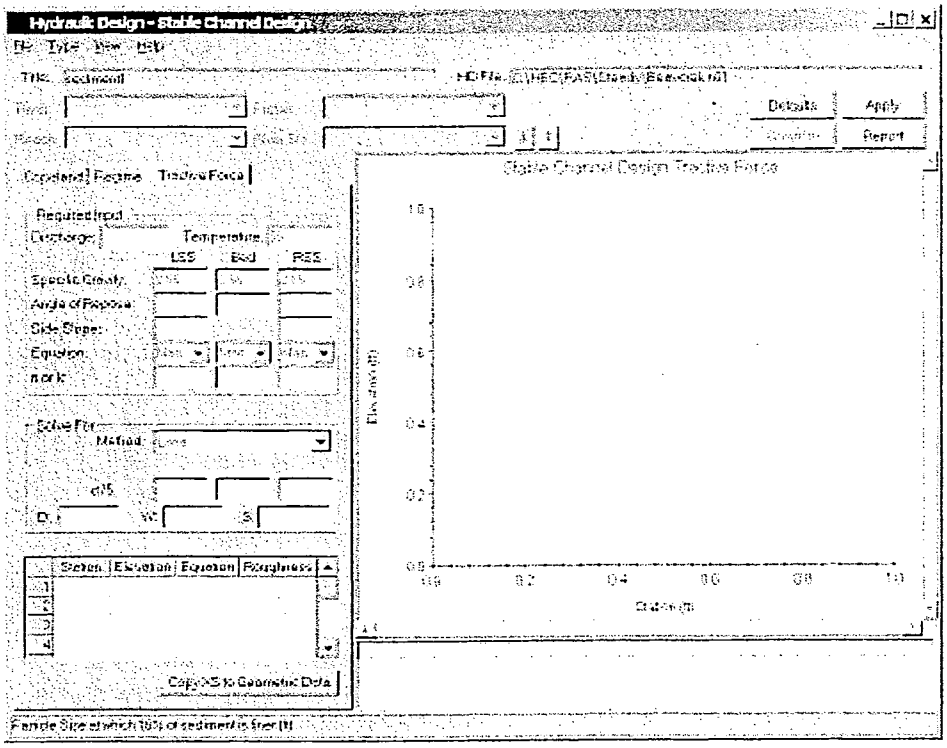


Figure 15.11 Tractive Force Method

Discharge: Design discharge (cfs or m^3/s).

Temperature: Temperature of the water. Default is 55 degrees F or 10 degrees C.

Specific Gravity: Specific gravity of the sediments for the left side slope, bed, and right side slope.

Angle of Repose: The angle of repose of the sediment for the left side slope, bed, and right side slope. See figure 12-9 in the HEC-RAS Hydraulic Reference Manual for suggested values.

Side Slope: Left side slope and right side slope (1Vertical : __Horizontal).

Equation: the roughness equation for the left side slope, bed, and right side slope. Mannings and Strickler are available for use.

n or k: If Mannings is selected, enter a Mannings "n" value. If Strickler is selected, enter a "k" value for the left side slope, bed, and right side slope (ft or m for k values).

Method: Solve for critical shear using either Lane, Shields, or by entering in your own critical mobility parameter.

The remaining values are the dependant variables. Only two can be solved for at a time. The other two must be entered by the user. The three fields for particle diameter (left side slope, bed, right side slope) are considered one variable such that any one of the remaining variables plus any or all of the particle diameters

can be solved for.

d50/d75: The particle diameter in which 50%/75% of the sediment is smaller, by weight. d_{50} is used for Shields and user-entered. d_{75} is used for Lane (mm).

D: The depth of the stable cross section (ft or m).

B: The bottom width of the stable cross section (ft or m).

S: The slope of the energy grade line at the stable cross section.

Once the required values plus two of the dependent variables are entered, the compute button becomes activated and the stable channel values for the remaining dependent variables will be solved for and entered into the appropriate fields. In addition, the plot window will display the resulting cross section.

The displayed cross section can be added to the existing geometry file by clicking on "Copy XS to Geometric Data."

Sediment Transport Potential

APPENDIX F

Scour Calculations

DESIGN MEMORANDUM

Client: MCDOT Sheet ____ Of ____

Project: Ellsworth Road Date: 11-27-04

Data For: Scour @ Proposed Ellsworth Chan. Work Order: ____

Prepared By: [illegible] Checked By: ____ File No: ____

amec

Note: This form must be used for project calculations and original filed in project files

• Applicable Scour Conditions

⇒ Long Term Degredation = Yes

⇒ General Scour

* Zeller Equation (Developed From A Study of Sand Bed Streams in Tucson) = This is Applicable = Yes

* Use 100-yr Q

* Regime Equations

* Contraction Scour = No, will be mitigated @ Culverts with Rip-Rap

⇒ Local Scour = No, will be mitigated @ Culverts with Rip-Rap

⇒ Bend Scour = No, Bends are not Pronounced Enough to Effect Scour

From Above Total Scour will be evaluated as ⇒

$y_{ts} = y_H + y_{SS} \cdot FS$

y_{ts} = Total Scour
y_H = Long Term Scour
y_{SS} = General Scour (from Zeller Eqn)
FS = Factor of Safety

Client: Flood Control District of Maricopa County | Sheet 1 of
Project Ellworth Channel Design | Date: 12/07/2004
Design: Scour Check Using State Standard 5-96
Prepared By: AFC | Checked By: | File Name: Anticipated Channel Scour.xls

State Standard 5-96 is a simplified method of estemating channel degredation, it will be used to check of the calculations for Long Term Degredation and General Scour.

	From Chan. Sta	to Chan. Sta	From HEC-RAS Sta	to HEC-RAS Sta	Segment Length (ft)	Upstream Grade Control	Downstream Grade Control	Design Slope (Energy Slope for Uniform Flow) (ft/ft)	Maximum Design Flow [100-yr] (cfs)
Segment 1	446+98.90	459+63.49	17100	15921	1264.6	MAG Headwall	C3	0.0006	600
Segment 2	460+28.49	464+40.65	15871	15450	412.2	C3	C4	0.0006	600
Segment 3	466+91.17	512+98.29	15192	10601	4607.1	C4	C7	0.0008	600
Segment 4	513+59.42	522+17.66	10540	9700	858.2	C7	Gabion at C8	0.0008	600
Segment 5	524+03.76	526+10.34	9700	9289	206.6	Gabion at C8	C9	0.0008	1172
Segment 6	526+91.51	530+89.97	9208	8800	398.5	C9	Gabion at C10	0.0008	1172
Segment 7	532+04.80	552+52.28	8800	6647	2047.5	Gabion at C10	C11	0.0008	1744
Segment 8	553+13.41	584+13.52	6586	3600	3100.1	C11	Drop Structure	0.0014	1744
Segment 9	584+50.52	593+18.52	3400	2581	868.0	Drop Structure	C12	0.00234	1744
Segment 10	593+42.12	616+55.16	2557	400	2313.0	C12	Exist Drop Structure	0.002527	1744

	Long Term Degredation Dlts = 0.02 (Q100)^0.6 Dlts		General Degredation Dgs = 0.157 (Q100)^0.4 Dgs		Total Scour (ft) Dlts + Dgs
Segment 1	0.93		2.03		2.96
Segment 2	0.93		2.03		2.96
Segment 3	0.93		2.03		2.96
Segment 4	0.93		2.03		2.96
Segment 5	1.39		2.65		4.04
Segment 6	1.39		2.65		4.04
Segment 7	1.76		3.11		4.87
Segment 8	1.76		3.11		4.87
Segment 9	1.76		3.11		4.87
Segment 10	1.76		3.11		4.87

Client: Flood Control District of Maricopa County
Project: Ellworth Channel Design
Design: Long Term Degredation Check
Prepared By: AFC

Sheet 1 of
Date: 05/09/2005
Checked By:
File Name: Anticipated Channel Scour.xls

The long term degredation of the proposed Ellsworth Channel can be estimated by comparing the Design Slope to the Equilbrium or "Stable" slope over the design reach between grade controls. The equlibrium slope will be estimated using the following methods: Schoklitsch Method; Meyer-Peter, Muller Method and the Lane's Tractive Force Method; The average of the Methods will be taken as the maximum expected Long Term Degredation.
Since these methods are not highly dependant on flow no factor of safety will be applied to the results.

	From Chan. Sta	to Chan. Sta	From HEC-RAS Sta	to HEC-RAS Sta	Segment Length (ft)	Upstream Grade Control	Downstream Grade Control	Design Slope (ft/ft)	Maximum Design Flow (cfs)	10-year Event Flow (cfs)	D50 (mm)	D90 (mm)	Maximum Width at Design Flow	Width at 10-year flow	Mean Depth (ft) at Design Event	Mean Depth (ft) for 10-year	Boring Pit Number *	Notes
Segment 1	446+98.90	459+63.49	17100	15921	1264.6	MAG Headwall	C3	0.0006	600	329	1.5	33	59.33	46.05	6.24	4.58	32	Representative HEC-RAS Section: 16200
Segment 2	460+28.49	464+40.65	15871	15450	412.2	C3	C4	0.0006	600	331	1.5	33	51.05	39.80	5.20	3.79	32	Representative HEC-RAS Section: 15809
Segment 3	466+91.17	512+98.29	15192	10601	4607.1	C4	C7	0.0008	600	331	1.5	33	68.02	54.23	5.03	3.31	32	Representative HEC-RAS Section: 11700
Segment 4	513+59.42	522+17.66	10540	9700	858.2	C7	Gabion at C8	0.0008	600	331	1.5	33	71.70	52.67	5.49	3.11	32	Representative HEC-RAS Section: 10200
Segment 5	524+03.76	526+10.34	9700	9289	206.6	Gabion at C8	C9	0.0008	1172	375	1.5	33	110.35	87.46	5.72	2.86	32	Representative HEC-RAS Section: 9400
Segment 6	526+91.51	530+89.97	9208	8800	398.5	C9	Gabion at C10	0.0008	1172	375	1.5	33	109.89	86.94	5.66	2.79	32	Representative HEC-RAS Section: 9100
Segment 7	532+04.80	552+52.28	8800	6647	2047.5	Gabion at C10	C11	0.0008	1744	482	1.5	33	111.15	88.15	5.82	2.94	32	Representative HEC-RAS Section: 7500
Segment 8	553+13.41	584+13.52	6586	3600	3100.1	C11	Drop Structure	0.0014	1744	482	0.96	26	106.80	85.89	5.28	2.66	31,32	Representative HEC-RAS Section: 4900
Segment 9	584+50.52	593+18.52	3400	2581	868.0	Drop Structure	C12	0.00234	1744	482	1.35	20	121.98	89.89	7.17	3.16	29, 30	Representative HEC-RAS Section: 2900
Segment 10	593+42.12	616+55.16	2557	400	2313.0	C12	Exist Drop Structure	0.002527	1744	482	1.35	20	97.87	81.71	4.16	2.14	29,30	Representative HEC-RAS Section: 1900

* From Speedie and Associates Report Dated August 3, 2001 (See Appendix C). If more than 1 boring pit was used an average was taken. Pit 34 was not used, because an accurate estimate of D50 could not be made with the available data.

Schoklitsch Method: SI = Ks (D*Wbf / Q)^3/4
Where: SI = Stable (Equilibrium) Channel Slope
& Ks = 0.00174

	SI	MAX Scour Depth (ft)
Segment 1	0.00054	0.08
Segment 2	0.00048	0.05
Segment 3	0.00061	0.89
Segment 4	0.00059	0.18
Segment 5	0.00079	0.00
Segment 6	0.00079	0.00
Segment 7	0.00066	0.29
Segment 8	0.00046	2.91
Segment 9	0.00062	1.49
Segment 10	0.00058	4.51

* For Schoklitsch Method, assume that dominant discharge for long term degredation is the 10-year discharge and that the Width bf (bank full) is equal to the water surface width at the 10-year discharge.

Meyer-Peter, Muller Method: SI = Kmpm (Q/Qbf) ((Ns / D90^1/6)^3/2) D/d
Where: SI = Stable (Equilibrium) Channel Slope
Kmpm = 0.19
Q/Qbf is ration of total flow to flow over the channel = 1
Ns is Manning's n for the stream bed = 0.03

	SI	MAX Scour Depth (ft)
Segment 1	0.00013	0.59
Segment 2	0.00016	0.18
Segment 3	0.00018	2.84
Segment 4	0.00020	0.52
Segment 5	0.00021	0.12
Segment 6	0.00022	0.23
Segment 7	0.00021	1.22
Segment 8	0.00016	3.86
Segment 9	0.00020	1.86
Segment 10	0.00029	5.17

* For Meyer-Peter, Muller Method, assume that dominant discharge is the design discharge and that the Width bf (bank full) is equal to the water surface width at the design discharge.

Lane's Tractive Force Method: Sl = tc / (Gamma W * d)

Where Sl = Stable (Equilibrium) Channel Slope

Gamma W = 62.4 lb/ft^3

Tc1 from the Chart for Tractive Force versus Transportable Sediment Size - After Lane (Pemberton and Lara, 1984) (SEE ATTACHED) (Using D50 as the input and the curve for Canals with Clear Water

Tc2 from the Chart for Tractive Force versus Transportable Sediment Size - After Lane (Pemberton and Lara, 1984) (SEE ATTACHED) (Using D50 as the input and the curve for Schoklitsh - Recommended for canals in SAND,

	Tc 1 (lb/ft^2)	Sl	MAX Scour Depth (ft)	Tc 2 (lb/ft^2)	Sl	MAX Scour Depth (ft)
Segment 1	0.0500	0.00017	0.54	0.1000	0.00035	0.32
Segment 2	0.0500	0.00021	0.16	0.1000	0.00042	0.07
Segment 3	0.0500	0.00024	2.57	0.1000	0.00048	1.46
Segment 4	0.0500	0.00026	0.47	0.1000	0.00052	0.24
Segment 5	0.0500	0.00028	0.11	0.1000	0.00056	0.05
Segment 6	0.0500	0.00029	0.20	0.1000	0.00057	0.09
Segment 7	0.0380	0.00021	1.21	0.0950	0.00052	0.58
Segment 8	0.0420	0.00025	3.56	0.0900	0.00054	2.66
Segment 9	0.0420	0.00021	1.85	0.0900	0.00046	1.63
Segment 10	0.042	0.00031	5.12	0.0900	0.00067	4.29

Average of Methods	
Segment 1	0.4
Segment 2	0.1
Segment 3	1.9
Segment 4	0.4
Segment 5	0.1
Segment 6	0.1
Segment 7	0.8
Segment 8	3.2
Segment 9	1.7
Segment 10	4.8

Client: Flood Control District of Maricopa County
Project: Ellworth Channel Design
Design: General Scour Check
Prepared By: AFC

Sheet 1 of
Date: 12/07/2004
Checked By:
File Name: Anticipated Channel Scour.xls

In contrast to Long Term Degredation, General Scour is the lowering of the streambed across the channel over relatively short time periods.
General scour will be estimated using the following methods: the Zeller Equation; the Blench and Lacey Regime Equations,

	From Chan. Sta	to Chan. Sta	From HEC-RAS Sta	to HEC-RAS Sta	Segment Length (ft)	Upstream Grade Control	Downstream Grade Control	Design Slope (ft/ft)	Maximum Design Flow (cfs)	Max Depth (ft) at Design Event	D50 (mm)	Maximum Width at Design Flow	Flow Area at Design Flow (ft^2)	Hydraulic Depth of Flow (ft)	Maximum Velocity at Design Flow (ft/s)	Discharge per unit width, qf (ft^3/s/ft)	Notes
Segment 1	446+98.90	459+63.49	17100	15921	1264.6	MAG Headwall	C3	0.0006	600	6.24	1.5	59.33	213.50	3.60	2.81	10.11	Representative HEC-RAS Section: 16200
Segment 2	460+28.49	464+40.65	15871	15450	412.2	C3	C4	0.0006	600	5.20	1.5	51.05	156.50	3.07	3.83	11.75	Representative HEC-RAS Section: 15809
Segment 3	466+91.17	512+98.29	15192	10601	4607.1	C4	C7	0.0008	600	5.03	1.5	68.02	236.80	3.48	2.53	8.82	Representative HEC-RAS Section: 11700
Segment 4	513+59.42	522+17.66	10540	9700	858.2	C7	Gabion at C8	0.0008	600	5.49	1.5	71.70	268.90	3.75	2.23	8.37	Representative HEC-RAS Section: 10200
Segment 5	524+03.76	526+10.34	9700	9289	206.6	Gabion at C8	C9	0.0008	1172	5.72	1.5	110.35	477.60	4.33	2.45	10.62	Representative HEC-RAS Section: 9400
Segment 6	526+91.51	530+89.97	9208	8800	398.5	C9	Gabion at C10	0.0008	1172	5.66	1.5	109.89	471.10	4.29	2.49	10.67	Representative HEC-RAS Section: 9100
Segment 7	532+04.80	552+52.28	8800	6647	2047.5	Gabion at C10	C11	0.0008	1744	5.82	0.96	111.15	488.50	4.39	3.57	15.69	Representative HEC-RAS Section: 7500
Segment 8	553+13.41	584+13.52	6586	3600	3100.1	C11	Drop Structure	0.0014	1744	5.28	1.35	106.80	429.60	4.02	4.06	16.33	Representative HEC-RAS Section: 4900
Segment 9	584+50.52	593+18.52	3400	2581	868.0	Drop Structure	C12	0.00234	1744	7.17	1.35	121.98	646.60	5.30	2.70	14.30	Representative HEC-RAS Section: 2900
Segment 10	593+42.12	616+55.16	2557	400	2313.0	C12	Exist Drop	0.002527	1744	4.16	1.35	97.87	315.10	3.22	5.53	17.82	Representative HEC-RAS Section: 1900

* From Speedie and Associates (SEE APPENDIX C) Report Dated August 3, 2001. If more than 1 boring pit was used an average was taken. Pit 34 was not used, because an accurate estimate of D50 could not be made with the available data.

Zeller Equation : Ygs = Ymax [(0.0685Vm^0.8)/(Yh^0.4Se^0.3)-1]

Where:
Ygs = general scour depth, (ft)
Ymax = maximum depth of flow (ft)
Vm = average velocity of flow, (ft/s)
Yh = Hydraulic depth of flow, (ft)
Se = energy slope (or bed slope for uniform flow), (ft)

Note: this equation was developed as a regression analysis of available data of sand bed streams in Tucson, AZ.

	Ygs	Ygs (actual)
Segment 1	-0.8	0
Segment 2	1.0	1
Segment 3	-1.3	0
Segment 4	-1.9	0
Segment 5	-1.9	0
Segment 6	-1.8	0
Segment 7	-0.6	0
Segment 8	-0.7	0
Segment 9	-3.7	0
Segment 10	0.1	0.1

PER THIS ANALYSIS GENERAL SCOUR IS NEGLIGABLE

Blench Regime Equation : Ys = Z*Yfo, Where Yfo = qf^2/3 / Fbo^1/3

Where:
qf = design discharge per unit width, (ft^3/s/ft)
Fbo = Blench's "zero bed factor" in ft/s^2 from Figure 9 (see attached)
Z = Regime Equation Multiplying Factor from Table 3 (see attached)

	Fbo	Yfo	Z	Ys
Segment 1	2.0	3.7	0.60	2.2
Segment 2	2.0	4.1	0.60	2.5
Segment 3	2.0	3.4	0.60	2.0
Segment 4	2.0	3.3	0.60	2.0
Segment 5	2.0	3.8	0.60	2.3
Segment 6	2.0	3.8	0.60	2.3
Segment 7	1.8	5.1	0.60	3.1
Segment 8	1.9	5.2	0.60	3.1
Segment 9	1.9	4.7	0.60	2.8
Segment 10	1.9	5.5	0.60	3.3

Lacey Regime Equation : Ys = Z*Ym, Where Ym = 0.47*(Q/f)^1/3

Where:

ym = mean water depth at the design discharge, (ft)

Q= design discharge, (ft^3/s)

f = Lacey's silt factor = 1.76(Dm)^1/2

Dm = Mean grain size of bed material, (mm)

Z = Regime Equation Multiplying Factor from Table 3 (see attached)

	f	Ym	Z	Ys
Segment 1	2.2	3.1	0.25	0.8
Segment 2	2.2	3.1	0.25	0.8
Segment 3	2.2	3.1	0.25	0.8
Segment 4	2.2	3.1	0.25	0.8
Segment 5	2.2	3.8	0.25	1.0
Segment 6	2.2	3.8	0.25	1.0
Segment 7	1.7	4.7	0.25	1.2
Segment 8	2.0	4.5	0.25	1.1
Segment 9	2.0	4.5	0.25	1.1
Segment 10	2.0	4.5	0.25	1.1

	Average of Methods	FS	General Scour (ft)
Segment 1	0.7	1.3	0.9
Segment 2	1.4	1.3	1.8
Segment 3	0.5	1.3	0.7
Segment 4	0.3	1.3	0.4
Segment 5	0.4	1.3	0.6
Segment 6	0.5	1.3	0.6
Segment 7	1.2	1.3	1.6
Segment 8	1.2	1.3	1.5
Segment 9	0.1	1.3	0.1
Segment 10	1.5	1.3	1.9

Total Scour (Long Term + General)
1.3
1.9
2.6
0.7
0.6
0.7
2.4
4.8
1.8
6.7

Notes:

- Method is based on results of study by Lane where he summarized the results of many studies in relationship of critical tractive force versus mean particle size. Figure 4 from Pemberton and Lara.
- Assumes zero or negligible sediment transport.

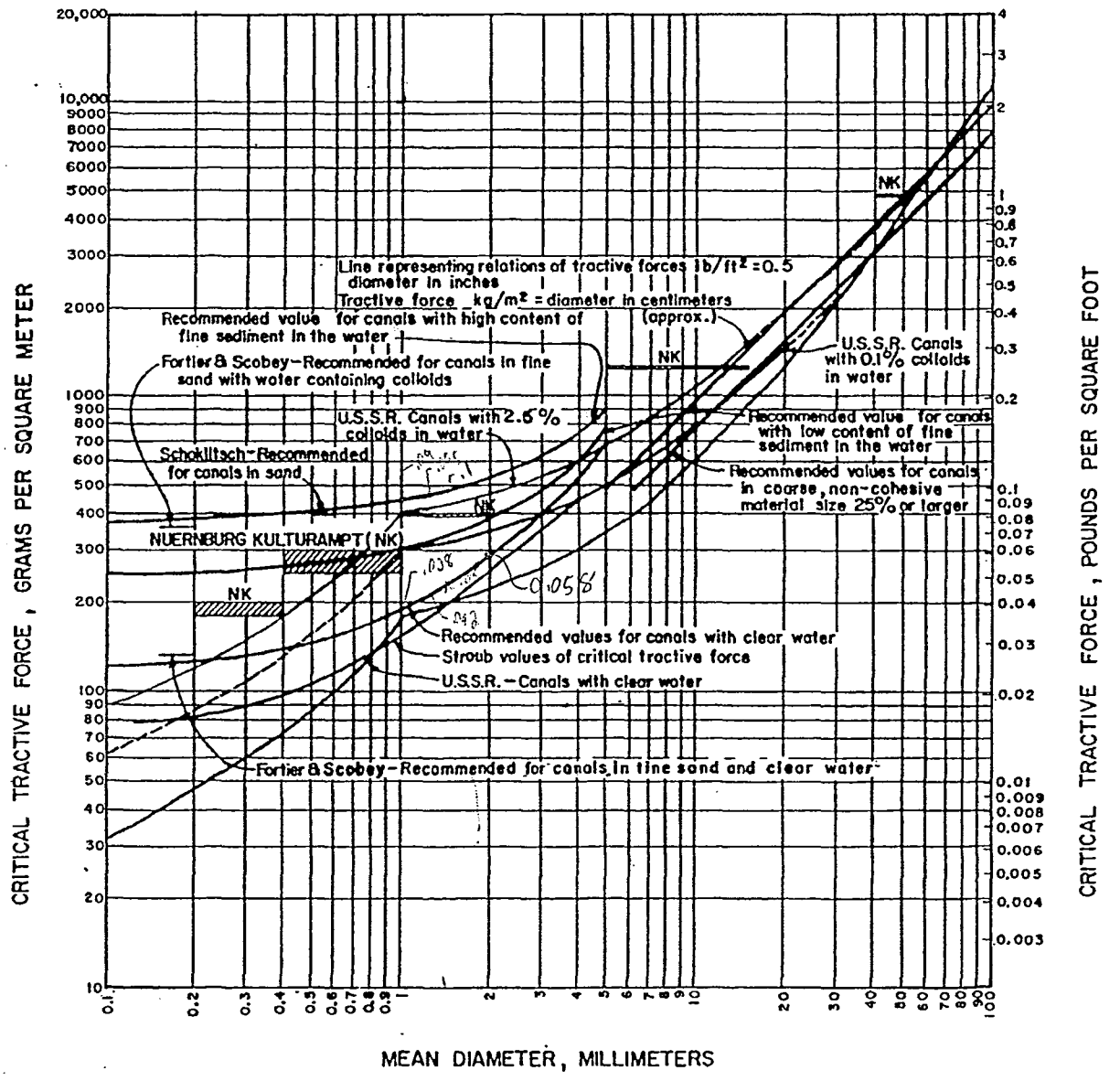


Figure 4. – Tractive Force versus Transportable Sediment Size – After Lane (Pemberton and Lara, 1984)

Regime Equations – Blench Equation (1969)

$$y_{f0} = q_f^{2/3} / F_{b0}^{1/3}$$

where:

y_{f0} = water depth for zero bed sediment transport, (ft)
q_f = design discharge per unit width, ($ft^3/s/ft$) (ACROSS THE CHANNEL)
F_{b0} = Blench's "zero bed factor" in ft/s^2 from Figure 9

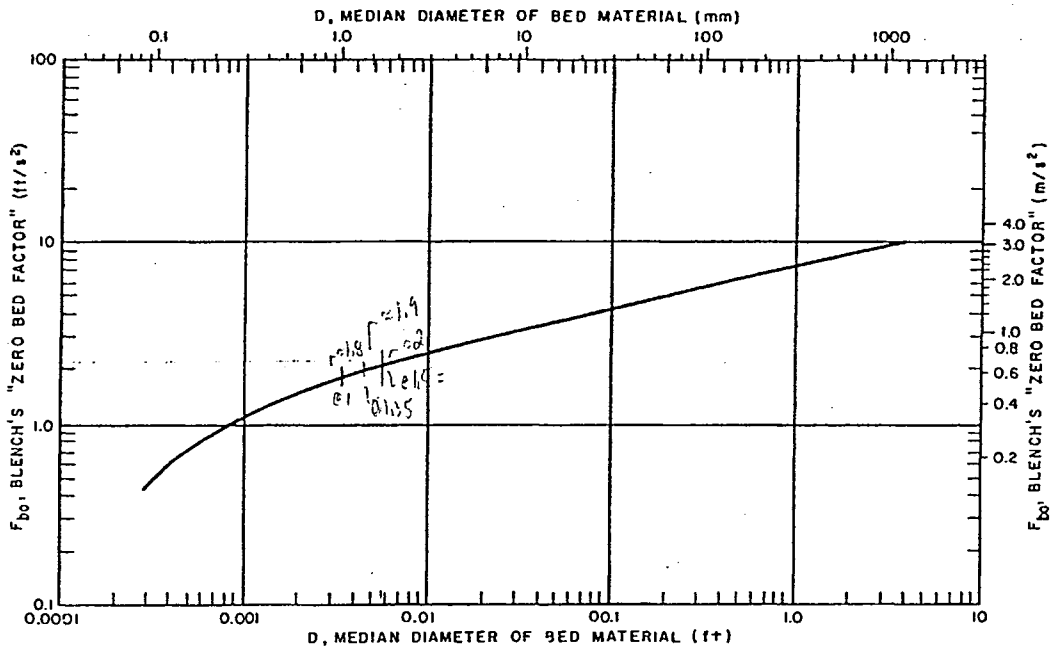


Figure 9. Chart for Estimating F_{b0} – After Blench (Pemberton and Lara, 1984)

Regime Equations – Lacey's Equation (1930)

$$y_m = 0.47\,(Q / f)^{1/3}$$

where:

y_m = mean water depth at design discharge, (ft)
Q = design discharge, (ft^3/s)
f = Lacey's silt factor = $1.76\,(D_m)^{1/2}$
D_m = mean grain size of bed material, (mm)

Regime Equations – Calculating Scour Depth

Calculating scour depth with the regime equations

- Accounts for probable concentration of flood flows in some portion of the natural channel
- Depth of scour below streambed (Figure VII-14) [general scour plus bend scour and thalweg formation]:

$y_s = Z\, y_f$ Neill

$y_s = Z\, y_{f0}$ Blench

$y_s = Z\, y_m$ Lacey

where:

y_s = depth of scour below low point in existing stream bed, in units of y_f, y_m, and y_{f0}

Z = multiplying factor from Table 7

Table 7. Multiplying Factors, Z, for Use in Scour Depths by Regime Equation (Pemberton and Lara, 1984)

Condition	Value of Z		
	Neill $d_s = Z\, d_f$	Lacey $d_s = Z\, d_m$	Blench $d_s = Z\, d_{fo}$
Equation Types A and B			
Straight reach	0.5	0.25	1/ 0.6
Moderate bend	0.6	0.5	
Severe bend	0.7	0.75	
Right angle bends		1.0	1.25
Vertical rock bank or wall		1.25	

FOOT NOTE

APPENDIX G

Pavement Drainage, Storm Drain and Riprap Sizing Calculations

- **Rainfall Intensity Calculations**
- **Pavement Drainage Calculations (Ultimate Condition)**
- **Storm Drain Calculations**
- **Road Side Ditch Calculations (Interim Condition)**
- **Rip-Rap Sizing Calculations**

AMEC Infrastructure {Phoenix}
100 - Ellsworth Road
Rainfall Data

Primary Zone Number:	7	Latitude:	0.0	Elevation:	0
Short Duration Zone Number:	8	Longitude:	0.0		

	Point Values (in)					
Duration	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
5 MIN	0.29	0.40	0.47	0.56	0.64	0.71
10 MIN	0.44	0.60	0.71	0.86	0.98	1.10
15 MIN	0.54	0.75	0.90	1.10	1.25	1.41
30 MIN	0.71	1.01	1.21	1.48	1.69	1.91
1 HOUR	0.87	1.25	1.50	1.85	2.12	2.38
2 HOUR	0.95	1.36	1.63	2.01	2.30	2.59
3 HOUR	1.00	1.43	1.72	2.12	2.43	2.73
6 HOUR	1.10	1.58	1.89	2.33	2.67	3.00
12 HOUR	1.20	1.73	2.08	2.56	2.93	3.30
24 HOUR	1.30	1.88	2.26	2.79	3.20	3.60

RAINFALL INTENSITY TABLE		
	Rainfall Intensity (in/hr)	
Tc	i10	i100
5	**5.64**	**8.52**
6	5.36	8.14
7	5.09	7.75
8	4.81	7.37
9	4.54	6.98
10	**4.26**	**6.60**
11	4.13	6.41
12	4.00	6.22
13	3.86	6.02
14	3.73	5.83
15	**3.60**	**5.64**
16	3.52	5.52
17	3.44	5.40
18	3.36	5.28
19	3.29	5.15
20	3.21	5.03
21	3.13	4.91
22	3.05	4.79
23	2.97	4.67
24	2.89	4.55
25	2.81	4.43
26	2.73	4.31
27	2.66	4.18
28	2.58	4.06
29	2.50	3.94
30	**2.42**	**3.82**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	
		Date:	05/20/2002

South Bound and North Bound: Station 20+00 to Station 25+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
20+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002600	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
20+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002600	0.0200	5.95	17.00	0.85	0.26	0.26	0.12	0	Yes
21+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002600	0.0200	7.72	17.00	1.01	0.61	0.87	0.15	0	Yes
21+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002600	0.0200	8.99	17.00	1.12	1.02	1.89	0.18	0	Yes
22+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002600	0.0200	10.01	17.00	1.20	1.46	3.34	0.20	0	Yes
22+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002600	0.0200	10.89	17.00	1.27	1.93	5.27	0.22	0	Yes
23+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.088	1.64	0.002600	0.0200	11.22	17.00	1.30	2.13	7.39	0.22	0	Yes
23+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	4.536	1.70	0.002600	0.0200	11.38	17.00	1.31	2.23	9.63	0.23	0	Yes
24+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	4.128	1.77	0.002600	0.0200	11.55	17.00	1.33	2.35	11.97	0.23	0	Yes
24+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	3.732	1.80	0.002600	0.0200	11.63	17.00	1.33	2.40	14.37	0.23	0	Yes
25+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	3.520	1.89	0.002600	0.0200	11.83	17.00	1.35	2.54	16.91	0.24	0	Add Inlet

South Bound and North Bound: Station 25+00 to Station 28+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
28+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002667	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
27+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002667	0.0200	5.93	17.00	0.86	0.97	0.97	0.12	0	Yes
27+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002667	0.0200	7.68	17.00	1.02	0.82	1.79	0.15	0	Yes
26+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002667	0.0200	8.95	17.00	1.13	0.74	2.52	0.18	0	Yes
26+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002667	0.0200	9.97	17.00	1.22	0.69	3.21	0.20	0	Yes
25+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002667	0.0200	10.84	17.00	1.29	0.65	3.86	0.22	0	Yes
25+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002667	0.0200	11.60	17.00	1.35	0.62	4.48	0.23	0	Add Inlet

Project: Ellworth Road

Subject Pavement Drainage Calculations (10-year flow)

Filename: PavementDrainage.xls

Computed By: GL / AFC **Checked By:** **Date:** 05/20/2002

South Bound and North Bound: Station 28+00 to Station 39+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inlet} (cfs)	Spread <Required?
28+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002727	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
28+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002727	0.0200	5.90	17.00	0.87	0.96	0.96	0.12	0	Yes
29+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002727	0.0200	7.65	17.00	1.03	0.81	1.77	0.15	0	Yes
29+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002727	0.0200	8.91	17.00	1.14	0.73	2.50	0.18	0	Yes
30+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002727	0.0200	9.92	17.00	1.23	0.68	3.18	0.20	0	Yes
30+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002727	0.0200	10.79	17.00	1.30	0.64	3.82	0.22	0	Yes
31+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002727	0.0200	11.55	17.00	1.36	0.61	4.44	0.23	0	Yes
31+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002727	0.0200	12.24	17.00	1.41	0.59	5.03	0.24	0	Yes
32+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002727	0.0200	12.87	17.00	1.46	0.57	5.60	0.26	0	Yes
32+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.364	2.59	0.002727	0.0200	13.20	17.00	1.48	0.56	6.16	0.26	0	Yes
33+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	5.364	2.88	0.002727	0.0200	13.73	17.00	1.52	0.55	6.71	0.27	0	Yes
33+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	5.088	3.00	0.002727	0.0200	13.95	17.00	1.54	0.54	7.25	0.28	0	Yes
34+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	5.088	3.27	0.002727	0.0200	14.42	17.00	1.57	0.53	7.78	0.29	0	Yes
34+50.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	4.812	3.35	0.002727	0.0200	14.55	17.00	1.58	0.53	8.30	0.29	0	Yes
35+00.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	4.812	3.61	0.002727	0.0200	14.96	17.00	1.61	0.52	8.82	0.30	0	Yes
35+50.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	4.536	3.65	0.002727	0.0200	15.01	17.00	1.62	0.52	9.34	0.30	0	Yes
36+00.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	4.536	3.89	0.002727	0.0200	15.38	17.00	1.64	0.51	9.84	0.31	0	Yes
36+50.00	39.50	0.77	17.50	0.34	0.85	0.75	0.911	4.260	3.88	0.002727	0.0200	15.37	17.00	1.64	0.51	10.35	0.31	0	Yes
37+00.00	39.50	0.82	17.50	0.36	0.85	0.75	0.965	4.260	4.11	0.002727	0.0200	15.70	17.00	1.67	0.50	10.85	0.31	0	Yes
37+50.00	39.50	0.86	17.50	0.38	0.85	0.75	1.018	4.128	4.20	0.002727	0.0200	15.84	17.00	1.68	0.50	11.35	0.32	0	Yes
38+00.00	39.50	0.91	17.50	0.40	0.85	0.75	1.072	4.128	4.43	0.002727	0.0200	16.14	17.00	1.70	0.49	11.84	0.32	0	Yes
38+50.00	**39.50**	**0.95**	**17.50**	**0.42**	**0.85**	**0.75**	**1.126**	**3.996**	**4.50**	**0.002727**	**0.0200**	**16.24**	**17.00**	**1.71**	**0.49**	**12.33**	**0.32**	**0**	**Add inlet**
38+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002727	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
39+00.00	**39.50**	**0.05**	**17.50**	**0.02**	**0.85**	**0.75**	**0.054**	**5.640**	**0.30**	**0.002727**	**0.0200**	**5.90**	**17.00**	**0.87**	**0.96**	**0.96**	**0.12**	**0**	**Add inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Date:**	05/20/2002

South Bound and North Bound: Station 39+00 to Station 44+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inlet} (cfs)	Spread <Required?
44+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002727	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
44+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002727	0.0200	5.90	17.00	0.87	0.96	0.96	0.12	0	Yes
43+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002727	0.0200	7.65	17.00	1.03	0.81	1.77	0.15	0	Yes
43+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002727	0.0200	8.91	17.00	1.14	0.73	2.50	0.18	0	Yes
42+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002727	0.0200	9.92	17.00	1.23	0.68	3.18	0.20	0	Yes
42+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002727	0.0200	10.79	17.00	1.30	0.64	3.82	0.22	0	Yes
41+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002727	0.0200	11.55	17.00	1.36	0.61	4.44	0.23	0	Yes
41+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002727	0.0200	12.24	17.00	1.41	0.59	5.03	0.24	0	Yes
40+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002727	0.0200	12.87	17.00	1.46	0.57	5.60	0.26	0	Yes
40+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.364	2.59	0.002727	0.0200	13.20	17.00	1.48	0.56	6.16	0.26	0	Yes
39+50.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	5.364	2.88	0.002727	0.0200	13.73	17.00	1.52	0.55	6.71	0.27	0	Yes
39+00.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	5.088	3.00	0.002727	0.0200	13.95	17.00	1.54	0.54	7.25	0.28	0	Add Inlet

South Bound and North Bound: Station 44+50 to Station 53+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inlet} (cfs)	Spread <Required?
44+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003059	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
45+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.003059	0.0200	5.78	17.00	0.90	0.92	0.92	0.12	0	Yes
45+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.003059	0.0200	7.49	17.00	1.08	0.77	1.70	0.15	0	Yes
46+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.003059	0.0200	8.72	17.00	1.19	0.70	2.40	0.17	0	Yes
46+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.003059	0.0200	9.71	17.00	1.28	0.65	3.05	0.19	0	Yes
47+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.003059	0.0200	10.56	17.00	1.35	0.62	3.66	0.21	0	Yes
47+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.003059	0.0200	11.31	17.00	1.42	0.59	4.25	0.23	0	Yes
48+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.003059	0.0200	11.98	17.00	1.47	0.57	4.82	0.24	0	Yes
48+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.003059	0.0200	12.60	17.00	1.52	0.55	5.36	0.25	0	Yes
49+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.640	2.72	0.003059	0.0200	13.17	17.00	1.57	0.53	5.90	0.26	0	Yes
49+50.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	5.364	2.88	0.003059	0.0200	13.44	17.00	1.59	0.52	6.42	0.27	0	Yes
50+00.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	5.364	3.16	0.003059	0.0200	13.93	17.00	1.63	0.51	6.93	0.28	0	Yes
50+50.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	5.088	3.27	0.003059	0.0200	14.11	17.00	1.64	0.51	7.44	0.28	0	Yes
51+00.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	5.088	3.55	0.003059	0.0200	14.54	17.00	1.68	0.50	7.93	0.29	0	Yes
51+50.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	4.812	3.61	0.003059	0.0200	14.64	17.00	1.68	0.49	8.43	0.29	0	Yes
52+00.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	4.812	3.87	0.003059	0.0200	15.02	17.00	1.71	0.49	8.91	0.30	0	Yes
52+50.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	4.536	3.89	0.003059	0.0200	15.05	17.00	1.72	0.49	9.40	0.30	0	Add Inlet
52+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003059	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
53+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.003059	0.0200	5.78	17.00	0.90	0.92	0.92	0.12	0	Add Inlet

Project: Ellworth Road

Subject Pavement Drainage Calculations (10-year flow)

Filename: PavementDrainage.xls

Computed By: Gl. / AFC **Checked By:** **Date:** 05/20/2002

South Bound and North Bound: Station 53+00 to Station 60+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpass} (cfs)	Spread <Required?
60+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002714	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
59+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002714	0.0200	5.91	17.00	0.86	0.96	0.96	0.12	0	Yes
59+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002714	0.0200	7.66	17.00	1.03	0.81	1.77	0.15	0	Yes
58+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002714	0.0200	8.92	17.00	1.14	0.73	2.51	0.18	0	Yes
58+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002714	0.0200	9.93	17.00	1.22	0.68	3.19	0.20	0	Yes
57+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002714	0.0200	10.80	17.00	1.29	0.64	3.83	0.22	0	Yes
57+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002714	0.0200	11.56	17.00	1.36	0.61	4.45	0.23	0	Yes
56+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002714	0.0200	12.25	17.00	1.41	0.59	5.04	0.25	0	Yes
56+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002714	0.0200	12.88	17.00	1.46	0.57	5.61	0.26	0	Yes
55+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.364	2.59	0.002714	0.0200	13.21	17.00	1.48	0.56	6.17	0.26	0	Yes
54+45.09	**39.50**	**0.50**	**17.50**	**0.22**	**0.85**	**0.75**	**0.595**	**5.088**	**3.03**	**0.002714**	**0.0200**	**14.01**	**17.00**	**1.54**	**1.13**	**7.31**	**0.28**	**0**	**Add Inlet**
54+45.09	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002714	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
54+00.00	39.50	0.04	17.50	0.02	0.85	0.75	0.048	5.640	0.27	0.002714	0.0200	5.68	17.00	0.84	0.89	0.89	0.11	0	Yes
53+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.102	5.640	0.57	0.002714	0.0200	7.52	17.00	1.02	0.82	1.71	0.15	0	Yes
53+00.00	**39.50**	**0.13**	**17.50**	**0.06**	**0.85**	**0.75**	**0.156**	**5.640**	**0.88**	**0.002714**	**0.0200**	**8.81**	**17.00**	**1.13**	**0.74**	**2.45**	**0.18**	**0**	**Add Inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AEC	**Checked By:**	
		Date:	05/20/2002

South Bound and North Bound: Station 60+00 to Station 79+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
60+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002526	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
60+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002526	0.0200	5.99	17.00	0.84	0.99	0.99	0.12	0	Yes
61+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002526	0.0200	7.76	17.00	1.00	0.83	1.82	0.16	0	Yes
61+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002526	0.0200	9.04	17.00	1.11	0.75	2.58	0.18	0	Yes
62+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002526	0.0200	10.07	17.00	1.19	0.70	3.27	0.20	0	Yes
62+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002526	0.0200	10.95	17.00	1.26	0.66	3.93	0.22	0	Yes
63+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002526	0.0200	11.72	17.00	1.32	0.63	4.57	0.23	0	Yes
63+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002526	0.0200	12.42	17.00	1.37	0.61	5.18	0.25	0	Yes
64+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002526	0.0200	13.06	17.00	1.42	0.59	5.76	0.26	0	Yes
64+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.364	2.59	0.002526	0.0200	13.39	17.00	1.44	0.58	6.34	0.27	0	Yes
65+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	5.364	2.88	0.002526	0.0200	13.93	17.00	1.48	0.56	6.90	0.28	0	Yes
65+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	5.088	3.00	0.002526	0.0200	14.16	17.00	1.50	0.56	7.46	0.28	0	Yes
66+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	4.812	3.10	0.002526	0.0200	14.32	17.00	1.51	0.55	8.01	0.29	0	Yes
66+50.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	4.812	3.35	0.002526	0.0200	14.76	17.00	1.54	0.54	8.55	0.30	0	Yes
67+00.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	4.536	3.40	0.002526	0.0200	14.84	17.00	1.55	0.54	9.09	0.30	0	Yes
67+50.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	4.536	3.65	0.002526	0.0200	15.23	17.00	1.57	0.53	9.62	0.30	0	Yes
68+00.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	4.260	3.65	0.002526	0.0200	15.24	17.00	1.57	0.53	10.15	0.30	0	Yes
68+50.00	39.50	0.77	17.50	0.34	0.85	0.75	0.911	4.260	3.88	0.002526	0.0200	15.59	17.00	1.60	0.52	10.67	0.31	0	Yes
69+21.47	**39.50**	**0.84**	**17.50**	**0.37**	**0.85**	**0.75**	**0.988**	**4.128**	**4.08**	**0.002526**	**0.0200**	**15.88**	**17.00**	**1.62**	**0.74**	**11.41**	**0.32**	**0**	**Add Inlet**
69+21.47	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002526	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
69+50.00	39.50	0.03	17.50	0.01	0.85	0.75	0.031	5.640	0.17	0.002526	0.0200	4.85	17.00	0.73	0.65	0.65	0.10	0	Yes
70+00.00	39.50	0.07	17.50	0.03	0.85	0.75	0.084	5.640	0.47	0.002526	0.0200	7.09	17.00	0.94	0.88	1.54	0.14	0	Yes
70+50.00	39.50	0.12	17.50	0.05	0.85	0.75	0.138	5.640	0.78	0.002526	0.0200	8.53	17.00	1.07	0.78	2.32	0.17	0	Yes
71+00.00	39.50	0.16	17.50	0.07	0.85	0.75	0.191	5.640	1.08	0.002526	0.0200	9.65	17.00	1.16	0.72	3.04	0.19	0	Yes
71+50.00	39.50	0.21	17.50	0.09	0.85	0.75	0.245	5.640	1.38	0.002526	0.0200	10.58	17.00	1.23	0.68	3.71	0.21	0	Yes
72+16.75	**39.50**	**0.27**	**17.50**	**0.12**	**0.85**	**0.75**	**0.317**	**5.640**	**1.79**	**0.002526**	**0.0200**	**11.65**	**17.00**	**1.31**	**0.85**	**4.56**	**0.23**	**0**	**Add Inlet**
72+16.75	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002526	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
75+00.00	39.50	0.26	17.50	0.11	0.85	0.75	0.304	5.640	1.71	0.002526	0.0200	11.47	17.00	1.30	3.63	3.63	0.23	0	Yes
75+50.00	39.50	0.30	17.50	0.13	0.85	0.75	0.357	5.640	2.02	0.002526	0.0200	12.19	17.00	1.35	0.62	4.25	0.24	0	Yes
76+00.00	39.50	0.35	17.50	0.15	0.85	0.75	0.411	5.640	2.32	0.002526	0.0200	12.85	17.00	1.40	0.59	4.84	0.26	0	Yes
76+50.00	39.50	0.39	17.50	0.17	0.85	0.75	0.464	5.640	2.62	0.002526	0.0200	13.45	17.00	1.45	0.58	5.42	0.27	0	Yes
77+00.00	39.50	0.44	17.50	0.19	0.85	0.75	0.518	5.640	2.92	0.002526	0.0200	14.02	17.00	1.49	0.56	5.98	0.28	0	Yes
77+64.64	**39.50**	**0.50**	**17.50**	**0.22**	**0.85**	**0.75**	**0.587**	**5.364**	**3.15**	**0.002526**	**0.0200**	**14.42**	**17.00**	**1.52**	**0.71**	**6.69**	**0.29**	**0**	**Add Inlet**
77+64.64	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002526	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
78+50.00	39.50	0.08	17.50	0.03	0.85	0.75	0.092	5.640	0.52	0.002526	0.0200	7.32	17.00	0.96	1.48	1.48	0.15	0	Yes
79+00.00	39.50	0.12	17.50	0.05	0.85	0.75	0.145	5.640	0.82	0.002526	0.0200	8.70	17.00	1.08	0.77	2.25	0.17	0	Add Inlet

Project: Ellworth Road

Subject Pavement Drainage Calculations (10-year flow)

Filename: PavementDrainage.xls

Computed By: GL / AFC **Checked By:** **Date:** 05/20/2002

South Bound and North Bound: Station 79+00 to Station 85+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpass} (cfs)	Spread <Required?
85+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002000	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
85+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002000	0.0200	6.25	17.00	0.77	1.08	1.08	0.13	0	Yes
84+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002000	0.0200	8.11	17.00	0.92	0.91	1.99	0.16	0	Yes
84+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002000	0.0200	9.44	17.00	1.02	0.82	2.81	0.19	0	Yes
83+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002000	0.0200	10.52	17.00	1.09	0.76	3.57	0.21	0	Yes
83+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002000	0.0200	11.44	17.00	1.15	0.72	4.30	0.23	0	Yes
82+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002000	0.0200	12.25	17.00	1.21	0.69	4.98	0.24	0	Yes
82+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002000	0.0200	12.97	17.00	1.26	0.66	5.65	0.26	0	Yes
81+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.364	2.30	0.002000	0.0200	13.39	17.00	1.28	0.65	6.30	0.27	0	Yes
81+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.364	2.59	0.002000	0.0200	13.99	17.00	1.32	0.63	6.93	0.28	0	Yes
80+50.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	5.088	2.73	0.002000	0.0200	14.27	17.00	1.34	0.62	7.55	0.29	0	Yes
80+00.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	4.812	2.84	0.002000	0.0200	14.48	17.00	1.35	0.62	8.17	0.29	0	Yes
79+50.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	4.812	3.10	0.002000	0.0200	14.96	17.00	1.38	0.60	8.77	0.30	0	Yes
79+00.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	4.536	3.16	0.002000	0.0200	15.08	17.00	1.39	0.60	9.37	0.30	0	Add Inlet

South Bound and North Bound: Station 85+00 to Station 92+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpass} (cfs)	Spread <Required?
85+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.005692	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
86+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.005692	0.0200	5.14	17.00	1.14	0.73	0.73	0.10	0	Yes
86+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.005692	0.0200	6.67	17.00	1.36	0.61	1.35	0.13	0	Yes
87+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.005692	0.0200	7.76	17.00	1.50	0.55	1.90	0.16	0	Yes
87+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.005692	0.0200	8.65	17.00	1.62	0.52	2.42	0.17	0	Yes
88+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.005692	0.0200	9.40	17.00	1.71	0.49	2.90	0.19	0	Yes
88+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.005692	0.0200	10.07	17.00	1.79	0.47	3.37	0.20	0	Yes
89+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.005692	0.0200	10.66	17.00	1.86	0.45	3.82	0.21	0	Yes
89+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.005692	0.0200	11.21	17.00	1.92	0.43	4.25	0.22	0	Yes
89+98.24	39.50	0.41	17.50	0.18	0.85	0.75	0.481	5.640	2.71	0.005692	0.0200	11.70	17.00	1.98	0.41	4.66	0.23	0	Add Inlet
89+98.24	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.005692	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
91+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.109	5.640	0.62	0.005692	0.0200	6.71	17.00	1.36	1.24	1.24	0.13	0	Yes
91+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.163	5.640	0.92	0.005692	0.0200	7.80	17.00	1.51	0.55	1.80	0.16	0	Yes
92+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.216	5.640	1.22	0.005692	0.0200	8.67	17.00	1.62	0.51	2.31	0.17	0	Add Inlet

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)	**Filename:**	PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	**Date:** 05/20/2002

South Bound and North Bound: Station 92+00 to Station 105+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
105+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002714	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
104+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002714	0.0200	5.91	17.00	0.86	0.96	0.96	0.12	0	Yes
104+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002714	0.0200	7.66	17.00	1.03	0.81	1.77	0.15	0	Yes
103+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002714	0.0200	8.92	17.00	1.14	0.73	2.51	0.18	0	Yes
103+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002714	0.0200	9.93	17.00	1.22	0.68	3.19	0.20	0	Yes
102+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002714	0.0200	10.80	17.00	1.29	0.64	3.83	0.22	0	Yes
102+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002714	0.0200	11.56	17.00	1.36	0.61	4.45	0.23	0	Yes
101+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002714	0.0200	12.25	17.00	1.41	0.59	5.04	0.25	0	Yes
101+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002714	0.0200	12.88	17.00	1.46	0.57	5.61	0.26	0	Yes
100+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.364	2.59	0.002714	0.0200	13.21	17.00	1.48	0.56	6.17	0.26	0	Yes
100+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	5.364	2.88	0.002714	0.0200	13.75	17.00	1.52	0.55	6.72	0.27	0	Yes
99+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	5.088	3.00	0.002714	0.0200	13.97	17.00	1.54	0.54	7.26	0.28	0	Yes
99+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	5.088	3.27	0.002714	0.0200	14.43	17.00	1.57	0.53	7.79	0.29	0	Yes
98+50.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	4.812	3.35	0.002500	0.0200	14.79	17.00	1.53	0.54	8.34	0.30	0	Yes
98+00.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	4.812	3.61	0.002500	0.0200	15.20	17.00	1.56	0.53	8.87	0.30	0	Yes
97+50.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	4.536	3.65	0.002500	0.0200	15.26	17.00	1.57	0.53	9.40	0.31	0	Yes
97+00.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	4.536	3.89	0.002500	0.0200	15.63	17.00	1.59	0.52	9.92	0.31	0	Yes
96+50.00	39.50	0.77	17.50	0.34	0.85	0.75	0.911	4.260	3.88	0.002500	0.0200	15.62	17.00	1.59	0.52	10.45	0.31	0	Yes
96+00.00	39.50	0.82	17.50	0.36	0.85	0.75	0.965	4.128	3.98	0.002500	0.0200	15.77	17.00	1.60	0.52	10.97	0.32	0	Yes
95+46.14	39.50	0.86	17.50	0.38	0.85	0.75	1.023	4.128	4.22	0.002500	0.0200	16.12	17.00	1.62	0.55	11.52	0.32	0	Add Inlet
95+46.14	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002500	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
95+00.00	39.50	0.04	17.50	0.02	0.85	0.75	0.049	5.640	0.28	0.002500	0.0200	5.82	17.00	0.82	0.94	0.94	0.12	0	Yes
94+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.103	5.640	0.58	0.002500	0.0200	7.66	17.00	0.99	0.84	1.78	0.15	0	Yes
94+00.00	39.50	0.13	17.50	0.06	0.85	0.75	0.157	5.640	0.88	0.002500	0.0200	8.97	17.00	1.10	0.76	2.54	0.18	0	Yes
93+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.210	5.640	1.19	0.002500	0.0200	10.01	17.00	1.18	0.71	3.25	0.20	0	Yes
93+00.00	39.50	0.22	17.50	0.10	0.85	0.75	0.264	5.640	1.49	0.002500	0.0200	10.90	17.00	1.25	0.67	3.91	0.22	0	Yes
92+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.317	5.640	1.79	0.002500	0.0200	11.69	17.00	1.31	0.64	4.55	0.23	0	Yes
92+00.00	39.50	0.31	17.50	0.14	0.85	0.75	0.371	5.640	2.09	0.002500	0.0200	12.39	17.00	1.36	0.61	5.16	0.25	0	Add Inlet

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	
		Date:	05/20/2002

South Bound and North Bound: Station 105+00 to Station 118+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
105+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003185	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
105+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.003185	0.0200	5.73	17.00	0.92	0.91	0.91	0.11	0	Yes
106+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.003185	0.0200	7.43	17.00	1.09	0.76	1.67	0.15	0	Yes
106+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.003185	0.0200	8.65	17.00	1.21	0.69	2.36	0.17	0	Yes
107+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.003185	0.0200	9.64	17.00	1.30	0.64	3.00	0.19	0	Yes
107+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.003185	0.0200	10.48	17.00	1.37	0.61	3.61	0.21	0	Yes
108+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.003185	0.0200	11.22	17.00	1.44	0.58	4.19	0.22	0	Yes
108+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.003185	0.0200	11.89	17.00	1.50	0.56	4.74	0.24	0	Yes
109+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.003185	0.0200	12.50	17.00	1.55	0.54	5.28	0.25	0	Yes
109+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.640	2.72	0.003185	0.0200	13.07	17.00	1.59	0.52	5.81	0.26	0	Yes
110+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	5.364	2.88	0.003185	0.0200	13.34	17.00	1.62	0.52	6.32	0.27	0	Yes
110+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	5.364	3.16	0.003185	0.0200	13.82	17.00	1.65	0.50	6.83	0.28	0	Yes
111+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	5.088	3.27	0.003185	0.0200	14.00	17.00	1.67	0.50	7.33	0.28	0	Yes
111+58.06	**39.50**	**0.60**	**17.50**	**0.26**	**0.85**	**0.75**	**0.705**	**5.088**	**3.59**	**0.003185**	**0.0200**	**14.50**	**17.00**	**1.71**	**0.57**	**7.89**	**0.29**	**0**	**Add Inlet**
111+58.06	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003185	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
112+00.00	39.50	0.04	17.50	0.02	0.85	0.75	0.045	5.640	0.25	0.003185	0.0200	5.37	17.00	0.88	0.80	0.80	0.11	0	Yes
112+50.00	39.50	0.08	17.50	0.04	0.85	0.75	0.099	5.640	0.56	0.003185	0.0200	7.20	17.00	1.07	0.78	1.58	0.14	0	Yes
113+00.00	39.50	0.13	17.50	0.06	0.85	0.75	0.152	5.640	0.86	0.003185	0.0200	8.48	17.00	1.19	0.70	2.27	0.17	0	Yes
113+50.00	39.50	0.17	17.50	0.08	0.85	0.75	0.206	5.640	1.16	0.003185	0.0200	9.49	17.00	1.29	0.65	2.92	0.19	0	Yes
114+00.00	39.50	0.22	17.50	0.10	0.85	0.75	0.259	5.640	1.46	0.003185	0.0200	10.35	17.00	1.36	0.61	3.53	0.21	0	Yes
114+50.00	39.50	0.26	17.50	0.12	0.85	0.75	0.313	5.640	1.77	0.003185	0.0200	11.11	17.00	1.43	0.58	4.12	0.22	0	Yes
115+14.64	**39.50**	**0.32**	**17.50**	**0.14**	**0.85**	**0.75**	**0.382**	**5.640**	**2.16**	**0.003185**	**0.0200**	**11.97**	**17.00**	**1.50**	**0.72**	**4.83**	**0.24**	**0**	**Add Inlet**
115+14.64	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003185	0.0200	0.00	17.00	0.00	#DIV/0!	0.00	0.00	0	Yes
116+00.00	39.50	0.08	17.50	0.03	0.85	0.75	0.092	5.640	0.52	0.003185	0.0200	7.00	17.00	1.05	1.36	1.36	0.14	0	Yes
116+50.00	39.50	0.12	17.50	0.05	0.85	0.75	0.145	5.640	0.82	0.003185	0.0200	8.33	17.00	1.18	0.71	2.06	0.17	0	Yes
117+00.00	39.50	0.17	17.50	0.07	0.85	0.75	0.199	5.640	1.12	0.003185	0.0200	9.37	17.00	1.27	0.65	2.72	0.19	0	Yes
117+50.00	39.50	0.21	17.50	0.09	0.85	0.75	0.252	5.640	1.42	0.003185	0.0200	10.25	17.00	1.35	0.62	3.33	0.20	0	Yes
118+00.00	39.50	0.26	17.50	0.11	0.85	0.75	0.306	5.640	1.73	0.003185	0.0200	11.01	17.00	1.42	0.59	3.92	0.22	0	Yes
118+50.00	**39.50**	**0.30**	**17.50**	**0.13**	**0.85**	**0.75**	**0.360**	**5.640**	**2.03**	**0.003185**	**0.0200**	**11.70**	**17.00**	**1.48**	**0.56**	**4.48**	**0.23**	**0**	**Add Inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	Checked By:	Date: 05/20/2002

South Bound and North Bound: Station 118+50 to Station 128+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
128+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002500	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
128+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002500	0.0200	6.00	17.00	0.84	0.99	0.99	0.12	0	Yes
127+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002500	0.0200	7.78	17.00	1.00	0.84	1.83	0.16	0	Yes
126+62.95	39.50	0.17	17.50	0.08	0.85	0.75	0.201	5.640	1.13	0.002500	0.0200	9.84	17.00	1.17	1.24	3.07	0.20	0	Add Inlet
126+62.95	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002500	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
126+00.00	39.50	0.06	17.50	0.03	0.85	0.75	0.067	5.640	0.38	0.002500	0.0200	6.54	17.00	0.89	1.18	1.18	0.13	0	Yes
125+50.00	39.50	0.10	17.50	0.05	0.85	0.75	0.121	5.640	0.68	0.002500	0.0200	8.14	17.00	1.03	0.81	1.99	0.16	0	Yes
125+00.00	39.50	0.15	17.50	0.07	0.85	0.75	0.175	5.640	0.99	0.002500	0.0200	9.34	17.00	1.13	0.74	2.73	0.19	0	Yes
124+50.00	39.50	0.19	17.50	0.09	0.85	0.75	0.228	5.640	1.29	0.002500	0.0200	10.33	17.00	1.21	0.69	3.42	0.21	0	Yes
124+00.00	39.50	0.24	17.50	0.11	0.85	0.75	0.282	5.640	1.59	0.002500	0.0200	11.18	17.00	1.27	0.66	4.08	0.22	0	Yes
123+50.00	39.50	0.28	17.50	0.13	0.85	0.75	0.336	5.640	1.89	0.002500	0.0200	11.93	17.00	1.33	0.63	4.71	0.24	0	Yes
123+00.00	39.50	0.33	17.50	0.15	0.85	0.75	0.389	5.640	2.19	0.002500	0.0200	12.61	17.00	1.38	0.60	5.31	0.25	0	Yes
122+36.43	39.50	0.39	17.50	0.17	0.85	0.75	0.457	5.640	2.58	0.002500	0.0200	13.40	17.00	1.44	0.74	6.05	0.27	0	Add Inlet
122+36.43	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002500	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
122+00.00	39.50	0.03	17.50	0.01	0.85	0.75	0.039	5.640	0.22	0.002500	0.0200	5.33	17.00	0.77	0.78	0.78	0.11	0	Yes
121+50.00	39.50	0.08	17.50	0.03	0.85	0.75	0.093	5.640	0.52	0.002500	0.0200	7.36	17.00	0.96	0.87	1.65	0.15	0	Yes
121+00.00	39.50	0.12	17.50	0.05	0.85	0.75	0.146	5.640	0.82	0.002500	0.0200	8.74	17.00	1.08	0.77	2.42	0.17	0	Yes
120+50.00	39.50	0.17	17.50	0.07	0.85	0.75	0.200	5.640	1.13	0.002500	0.0200	9.83	17.00	1.17	0.71	3.14	0.20	0	Yes
120+00.00	39.50	0.21	17.50	0.09	0.85	0.75	0.253	5.640	1.43	0.002500	0.0200	10.74	17.00	1.24	0.67	3.81	0.21	0	Yes
119+50.00	39.50	0.26	17.50	0.12	0.85	0.75	0.307	5.640	1.73	0.002500	0.0200	11.54	17.00	1.30	0.64	4.45	0.23	0	Yes
119+00.00	39.50	0.31	17.50	0.14	0.85	0.75	0.361	5.640	2.03	0.002500	0.0200	12.26	17.00	1.35	0.62	5.07	0.25	0	Yes
118+50.00	39.50	0.35	17.50	0.16	0.85	0.75	0.414	5.640	2.34	0.002500	0.0200	12.91	17.00	1.40	0.60	5.67	0.26	0	Add Inlet

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	**Date:** 05/20/2002

North Bound: Station 128+50 to 137+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	$Q_{to\ pass}$ (cfs)	Spread <Required?
128+50.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
129+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	5.640	0.37	0.002706	0.0200	6.40	17.00	0.91	0.92	0.92	0.13	0	Yes
129+50.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	5.640	0.75	0.002706	0.0200	8.30	17.00	1.08	0.77	1.68	0.17	0	Yes
130+00.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	5.640	1.12	0.002706	0.0200	9.66	17.00	1.20	0.69	2.38	0.19	0	Yes
130+50.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	5.640	1.49	0.002706	0.0200	10.76	17.00	1.29	0.65	3.03	0.22	0	Yes
131+00.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	5.640	1.87	0.002706	0.0200	11.70	17.00	1.36	0.61	3.64	0.23	0	Yes
131+50.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	5.640	2.24	0.002706	0.0200	12.53	17.00	1.43	0.58	4.22	0.25	0	Yes
132+00.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	5.640	2.62	0.002706	0.0200	13.27	17.00	1.48	0.56	4.78	0.27	0	Yes
132+50.00	39.50	0.36	34.50	0.32	0.85	0.70	0.530	5.640	2.99	0.002706	0.0200	13.96	17.00	1.53	0.54	5.32	0.28	0	Yes
133+00.00	39.50	0.41	34.50	0.36	0.85	0.70	0.596	5.640	3.36	0.002706	0.0200	14.59	17.00	1.58	0.53	5.85	0.29	0	Add Inlet
133+00.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002706	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
133+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	5.640	0.37	0.002706	0.0200	6.40	17.00	0.91	0.92	0.92	0.13	0	Yes
134+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	5.640	0.75	0.002706	0.0200	8.30	17.00	1.08	0.77	1.68	0.17	0	Yes
134+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	5.640	1.12	0.002706	0.0200	9.66	17.00	1.20	0.69	2.38	0.19	0	Yes
135+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	5.640	1.49	0.002706	0.0200	10.76	17.00	1.29	0.65	3.03	0.22	0	Yes
135+50.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	5.640	1.87	0.002706	0.0200	11.70	17.00	1.36	0.61	3.64	0.23	0	Yes
136+00.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	5.640	2.24	0.002706	0.0200	12.53	17.00	1.43	0.58	4.22	0.25	0	Yes
136+50.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	5.640	2.62	0.002706	0.0200	13.27	17.00	1.48	0.56	4.78	0.27	0	Yes
137+00.00	39.50	0.36	34.50	0.32	0.85	0.70	0.530	5.640	2.99	0.002706	0.0200	13.96	17.00	1.53	0.54	5.32	0.28	0	Add Inlet

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Date:**	05/20/2002

South Bound: Station 128+50 to 137+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
128+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002706	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
129+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002706	0.0200	5.91	17.00	0.86	0.97	0.97	0.12	0	Yes
129+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002706	0.0200	7.66	17.00	1.03	0.81	1.78	0.15	0	Yes
130+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002706	0.0200	8.92	17.00	1.14	0.73	2.51	0.18	0	Yes
130+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002706	0.0200	9.94	17.00	1.22	0.68	3.19	0.20	0	Yes
131+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002706	0.0200	10.81	17.00	1.29	0.64	3.84	0.22	0	Yes
131+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002706	0.0200	11.57	17.00	1.35	0.62	4.45	0.23	0	Yes
132+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002706	0.0200	12.26	17.00	1.41	0.59	5.04	0.25	0	Yes
132+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002706	0.0200	12.89	17.00	1.46	0.57	5.62	0.26	0	Yes
133+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.640	2.72	0.002706	0.0200	13.47	17.00	1.50	0.56	6.17	0.27	0	Add Inlet
133+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002706	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
133+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002706	0.0200	5.91	17.00	0.86	0.97	0.97	0.12	0	Yes
134+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002706	0.0200	7.66	17.00	1.03	0.81	1.78	0.15	0	Yes
134+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002706	0.0200	8.92	17.00	1.14	0.73	2.51	0.18	0	Yes
135+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002706	0.0200	9.94	17.00	1.22	0.68	3.19	0.20	0	Yes
135+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002706	0.0200	10.81	17.00	1.29	0.64	3.84	0.22	0	Yes
136+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002706	0.0200	11.57	17.00	1.35	0.62	4.45	0.23	0	Yes
136+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002706	0.0200	12.26	17.00	1.41	0.59	5.04	0.25	0	Yes
137+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002706	0.0200	12.89	17.00	1.46	0.57	5.62	0.26	0	Add Inlet

Project: Ellworth Road

Subject Pavement Drainage Calculations (10-year flow)

Filename: PavementDrainage.xls

Computed By: GL / AFC **Checked By:** **Date:** 05/20/2002

North Bound: Station 137+00 to 154+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
154+50.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
154+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	5.640	0.37	0.002571	0.0200	6.46	17.00	0.89	0.93	0.93	0.13	0	Yes
153+50.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	5.640	0.75	0.002571	0.0200	8.38	17.00	1.06	0.78	1.72	0.17	0	Yes
153+00.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	5.640	1.12	0.002571	0.0200	9.75	17.00	1.18	0.71	2.43	0.20	0	Yes
152+71.21	**39.50**	**0.16**	**34.50**	**0.14**	**0.85**	**0.70**	**0.237**	**5.640**	**1.34**	**0.002571**	**0.0200**	**10.42**	**17.00**	**1.23**	**0.39**	**2.82**	**0.21**	**0**	**Add Inlet**
152+71.21	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
152+00.00	39.50	0.06	34.50	0.06	0.85	0.70	0.094	5.640	0.53	0.002571	0.0200	7.38	17.00	0.98	1.22	1.22	0.15	0	Yes
151+50.00	39.50	0.11	34.50	0.10	0.85	0.70	0.161	5.640	0.91	0.002571	0.0200	9.00	17.00	1.12	0.75	1.96	0.18	0	Yes
151+00.00	39.50	0.16	34.50	0.14	0.85	0.70	0.227	5.640	1.28	0.002571	0.0200	10.25	17.00	1.22	0.69	2.65	0.20	0	Yes
150+50.00	39.50	0.20	34.50	0.18	0.85	0.70	0.293	5.640	1.65	0.002571	0.0200	11.28	17.00	1.30	0.64	3.29	0.23	0	Yes
150+00.00	39.50	0.25	34.50	0.21	0.85	0.70	0.359	5.640	2.03	0.002571	0.0200	12.18	17.00	1.37	0.61	3.90	0.24	0	Yes
149+50.00	39.50	0.29	34.50	0.25	0.85	0.70	0.426	5.640	2.40	0.002571	0.0200	12.98	17.00	1.42	0.58	4.49	0.26	0	Yes
149+00.00	39.50	0.34	34.50	0.29	0.85	0.70	0.492	5.640	2.77	0.002571	0.0200	13.70	17.00	1.48	0.56	5.05	0.27	0	Yes
148+50.00	39.50	0.38	34.50	0.33	0.85	0.70	0.558	5.640	3.15	0.002571	0.0200	14.37	17.00	1.53	0.55	5.60	0.29	0	Yes
147+95.49	**39.50**	**0.43**	**34.50**	**0.38**	**0.85**	**0.70**	**0.630**	**5.640**	**3.56**	**0.002571**	**0.0200**	**15.04**	**17.00**	**1.57**	**0.58**	**6.17**	**0.30**	**0**	**Add Inlet**
147+95.49	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
147+50.00	39.50	0.04	34.50	0.04	0.85	0.70	0.060	5.640	0.34	0.002571	0.0200	6.24	17.00	0.87	0.87	0.87	0.12	0	Yes
147+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.127	5.640	0.71	0.002571	0.0200	8.23	17.00	1.05	0.79	1.66	0.16	0	Yes
146+50.00	39.50	0.13	34.50	0.12	0.85	0.70	0.193	5.640	1.09	0.002571	0.0200	9.64	17.00	1.17	0.71	2.38	0.19	0	Yes
146+00.00	39.50	0.18	34.50	0.15	0.85	0.70	0.259	5.640	1.46	0.002571	0.0200	10.77	17.00	1.26	0.66	3.04	0.22	0	Yes
145+50.00	39.50	0.22	34.50	0.19	0.85	0.70	0.325	5.640	1.83	0.002571	0.0200	11.73	17.00	1.33	0.63	3.66	0.23	0	Yes
145+00.00	39.50	0.27	34.50	0.23	0.85	0.70	0.392	5.640	2.21	0.002571	0.0200	12.58	17.00	1.40	0.60	4.26	0.25	0	Yes
144+50.00	39.50	0.31	34.50	0.27	0.85	0.70	0.458	5.640	2.58	0.002571	0.0200	13.34	17.00	1.45	0.57	4.84	0.27	0	Yes
144+00.00	39.50	0.36	34.50	0.31	0.85	0.70	0.524	5.640	2.96	0.002571	0.0200	14.03	17.00	1.50	0.56	5.39	0.28	0	Yes
143+50.00	39.50	0.40	34.50	0.35	0.85	0.70	0.590	5.640	3.33	0.002571	0.0200	14.67	17.00	1.55	0.54	5.93	0.29	0	Yes
143+03.06	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.653**	**5.640**	**3.68**	**0.002571**	**0.0200**	**15.23**	**17.00**	**1.59**	**0.49**	**6.42**	**0.30**	**0**	**Add Inlet**
143+03.06	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
142+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.070	5.640	0.40	0.002571	0.0200	6.61	17.00	0.91	0.98	0.98	0.13	0	Yes
142+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.137	5.640	0.77	0.002571	0.0200	8.47	17.00	1.07	0.78	1.75	0.17	0	Yes
141+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.203	5.640	1.14	0.002571	0.0200	9.83	17.00	1.18	0.70	2.46	0.20	0	Yes
141+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.269	5.640	1.52	0.002571	0.0200	10.93	17.00	1.27	0.66	3.11	0.22	0	Yes
140+50.00	39.50	0.23	34.50	0.20	0.85	0.70	0.335	5.640	1.89	0.002571	0.0200	11.87	17.00	1.34	0.62	3.74	0.24	0	Yes
140+00.00	39.50	0.27	34.50	0.24	0.85	0.70	0.402	5.640	2.27	0.002571	0.0200	12.70	17.00	1.40	0.59	4.33	0.25	0	Yes
139+50.00	39.50	0.32	34.50	0.28	0.85	0.70	0.468	5.640	2.64	0.002571	0.0200	13.45	17.00	1.46	0.57	4.90	0.27	0	Yes
139+00.00	39.50	0.37	34.50	0.32	0.85	0.70	0.534	5.640	3.01	0.002571	0.0200	14.13	17.00	1.51	0.55	5.45	0.28	0	Yes
138+11.24	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.652**	**5.640**	**3.68**	**0.002571**	**0.0200**	**15.23**	**17.00**	**1.59**	**0.93**	**6.39**	**0.30**	**0**	**Add Inlet**
138+11.24	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	#DIV/0!	0.00	0.00	0	Yes
137+50.00	39.50	0.06	34.50	0.05	0.85	0.70	0.081	5.640	0.46	0.002571	0.0200	6.97	17.00	0.94	1.09	1.09	0.14	0	Yes
137+00.00	**39.50**	**0.10**	**34.50**	**0.09**	**0.85**	**0.70**	**0.147**	**5.640**	**0.83**	**0.002571**	**0.0200**	**8.72**	**17.00**	**1.09**	**0.76**	**1.85**	**0.17**	**0**	**Add Inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Date:**	05/20/2002

South Bound: Station 137+00 to 154+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Trnvel T (min)	d (ft)	Q_{inpass} (cfs)	Spread <Required?
154+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
154+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002571	0.0200	5.97	17.00	0.85	0.98	0.98	0.12	0	Yes
153+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002571	0.0200	7.74	17.00	1.01	0.83	1.81	0.15	0	Yes
153+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002571	0.0200	9.01	17.00	1.12	0.75	2.56	0.18	0	Yes
152+71.21	**39.50**	**0.16**	**17.50**	**0.07**	**0.85**	**0.75**	**0.192**	**5.640**	**1.08**	**0.002571**	**0.0200**	**9.62**	**17.00**	**1.17**	**0.41**	**2.97**	**0.19**	**0**	**Add Inlet**
152+71.21	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
152+00.00	39.50	0.06	17.50	0.03	0.85	0.75	0.076	5.640	0.43	0.002571	0.0200	6.81	17.00	0.93	1.28	1.28	0.14	0	Yes
151+50.00	39.50	0.11	17.50	0.05	0.85	0.75	0.130	5.640	0.73	0.002571	0.0200	8.32	17.00	1.06	0.79	2.07	0.17	0	Yes
151+00.00	39.50	0.16	17.50	0.07	0.85	0.75	0.184	5.640	1.04	0.002571	0.0200	9.47	17.00	1.15	0.72	2.79	0.19	0	Yes
150+50.00	39.50	0.20	17.50	0.09	0.85	0.75	0.237	5.640	1.34	0.002571	0.0200	10.42	17.00	1.23	0.68	3.47	0.21	0	Yes
150+00.00	39.50	0.25	17.50	0.11	0.85	0.75	0.291	5.640	1.64	0.002571	0.0200	11.25	17.00	1.29	0.64	4.11	0.22	0	Yes
149+50.00	39.50	0.29	17.50	0.13	0.85	0.75	0.344	5.640	1.94	0.002571	0.0200	11.99	17.00	1.35	0.62	4.73	0.24	0	Yes
149+00.00	39.50	0.34	17.50	0.15	0.85	0.75	0.398	5.640	2.24	0.002571	0.0200	12.65	17.00	1.40	0.59	5.33	0.25	0	Yes
148+50.00	39.50	0.38	17.50	0.17	0.85	0.75	0.452	5.640	2.55	0.002571	0.0200	13.27	17.00	1.45	0.58	5.90	0.27	0	Yes
147+95.49	**39.50**	**0.43**	**17.50**	**0.19**	**0.85**	**0.75**	**0.510**	**5.364**	**2.74**	**0.002571**	**0.0200**	**13.63**	**17.00**	**1.47**	**0.62**	**6.52**	**0.27**	**0**	**Add Inlet**
147+95.49	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
147+50.00	39.50	0.04	17.50	0.02	0.85	0.75	0.049	5.640	0.28	0.002571	0.0200	5.76	17.00	0.83	0.92	0.92	0.12	0	Yes
147+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.102	5.640	0.58	0.002571	0.0200	7.61	17.00	1.00	0.84	1.75	0.15	0	Yes
146+50.00	39.50	0.13	17.50	0.06	0.85	0.75	0.156	5.640	0.88	0.002571	0.0200	8.91	17.00	1.11	0.75	2.51	0.18	0	Yes
146+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.210	5.640	1.18	0.002571	0.0200	9.95	17.00	1.19	0.70	3.21	0.20	0	Yes
145+50.00	39.50	0.22	17.50	0.10	0.85	0.75	0.263	5.640	1.48	0.002571	0.0200	10.84	17.00	1.26	0.66	3.87	0.22	0	Yes
145+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.317	5.640	1.79	0.002571	0.0200	11.62	17.00	1.32	0.63	4.49	0.23	0	Yes
144+50.00	39.50	0.31	17.50	0.14	0.85	0.75	0.370	5.640	2.09	0.002571	0.0200	12.32	17.00	1.38	0.61	5.10	0.25	0	Yes
144+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.424	5.640	2.39	0.002571	0.0200	12.96	17.00	1.42	0.59	5.69	0.26	0	Yes
143+50.00	39.50	0.40	17.50	0.18	0.85	0.75	0.478	5.640	2.69	0.002571	0.0200	13.55	17.00	1.47	0.57	6.25	0.27	0	Yes
143+03.06	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.528**	**5.640**	**2.98**	**0.002571**	**0.0200**	**14.07**	**17.00**	**1.50**	**0.52**	**6.77**	**0.28**	**0**	**Add Inlet**
143+03.06	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
142+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.057	5.640	0.32	0.002571	0.0200	6.10	17.00	0.86	1.03	1.03	0.12	0	Yes
142+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.110	5.640	0.62	0.002571	0.0200	7.83	17.00	1.02	0.82	1.85	0.16	0	Yes
141+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.164	5.640	0.93	0.002571	0.0200	9.08	17.00	1.12	0.74	2.59	0.18	0	Yes
141+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.218	5.640	1.23	0.002571	0.0200	10.09	17.00	1.20	0.69	3.29	0.20	0	Yes
140+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.271	5.640	1.53	0.002571	0.0200	10.96	17.00	1.27	0.65	3.94	0.22	0	Yes
140+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.325	5.640	1.83	0.002571	0.0200	11.73	17.00	1.33	0.63	4.57	0.23	0	Yes
139+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.379	5.640	2.13	0.002571	0.0200	12.42	17.00	1.38	0.60	5.17	0.25	0	Yes
139+00.00	39.50	0.37	17.50	0.16	0.85	0.75	0.432	5.640	2.44	0.002571	0.0200	13.05	17.00	1.43	0.58	5.75	0.26	0	Yes
138+11.24	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.527**	**5.640**	**2.97**	**0.002571**	**0.0200**	**14.06**	**17.00**	**1.50**	**0.98**	**6.73**	**0.28**	**0**	**Add Inlet**
138+11.24	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002571	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
137+50.00	39.50	0.06	17.50	0.02	0.85	0.75	0.066	5.640	0.37	0.002571	0.0200	6.44	17.00	0.89	1.15	1.15	0.13	0	Yes
137+00.00	**39.50**	**0.10**	**17.50**	**0.04**	**0.85**	**0.75**	**0.119**	**5.640**	**0.67**	**0.002571**	**0.0200**	**8.05**	**17.00**	**1.04**	**0.81**	**1.95**	**0.16**	**0**	**Add Inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	
		Date:	05/20/2002

North Bound: Station 154+50 to 161+07.83

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	$Q_{in\ pass}$ (cfs)	Spread <Required?
154+50.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002615	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
155+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	5.640	0.37	0.002615	0.0200	6.44	17.00	0.90	0.93	0.93	0.13	0	Yes
155+50.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	5.640	0.75	0.002615	0.0200	8.35	17.00	1.07	0.78	1.71	0.17	0	Yes
156+00.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	5.640	1.12	0.002615	0.0200	9.72	17.00	1.18	0.70	2.41	0.19	0	Yes
156+50.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	5.640	1.49	0.002615	0.0200	10.83	17.00	1.27	0.65	3.06	0.22	0	Yes
157+00.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	5.640	1.87	0.002615	0.0200	11.78	17.00	1.35	0.62	3.68	0.24	0	Yes
157+50.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	5.640	2.24	0.002615	0.0200	12.61	17.00	1.41	0.59	4.27	0.25	0	Yes
158+00.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	5.640	2.62	0.002615	0.0200	13.36	17.00	1.47	0.57	4.84	0.27	0	Yes
158+50.00	39.50	0.36	34.50	0.32	0.85	0.70	0.530	5.640	2.99	0.002615	0.0200	14.05	17.00	1.52	0.55	5.39	0.28	0	Yes
159+00.00	39.50	0.41	34.50	0.36	0.85	0.70	0.596	5.640	3.36	0.002615	0.0200	14.68	17.00	1.56	0.53	5.93	0.29	0	Yes
159+43.79	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.654**	**5.364**	**3.51**	**0.002615**	**0.0200**	**14.92**	**17.00**	**1.58**	**0.46**	**6.39**	**0.30**	**0**	**Add Inlet**
159+43.79	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002615	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
160+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.074	5.640	0.42	0.002615	0.0200	6.73	17.00	0.93	1.01	1.01	0.13	0	Yes
160+50.00	39.50	0.10	34.50	0.08	0.85	0.70	0.141	5.640	0.79	0.002615	0.0200	8.54	17.00	1.09	0.77	1.78	0.17	0	Yes
161+07.83	**39.50**	**0.15**	**34.50**	**0.13**	**0.85**	**0.70**	**0.217**	**5.640**	**1.23**	**0.002615**	**0.0200**	**10.05**	**17.00**	**1.21**	**0.80**	**2.58**	**0.20**	**0**	**Add Inlet**

South Bound: Station 154+50 to 161+07.83

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	$Q_{in\ pass}$ (cfs)	Spread <Required?
154+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002615	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
155+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002615	0.0200	5.95	17.00	0.85	0.98	0.98	0.12	0	Yes
155+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002615	0.0200	7.71	17.00	1.01	0.82	1.80	0.15	0	Yes
156+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002615	0.0200	8.98	17.00	1.12	0.74	2.54	0.18	0	Yes
156+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002615	0.0200	10.00	17.00	1.21	0.69	3.23	0.20	0	Yes
157+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.002615	0.0200	10.88	17.00	1.28	0.65	3.89	0.22	0	Yes
157+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.002615	0.0200	11.65	17.00	1.34	0.62	4.51	0.23	0	Yes
158+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.002615	0.0200	12.34	17.00	1.39	0.60	5.11	0.25	0	Yes
158+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.002615	0.0200	12.97	17.00	1.44	0.58	5.69	0.26	0	Yes
159+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.364	2.59	0.002615	0.0200	13.31	17.00	1.46	0.57	6.26	0.27	0	Yes
159+43.79	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.529**	**5.364**	**2.84**	**0.002615**	**0.0200**	**13.78**	**17.00**	**1.50**	**0.49**	**6.75**	**0.28**	**0**	**Add Inlet**
159+43.79	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002615	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
160+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.060	5.640	0.34	0.002615	0.0200	6.21	17.00	0.88	1.07	1.07	0.12	0	Yes
160+50.00	39.50	0.10	17.50	0.04	0.85	0.75	0.114	5.640	0.64	0.002615	0.0200	7.89	17.00	1.03	0.81	1.88	0.16	0	Yes
160+97.99	**39.50**	**0.14**	**17.50**	**0.06**	**0.85**	**0.75**	**0.165**	**5.640**	**0.93**	**0.002615**	**0.0200**	**9.07**	**17.00**	**1.13**	**0.71**	**2.58**	**0.18**	**0**	**Add Inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	
		Date:	05/20/2002

North Bound: Station 161+07.83 to Station 179+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Spread <Required?
179+00.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
178+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	5.640	0.37	0.003072	0.0200	6.25	17.00	0.95	0.87	0.87	0.12	0	Yes
178+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	5.640	0.75	0.003072	0.0200	8.10	17.00	1.14	0.73	1.61	0.16	0	Yes
177+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	5.640	1.12	0.003072	0.0200	9.43	17.00	1.26	0.66	2.27	0.19	0	Yes
177+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	5.640	1.49	0.003072	0.0200	10.51	17.00	1.35	0.62	2.89	0.21	0	Yes
176+50.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	5.640	1.87	0.003072	0.0200	11.43	17.00	1.43	0.58	3.47	0.23	0	Yes
176+00.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	5.640	2.24	0.003072	0.0200	12.23	17.00	1.50	0.56	4.02	0.24	0	Yes
175+50.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	5.640	2.62	0.003072	0.0200	12.96	17.00	1.56	0.54	4.56	0.26	0	Yes
175+00.00	39.50	0.36	34.50	0.32	0.85	0.70	0.530	5.640	2.99	0.003072	0.0200	13.63	17.00	1.61	0.52	5.08	0.27	0	Yes
174+50.00	39.50	0.41	34.50	0.36	0.85	0.70	0.596	5.640	3.36	0.003072	0.0200	14.24	17.00	1.66	0.50	5.58	0.28	0	Yes
174+20.49	**39.50**	**0.43**	**34.50**	**0.38**	**0.85**	**0.70**	**0.635**	**5.640**	**3.58**	**0.003072**	**0.0200**	**14.59**	**17.00**	**1.68**	**0.29**	**5.87**	**0.29**	**0**	**Add Inlet**
174+20.49	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
173+50.00	39.50	0.06	34.50	0.06	0.85	0.70	0.093	5.640	0.53	0.003072	0.0200	7.11	17.00	1.04	1.13	1.13	0.14	0	Yes
173+00.00	39.50	0.11	34.50	0.10	0.85	0.70	0.160	5.640	0.90	0.003072	0.0200	8.69	17.00	1.19	0.70	1.83	0.17	0	Yes
172+50.00	39.50	0.15	34.50	0.14	0.85	0.70	0.226	5.640	1.27	0.003072	0.0200	9.90	17.00	1.30	0.64	2.47	0.20	0	Yes
172+00.00	39.50	0.20	34.50	0.17	0.85	0.70	0.292	5.640	1.65	0.003072	0.0200	10.90	17.00	1.39	0.60	3.07	0.22	0	Yes
171+50.00	39.50	0.25	34.50	0.21	0.85	0.70	0.358	5.640	2.02	0.003072	0.0200	11.77	17.00	1.46	0.57	3.64	0.24	0	Yes
171+00.00	39.50	0.29	34.50	0.25	0.85	0.70	0.425	5.640	2.40	0.003072	0.0200	12.54	17.00	1.52	0.55	4.19	0.25	0	Yes
170+50.00	39.50	0.34	34.50	0.29	0.85	0.70	0.491	5.640	2.77	0.003072	0.0200	13.24	17.00	1.58	0.53	4.72	0.26	0	Yes
170+00.00	39.50	0.38	34.50	0.33	0.85	0.70	0.557	5.640	3.14	0.003072	0.0200	13.89	17.00	1.63	0.51	5.23	0.28	0	Yes
169+28.03	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.653**	**5.640**	**3.68**	**0.003072**	**0.0200**	**14.73**	**17.00**	**1.70**	**0.71**	**5.94**	**0.29**	**0**	**Add Inlet**
169+28.03	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
169+00.00	39.50	0.03	34.50	0.02	0.85	0.70	0.037	5.640	0.21	0.003072	0.0200	5.03	17.00	0.83	0.57	0.57	0.10	0	Yes
168+50.00	39.50	0.07	34.50	0.06	0.85	0.70	0.103	5.640	0.58	0.003072	0.0200	7.38	17.00	1.07	0.78	1.35	0.15	0	Yes
168+00.00	39.50	0.12	34.50	0.10	0.85	0.70	0.170	5.640	0.96	0.003072	0.0200	8.89	17.00	1.21	0.69	2.04	0.18	0	Yes
167+50.00	39.50	0.16	34.50	0.14	0.85	0.70	0.236	5.640	1.33	0.003072	0.0200	10.06	17.00	1.34	0.63	2.67	0.20	0	Yes
167+00.00	39.50	0.21	34.50	0.18	0.85	0.70	0.302	5.640	1.70	0.003072	0.0200	11.04	17.00	1.40	0.60	3.27	0.22	0	Yes
166+50.00	39.50	0.25	34.50	0.22	0.85	0.70	0.368	5.640	2.08	0.003072	0.0200	11.89	17.00	1.47	0.57	3.83	0.24	0	Yes
166+00.00	39.50	0.30	34.50	0.26	0.85	0.70	0.435	5.640	2.45	0.003072	0.0200	12.65	17.00	1.53	0.54	4.38	0.25	0	Yes
165+50.00	39.50	0.34	34.50	0.30	0.85	0.70	0.501	5.640	2.83	0.003072	0.0200	13.34	17.00	1.59	0.53	4.90	0.27	0	Yes
165+00.00	39.50	0.39	34.50	0.34	0.85	0.70	0.567	5.640	3.20	0.003072	0.0200	13.98	17.00	1.64	0.51	5.41	0.28	0	Yes
164+35.91	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.652**	**5.364**	**3.50**	**0.003072**	**0.0200**	**14.45**	**17.00**	**1.67**	**0.64**	**6.05**	**0.29**	**0**	**Add Inlet**
164+35.91	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
164+00.00	39.50	0.03	34.50	0.03	0.85	0.70	0.048	5.640	0.27	0.003072	0.0200	5.52	17.00	0.88	0.68	0.68	0.11	0	Yes
163+50.00	39.50	0.08	34.50	0.07	0.85	0.70	0.114	5.640	0.64	0.003072	0.0200	7.65	17.00	1.09	0.76	1.44	0.15	0	Yes
163+00.00	39.50	0.12	34.50	0.11	0.85	0.70	0.180	5.640	1.02	0.003072	0.0200	9.09	17.00	1.23	0.68	2.12	0.18	0	Yes
162+71.87	**39.50**	**0.15**	**34.50**	**0.13**	**0.85**	**0.70**	**0.217**	**5.640**	**1.23**	**0.003072**	**0.0200**	**9.76**	**17.00**	**1.29**	**0.36**	**2.49**	**0.20**	**0**	**Add Inlet**
162+71.87	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
161+50.00	39.50	0.11	34.50	0.10	0.85	0.70	0.162	5.640	0.91	0.003072	0.0200	8.73	17.00	1.19	1.70	1.70	0.17	0	Yes
161+07.83	**39.50**	**0.15**	**34.50**	**0.13**	**0.85**	**0.70**	**0.217**	**5.640**	**1.23**	**0.003072**	**0.0200**	**9.76**	**17.00**	**1.29**	**0.55**	**2.25**	**0.20**	**0**	**Add Inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	
		Date:	05/20/2002

South Bound: Station 161+07.83 to Station 179+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{pa} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inlet} (cfs)	Spread <Required?
179+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
178+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.003072	0.0200	5.77	17.00	0.90	0.92	0.92	0.12	0	Yes
178+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.003072	0.0200	7.48	17.00	1.08	0.77	1.69	0.15	0	Yes
177+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.003072	0.0200	8.71	17.00	1.19	0.70	2.39	0.17	0	Yes
177+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.003072	0.0200	9.71	17.00	1.28	0.65	3.04	0.19	0	Yes
176+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	5.640	1.51	0.003072	0.0200	10.55	17.00	1.36	0.61	3.66	0.21	0	Yes
176+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	5.640	1.81	0.003072	0.0200	11.30	17.00	1.42	0.59	4.24	0.23	0	Yes
175+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.640	2.12	0.003072	0.0200	11.97	17.00	1.48	0.56	4.81	0.24	0	Yes
175+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.640	2.42	0.003072	0.0200	12.59	17.00	1.53	0.55	5.36	0.25	0	Yes
174+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.640	2.72	0.003072	0.0200	13.15	17.00	1.57	0.53	5.89	0.26	0	Yes
174+10.32	**39.50**	**0.44**	**17.50**	**0.20**	**0.85**	**0.75**	**0.525**	**5.364**	**2.82**	**0.003072**	**0.0200**	**13.33**	**17.00**	**1.59**	**0.42**	**6.30**	**0.27**	**0**	**Add Inlet**
174+10.32	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
173+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.065	5.640	0.36	0.003072	0.0200	6.19	17.00	0.95	1.06	1.06	0.12	0	Yes
173+00.00	39.50	0.10	17.50	0.04	0.85	0.75	0.118	5.640	0.67	0.003072	0.0200	7.76	17.00	1.10	0.75	1.81	0.16	0	Yes
172+50.00	39.50	0.15	17.50	0.06	0.85	0.75	0.172	5.640	0.97	0.003072	0.0200	8.93	17.00	1.21	0.69	2.50	0.18	0	Yes
172+00.00	39.50	0.19	17.50	0.08	0.85	0.75	0.225	5.640	1.27	0.003072	0.0200	9.89	17.00	1.30	0.64	3.14	0.20	0	Yes
171+50.00	39.50	0.24	17.50	0.10	0.85	0.75	0.279	5.640	1.57	0.003072	0.0200	10.71	17.00	1.37	0.61	3.75	0.21	0	Yes
171+00.00	39.50	0.28	17.50	0.12	0.85	0.75	0.333	5.640	1.88	0.003072	0.0200	11.44	17.00	1.43	0.58	4.33	0.23	0	Yes
170+50.00	39.50	0.33	17.50	0.14	0.85	0.75	0.386	5.640	2.18	0.003072	0.0200	12.10	17.00	1.49	0.56	4.89	0.24	0	Yes
170+00.00	39.50	0.37	17.50	0.16	0.85	0.75	0.440	5.640	2.48	0.003072	0.0200	12.71	17.00	1.54	0.54	5.44	0.25	0	Yes
169+18.19	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.528**	**5.364**	**2.83**	**0.003072**	**0.0200**	**13.35**	**17.00**	**1.59**	**0.86**	**6.30**	**0.27**	**0**	**Add Inlet**
169+18.19	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
169+00.00	39.50	0.02	17.50	0.01	0.85	0.75	0.020	5.640	0.11	0.003072	0.0200	3.95	17.00	0.70	0.43	0.43	0.08	0	Yes
168+50.00	39.50	0.06	17.50	0.03	0.85	0.75	0.073	5.640	0.41	0.003072	0.0200	6.48	17.00	0.98	0.85	1.28	0.13	0	Yes
168+00.00	39.50	0.11	17.50	0.05	0.85	0.75	0.127	5.640	0.71	0.003072	0.0200	7.97	17.00	1.12	0.74	2.03	0.16	0	Yes
167+50.00	39.50	0.15	17.50	0.07	0.85	0.75	0.180	5.640	1.02	0.003072	0.0200	9.10	17.00	1.23	0.68	2.70	0.18	0	Yes
167+00.00	39.50	0.20	17.50	0.09	0.85	0.75	0.234	5.640	1.32	0.003072	0.0200	10.03	17.00	1.31	0.64	3.34	0.20	0	Yes
166+50.00	39.50	0.24	17.50	0.11	0.85	0.75	0.288	5.640	1.62	0.003072	0.0200	10.83	17.00	1.38	0.60	3.94	0.22	0	Yes
166+00.00	39.50	0.29	17.50	0.13	0.85	0.75	0.341	5.640	1.92	0.003072	0.0200	11.55	17.00	1.44	0.58	4.52	0.23	0	Yes
165+50.00	39.50	0.33	17.50	0.15	0.85	0.75	0.395	5.640	2.23	0.003072	0.0200	12.20	17.00	1.49	0.56	5.08	0.24	0	Yes
165+00.00	39.50	0.38	17.50	0.17	0.85	0.75	0.448	5.640	2.53	0.003072	0.0200	12.80	17.00	1.54	0.54	5.62	0.26	0	Yes
164+26.07	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.528**	**5.364**	**2.83**	**0.003072**	**0.0200**	**13.35**	**17.00**	**1.59**	**0.78**	**6.40**	**0.27**	**0**	**Add Inlet**
164+26.07	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.003072	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
164+00.00	39.50	0.02	17.50	0.01	0.85	0.75	0.028	5.640	0.16	0.003072	0.0200	4.52	17.00	0.77	0.57	0.57	0.09	0	Yes
163+50.00	39.50	0.07	17.50	0.03	0.85	0.75	0.082	5.640	0.46	0.003072	0.0200	6.75	17.00	1.01	0.83	1.39	0.14	0	Yes
163+00.00	39.50	0.11	17.50	0.05	0.85	0.75	0.135	5.640	0.76	0.003072	0.0200	8.16	17.00	1.14	0.73	2.12	0.16	0	Yes
162+50.00	39.50	0.16	17.50	0.07	0.85	0.75	0.189	5.640	1.06	0.003072	0.0200	9.25	17.00	1.24	0.67	2.80	0.19	0	Yes
162+00.00	39.50	0.20	17.50	0.09	0.85	0.75	0.242	5.640	1.37	0.003072	0.0200	10.16	17.00	1.32	0.63	3.43	0.20	0	Yes
161+50.00	39.50	0.25	17.50	0.11	0.85	0.75	0.296	5.640	1.67	0.003072	0.0200	10.95	17.00	1.39	0.60	4.02	0.22	0	Yes
160+97.99	**39.50**	**0.30**	**17.50**	**0.13**	**0.85**	**0.75**	**0.352**	**5.640**	**1.98**	**0.003072**	**0.0200**	**11.68**	**17.00**	**1.45**	**0.60**	**4.62**	**0.23**	**0**	**Add Inlet**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (10-year flow)		
		Filename:	PavementDrainage.xls
Computed By:	GL/AFC	**Checked By:**	
		Date:	05/20/2002

North Bound: Station 179+00 to Station 181+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpaw} (cfs)	Spread <Required?
179+00.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	5.640	0.00	0.002500	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
179+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	5.640	0.37	0.002500	0.0200	6.49	17.00	0.88	0.94	0.94	0.13	0	Yes
180+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	5.640	0.75	0.002500	0.0200	8.42	17.00	1.05	0.79	1.74	0.17	0	Yes
180+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	5.640	1.12	0.002500	0.0200	9.81	17.00	1.16	0.72	2.45	0.20	0	Yes
181+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	5.640	1.49	0.002500	0.0200	10.92	17.00	1.25	0.67	3.12	0.22	0	Add Inlet

South Bound: Station 179+00 to Station 181+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{10} (in/hr)	Q10 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	Tsp-allowed (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpaw} (cfs)	Spread <Required?
179+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	5.640	0.00	0.002500	0.0200	0.00	17.00	0.00	0.00	0.00	0.00	0	Yes
179+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	5.640	0.30	0.002500	0.0200	6.00	17.00	0.84	0.99	0.99	0.12	0	Yes
180+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	5.640	0.60	0.002500	0.0200	7.78	17.00	1.00	0.84	1.83	0.16	0	Yes
180+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	5.640	0.91	0.002500	0.0200	9.06	17.00	1.10	0.75	2.59	0.18	0	Yes
181+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	5.640	1.21	0.002500	0.0200	10.09	17.00	1.19	0.70	3.29	0.20	0	Add Inlet

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

South Bound and North Bound: Station 20+00 to Station 25+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
20+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002600	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
20+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002600	0.0200	6.95	0.94	0.43	0.43	0.14	0	Yes
21+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002600	0.0200	9.01	1.12	1.03	1.46	0.18	0	Yes
21+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002600	0.0200	10.49	1.24	1.70	3.16	0.21	0	Yes
22+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002600	0.0200	11.69	1.34	2.44	5.60	0.23	0	Yes
22+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	7.368	1.97	0.002600	0.0200	12.04	1.36	2.69	8.29	0.24	0	Yes
23+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	6.408	2.06	0.002600	0.0200	12.23	1.38	2.84	11.13	0.24	0	Yes
23+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	5.832	2.19	0.002600	0.0200	12.51	1.40	3.06	14.19	0.25	0	Yes
24+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	5.397	2.31	0.002600	0.0200	12.77	1.42	3.28	17.47	0.26	0	Yes
24+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	5.033	2.43	0.002600	0.0200	13.01	1.43	3.48	20.95	0.26	0	Yes
25+00.00	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.536**	**4.548**	**2.44**	**0.002600**	**0.0200**	**13.03**	**1.44**	**3.50**	**24.46**	**0.26**	**0**	**Yes**

South Bound and North Bound: Station 25+00 to Station 28+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
28+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002667	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
27+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002667	0.0200	6.92	0.95	0.88	0.88	0.14	0	Yes
27+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002667	0.0200	8.97	1.13	0.74	1.61	0.18	0	Yes
26+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002667	0.0200	10.44	1.25	0.66	2.27	0.21	0	Yes
26+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002667	0.0200	11.63	1.35	0.62	2.89	0.23	0	Yes
25+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002667	0.0200	12.65	1.43	0.58	3.48	0.25	0	Yes
25+00.00	**39.50**	**0.27**	**17.50**	**0.12**	**0.85**	**0.75**	**0.322**	**8.520**	**2.74**	**0.002667**	**0.0200**	**13.54**	**1.49**	**0.56**	**4.03**	**0.27**	**0**	**Yes**

Project:	Ellworth Road
Subject	Pavement Drainage Calculations (100-year flow)
	PavementDrainage.xls
Computed By: GL / AFC	**Checked By:** 05/20/2005

South Bound and North Bound: Station 28+00 to Station 39+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
28+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002727	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
28+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002727	0.0200	6.89	0.96	0.87	0.87	0.14	0	Yes
29+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002727	0.0200	8.93	1.14	0.73	1.60	0.18	0	Yes
29+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002727	0.0200	10.40	1.27	0.66	2.26	0.21	0	Yes
30+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002727	0.0200	11.59	1.36	0.61	2.87	0.23	0	Yes
30+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002727	0.0200	12.60	1.44	0.58	3.45	0.25	0	Yes
31+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002727	0.0200	13.49	1.51	0.55	4.00	0.27	0	Yes
31+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002727	0.0200	14.29	1.57	0.53	4.53	0.29	0	Yes
32+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002727	0.0200	15.02	1.62	0.51	5.05	0.30	0	Yes
32+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.002727	0.0200	15.70	1.67	0.50	5.55	0.31	0	Yes
33+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	8.136	4.36	0.002727	0.0200	16.06	1.69	0.49	6.04	0.32	0	Yes
33+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	8.136	4.80	0.002727	0.0200	16.64	1.73	0.48	6.52	0.33	0	Yes
34+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	8.136	5.23	0.002727	0.0200	17.19	1.77	0.47	6.99	0.34	0	Yes
34+50.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	7.752	5.40	0.002727	0.0200	17.40	1.79	0.47	7.46	0.35	0	Yes
35+00.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	7.752	5.82	0.002727	0.0200	17.89	1.82	0.46	7.92	0.36	0	Yes
35+50.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	7.368	5.92	0.002727	0.0200	18.01	1.83	0.46	8.37	0.36	0	Yes
36+00.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	7.368	6.32	0.002727	0.0200	18.45	1.86	0.45	8.82	0.37	0	Yes
36+50.00	39.50	0.77	17.50	0.34	0.85	0.75	0.911	6.984	6.36	0.002727	0.0200	18.50	1.86	0.45	9.27	0.37	0	Yes
37+00.00	39.50	0.82	17.50	0.36	0.85	0.75	0.965	6.984	6.74	0.002727	0.0200	18.90	1.89	0.44	9.71	0.38	0	Yes
37+50.00	39.50	0.86	17.50	0.38	0.85	0.75	1.018	6.600	6.72	0.002727	0.0200	18.88	1.89	0.44	10.15	0.38	0	Yes
38+00.00	39.50	0.91	17.50	0.40	0.85	0.75	1.072	6.600	7.08	0.002727	0.0200	19.25	1.91	0.44	10.59	0.38	0	Yes
38+50.00	39.50	0.95	17.50	0.42	0.85	0.75	1.126	6.408	7.21	0.002727	0.0200	19.39	1.92	0.43	11.02	0.39	0	Yes
38+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002727	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
39+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002727	0.0200	6.89	0.96	0.87	0.87	0.14	0	Yes

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

South Bound and North Bound: Station 39+00 to Station 44+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
44+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002727	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
44+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002727	0.0200	6.89	0.96	0.87	0.87	0.14	0	Yes
43+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002727	0.0200	8.93	1.14	0.73	1.60	0.18	0	Yes
43+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002727	0.0200	10.40	1.27	0.66	2.26	0.21	0	Yes
42+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002727	0.0200	11.59	1.36	0.61	2.87	0.23	0	Yes
42+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002727	0.0200	12.60	1.44	0.58	3.45	0.25	0	Yes
41+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002727	0.0200	13.49	1.51	0.55	4.00	0.27	0	Yes
41+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002727	0.0200	14.29	1.57	0.53	4.53	0.29	0	Yes
40+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002727	0.0200	15.02	1.62	0.51	5.05	0.30	0	Yes
40+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.002727	0.0200	15.70	1.67	0.50	5.55	0.31	0	Yes
39+50.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	8.136	4.36	0.002727	0.0200	16.06	1.69	0.49	6.04	0.32	0	Yes
39+00.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	8.136	4.80	0.002727	0.0200	16.64	1.73	0.48	6.52	0.33	0	Yes

South Bound and North Bound: Station 44+50 to Station 53+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
44+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003059	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
45+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.003059	0.0200	6.74	1.00	0.83	0.83	0.13	0	Yes
45+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.003059	0.0200	8.74	1.19	0.70	1.53	0.17	0	Yes
46+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.003059	0.0200	10.18	1.32	0.63	2.16	0.20	0	Yes
46+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.003059	0.0200	11.34	1.42	0.59	2.75	0.23	0	Yes
47+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.003059	0.0200	12.33	1.50	0.55	3.30	0.25	0	Yes
47+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.003059	0.0200	13.20	1.57	0.53	3.83	0.26	0	Yes
48+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.003059	0.0200	13.99	1.63	0.51	4.34	0.28	0	Yes
48+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.003059	0.0200	14.70	1.69	0.49	4.84	0.29	0	Yes
49+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.003059	0.0200	15.37	1.74	0.48	5.31	0.31	0	Yes
49+50.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	8.520	4.57	0.003059	0.0200	15.99	1.79	0.47	5.78	0.32	0	Yes
50+00.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	8.136	4.80	0.003059	0.0200	16.28	1.81	0.46	6.24	0.33	0	Yes
50+50.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	8.136	5.23	0.003059	0.0200	16.82	1.85	0.45	6.69	0.34	0	Yes
51+00.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	7.752	5.40	0.003059	0.0200	17.03	1.86	0.45	7.14	0.34	0	Yes
51+50.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	7.752	5.82	0.003059	0.0200	17.51	1.90	0.44	7.58	0.35	0	Yes
52+00.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	7.368	5.92	0.003059	0.0200	17.63	1.91	0.44	8.01	0.35	0	Yes
52+50.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	7.368	6.32	0.003059	0.0200	18.06	1.94	0.43	8.44	0.36	0	Yes
52+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003059	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
53+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.003059	0.0200	6.74	1.00	0.83	0.83	0.13	0	Yes

Project:	Ellworth Road
Subject	Pavement Drainage Calculations (100-year flow)
	PavementDrainage.xls
Computed By: GL / AFC	**Checked By:** 05/20/2005

South Bound and North Bound: Station 53+00 to Station 60+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	$Q_{in\ pave}$ (cfs)	Q100 Contained RW?
60+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002714	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
59+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002714	0.0200	6.89	0.96	0.87	0.87	0.14	0	Yes
59+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002714	0.0200	8.94	1.14	0.73	1.60	0.18	0	Yes
58+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002714	0.0200	10.41	1.26	0.66	2.26	0.21	0	Yes
58+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002714	0.0200	11.60	1.36	0.61	2.87	0.23	0	Yes
57+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002714	0.0200	12.61	1.44	0.58	3.45	0.25	0	Yes
57+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002714	0.0200	13.50	1.50	0.55	4.01	0.27	0	Yes
56+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002714	0.0200	14.30	1.56	0.53	4.54	0.29	0	Yes
56+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002714	0.0200	15.04	1.62	0.52	5.06	0.30	0	Yes
55+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.002714	0.0200	15.72	1.66	0.50	5.56	0.31	0	Yes
54+45.09	39.50	0.50	17.50	0.22	0.85	0.75	0.595	8.136	4.84	0.002714	0.0200	16.71	1.73	1.01	6.57	0.33	0	Yes
54+45.09	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002714	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
54+00.00	39.50	0.04	17.50	0.02	0.85	0.75	0.048	8.520	0.41	0.002714	0.0200	6.63	0.93	0.80	0.80	0.13	0	Yes
53+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.102	8.520	0.87	0.002714	0.0200	8.77	1.13	0.74	1.54	0.18	0	Yes
53+00.00	39.50	0.13	17.50	0.06	0.85	0.75	0.156	8.520	1.33	0.002714	0.0200	10.28	1.25	0.67	2.21	0.21	0	Yes

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

South Bound and North Bound: Station 60+00 to Station 79+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
60+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002526	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
60+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002526	0.0200	6.99	0.93	0.89	0.89	0.14	0	Yes
61+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002526	0.0200	9.06	1.11	0.75	1.64	0.18	0	Yes
61+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002526	0.0200	10.55	1.23	0.68	2.32	0.21	0	Yes
62+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002526	0.0200	11.75	1.32	0.63	2.95	0.24	0	Yes
62+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002526	0.0200	12.78	1.40	0.60	3.55	0.26	0	Yes
63+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002526	0.0200	13.68	1.46	0.57	4.12	0.27	0	Yes
63+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002526	0.0200	14.50	1.52	0.55	4.67	0.29	0	Yes
64+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002526	0.0200	15.24	1.57	0.53	5.20	0.30	0	Yes
64+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.002526	0.0200	15.93	1.62	0.51	5.71	0.32	0	Yes
65+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	8.136	4.36	0.002526	0.0200	16.29	1.64	0.51	6.22	0.33	0	Yes
65+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	8.136	4.80	0.002526	0.0200	16.88	1.68	0.49	6.71	0.34	0	Yes
66+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	7.752	4.99	0.002526	0.0200	17.13	1.70	0.49	7.20	0.34	0	Yes
66+50.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	7.752	5.40	0.002526	0.0200	17.65	1.74	0.48	7.68	0.35	0	Yes
67+00.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	7.368	5.53	0.002526	0.0200	17.80	1.75	0.48	8.16	0.36	0	Yes
67+50.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	7.368	5.92	0.002526	0.0200	18.27	1.78	0.47	8.63	0.37	0	Yes
68+00.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	6.984	5.99	0.002526	0.0200	18.35	1.78	0.47	9.10	0.37	0	Yes
68+50.00	39.50	0.77	17.50	0.34	0.85	0.75	0.911	6.984	6.36	0.002526	0.0200	18.77	1.81	0.46	9.56	0.38	0	Yes
69+21.47	**39.50**	**0.84**	**17.50**	**0.37**	**0.85**	**0.75**	**0.988**	**6.600**	**6.52**	**0.002526**	**0.0200**	**18.94**	**1.82**	**0.65**	**10.21**	**0.38**	**0**	**Yes**
69+21.47	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002526	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
69+50.00	39.50	0.03	17.50	0.01	0.85	0.75	0.031	8.520	0.26	0.002526	0.0200	5.66	0.81	0.59	0.59	0.11	0	Yes
70+00.00	39.50	0.07	17.50	0.03	0.85	0.75	0.084	8.520	0.72	0.002526	0.0200	8.28	1.04	0.80	1.38	0.17	0	Yes
70+50.00	39.50	0.12	17.50	0.05	0.85	0.75	0.138	8.520	1.17	0.002526	0.0200	9.96	1.18	0.70	2.09	0.20	0	Yes
71+00.00	39.50	0.16	17.50	0.07	0.85	0.75	0.191	8.520	1.63	0.002526	0.0200	11.26	1.28	0.65	2.74	0.23	0	Yes
71+50.00	39.50	0.21	17.50	0.09	0.85	0.75	0.245	8.520	2.09	0.002526	0.0200	12.36	1.37	0.61	3.35	0.25	0	Yes
72+16.75	**39.50**	**0.27**	**17.50**	**0.12**	**0.85**	**0.75**	**0.317**	**8.520**	**2.70**	**0.002526**	**0.0200**	**13.60**	**1.46**	**0.76**	**4.11**	**0.27**	**0**	**Yes**
72+16.75	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002526	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
75+00.00	39.50	0.26	17.50	0.11	0.85	0.75	0.304	8.520	2.59	0.002526	0.0200	13.39	1.44	3.27	3.27	0.27	0	Yes
75+50.00	39.50	0.30	17.50	0.13	0.85	0.75	0.357	8.520	3.04	0.002526	0.0200	14.23	1.50	0.55	3.83	0.28	0	Yes
76+00.00	39.50	0.35	17.50	0.15	0.85	0.75	0.411	8.520	3.50	0.002526	0.0200	15.00	1.56	0.54	4.36	0.30	0	Yes
76+50.00	39.50	0.39	17.50	0.17	0.85	0.75	0.464	8.520	3.96	0.002526	0.0200	15.70	1.60	0.52	4.88	0.31	0	Yes
77+00.00	39.50	0.44	17.50	0.19	0.85	0.75	0.518	8.520	4.41	0.002526	0.0200	16.36	1.65	0.51	5.39	0.33	0	Yes
77+64.64	**39.50**	**0.50**	**17.50**	**0.22**	**0.85**	**0.75**	**0.587**	**8.136**	**4.78**	**0.002526**	**0.0200**	**16.86**	**1.68**	**0.64**	**6.03**	**0.34**	**0**	**Yes**
77+64.64	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002526	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
78+50.00	39.50	0.08	17.50	0.03	0.85	0.75	0.092	8.520	0.78	0.002526	0.0200	8.54	1.07	1.33	1.33	0.17	0	Yes
79+00.00	**39.50**	**0.12**	**17.50**	**0.05**	**0.85**	**0.75**	**0.145**	**8.520**	**1.24**	**0.002526**	**0.0200**	**10.15**	**1.20**	**0.70**	**2.03**	**0.20**	**0**	**Yes**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

South Bound and North Bound: Station 79+00 to Station 85+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
85+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002000	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
85+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002000	0.0200	7.30	0.85	0.97	0.97	0.15	0	Yes
84+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002000	0.0200	9.47	1.02	0.82	1.79	0.19	0	Yes
84+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002000	0.0200	11.02	1.13	0.74	2.53	0.22	0	Yes
83+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002000	0.0200	12.28	1.21	0.69	3.22	0.25	0	Yes
83+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002000	0.0200	13.35	1.28	0.65	3.87	0.27	0	Yes
82+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002000	0.0200	14.29	1.34	0.62	4.49	0.29	0	Yes
82+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002000	0.0200	15.15	1.39	0.60	5.09	0.30	0	Yes
81+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002000	0.0200	15.92	1.44	0.58	5.67	0.32	0	Yes
81+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.136	3.93	0.002000	0.0200	16.36	1.47	0.57	6.24	0.33	0	Yes
80+50.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	8.136	4.36	0.002000	0.0200	17.02	1.51	0.55	6.79	0.34	0	Yes
80+00.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	7.752	4.57	0.002000	0.0200	17.32	1.52	0.55	7.34	0.35	0	Yes
79+50.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	7.752	4.99	0.002000	0.0200	17.89	1.56	0.53	7.87	0.36	0	Yes
79+00.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	7.368	5.13	0.002000	0.0200	18.09	1.57	0.53	8.40	0.36	0	Yes

South Bound and North Bound: Station 85+00 to Station 92+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
85+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.005692	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
86+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.005692	0.0200	6.00	1.26	0.66	0.66	0.12	0	Yes
86+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.005692	0.0200	7.78	1.51	0.55	1.21	0.16	0	Yes
87+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.005692	0.0200	9.06	1.67	0.50	1.71	0.18	0	Yes
87+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.005692	0.0200	10.09	1.79	0.47	2.18	0.20	0	Yes
88+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.005692	0.0200	10.97	1.89	0.44	2.62	0.22	0	Yes
88+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.005692	0.0200	11.75	1.98	0.42	3.04	0.23	0	Yes
89+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.005692	0.0200	12.45	2.06	0.40	3.44	0.25	0	Yes
89+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.005692	0.0200	13.09	2.13	0.39	3.83	0.26	0	Yes
89+98.24	39.50	0.41	17.50	0.18	0.85	0.75	0.481	8.520	4.09	0.005692	0.0200	13.66	2.19	0.37	4.20	0.27	0	Yes
89+98.24	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.005692	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
91+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.109	8.520	0.93	0.005692	0.0200	7.83	1.51	1.12	1.12	0.16	0	Yes
91+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.163	8.520	1.39	0.005692	0.0200	9.10	1.67	0.50	1.62	0.18	0	Yes
92+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.216	8.520	1.84	0.005692	0.0200	10.13	1.80	0.46	2.08	0.20	0	Yes

Project:	Ellworth Road
Subject	Pavement Drainage Calculations (100-year flow)
	PavementDrainage.xls
Computed By:	GL / AFC
Checked By:	05/20/2005

South Bound and North Bound: Station 92+00 to Station 105+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inspan} (cfs)	Q100 Contained RW?
105+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002714	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
104+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002714	0.0200	6.89	0.96	0.87	0.87	0.14	0	Yes
104+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002714	0.0200	8.94	1.14	0.73	1.60	0.18	0	Yes
103+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002714	0.0200	10.41	1.26	0.66	2.26	0.21	0	Yes
103+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002714	0.0200	11.60	1.36	0.61	2.87	0.23	0	Yes
102+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002714	0.0200	12.61	1.44	0.58	3.45	0.25	0	Yes
102+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002714	0.0200	13.50	1.50	0.55	4.01	0.27	0	Yes
101+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002714	0.0200	14.30	1.56	0.53	4.54	0.29	0	Yes
101+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002714	0.0200	15.04	1.62	0.52	5.06	0.30	0	Yes
100+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.002714	0.0200	15.72	1.66	0.50	5.56	0.31	0	Yes
100+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	8.136	4.36	0.002714	0.0200	16.07	1.69	0.49	6.05	0.32	0	Yes
99+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	8.136	4.80	0.002714	0.0200	16.65	1.73	0.48	6.53	0.33	0	Yes
99+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	7.752	4.99	0.002714	0.0200	16.90	1.75	0.48	7.01	0.34	0	Yes
98+50.00	39.50	0.59	17.50	0.26	0.85	0.75	0.697	7.752	5.40	0.002500	0.0200	17.68	1.73	0.48	7.49	0.35	0	Yes
98+00.00	39.50	0.63	17.50	0.28	0.85	0.75	0.750	7.752	5.82	0.002500	0.0200	18.18	1.76	0.47	7.97	0.36	0	Yes
97+50.00	39.50	0.68	17.50	0.30	0.85	0.75	0.804	7.368	5.92	0.002500	0.0200	18.31	1.77	0.47	8.44	0.37	0	Yes
97+00.00	39.50	0.73	17.50	0.32	0.85	0.75	0.858	7.368	6.32	0.002500	0.0200	18.75	1.80	0.46	8.90	0.38	0	Yes
96+50.00	39.50	0.77	17.50	0.34	0.85	0.75	0.911	6.984	6.36	0.002500	0.0200	18.80	1.80	0.46	9.36	0.38	0	Yes
96+00.00	39.50	0.82	17.50	0.36	0.85	0.75	0.965	6.984	6.74	0.002500	0.0200	19.21	1.83	0.46	9.82	0.38	0	Yes
95+46.14	39.50	0.86	17.50	0.38	0.85	0.75	1.023	6.600	6.75	0.002500	0.0200	19.22	1.83	0.49	10.31	0.38	0	Yes
95+46.14	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002500	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
95+00.00	39.50	0.04	17.50	0.02	0.85	0.75	0.049	8.520	0.42	0.002500	0.0200	6.79	0.91	0.84	0.84	0.14	0	Yes
94+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.103	8.520	0.88	0.002500	0.0200	8.95	1.10	0.76	1.61	0.18	0	Yes
94+00.00	39.50	0.13	17.50	0.06	0.85	0.75	0.157	8.520	1.33	0.002500	0.0200	10.47	1.22	0.68	2.29	0.21	0	Yes
93+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.210	8.520	1.79	0.002500	0.0200	11.69	1.31	0.64	2.93	0.23	0	Yes
93+00.00	39.50	0.22	17.50	0.10	0.85	0.75	0.264	8.520	2.25	0.002500	0.0200	12.73	1.39	0.60	3.53	0.25	0	Yes
92+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.317	8.520	2.70	0.002500	0.0200	13.64	1.45	0.57	4.10	0.27	0	Yes
92+00.00	39.50	0.31	17.50	0.14	0.85	0.75	0.371	8.520	3.16	0.002500	0.0200	14.46	1.51	0.55	4.65	0.29	0	Yes

Project: Ellworth Road

Subject Pavement Drainage Calculations (100-year flow)

PavementDrainage.xls

Computed By: GL / AFC **Checked By:** 05/20/2005

South Bound and North Bound: Station 105+00 to Station 118+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpass} (cfs)	Q100 Contained RW?
105+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003185	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
105+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.003185	0.0200	6.69	1.02	0.82	0.82	0.13	0	Yes
106+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.003185	0.0200	8.68	1.21	0.69	1.51	0.17	0	Yes
106+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.003185	0.0200	10.10	1.34	0.62	2.13	0.20	0	Yes
107+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.003185	0.0200	11.25	1.44	0.58	2.71	0.23	0	Yes
107+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.003185	0.0200	12.23	1.52	0.55	3.25	0.24	0	Yes
108+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.003185	0.0200	13.10	1.60	0.52	3.78	0.26	0	Yes
108+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.003185	0.0200	13.88	1.66	0.50	4.28	0.28	0	Yes
109+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.003185	0.0200	14.59	1.72	0.49	4.76	0.29	0	Yes
109+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.003185	0.0200	15.25	1.77	0.47	5.24	0.31	0	Yes
110+00.00	39.50	0.45	17.50	0.20	0.85	0.75	0.536	8.520	4.57	0.003185	0.0200	15.87	1.81	0.46	5.69	0.32	0	Yes
110+50.00	39.50	0.50	17.50	0.22	0.85	0.75	0.590	8.136	4.80	0.003185	0.0200	16.16	1.84	0.45	6.15	0.32	0	Yes
111+00.00	39.50	0.54	17.50	0.24	0.85	0.75	0.643	8.136	5.23	0.003185	0.0200	16.70	1.88	0.44	6.59	0.33	0	Yes
111+58.06	**39.50**	**0.60**	**17.50**	**0.26**	**0.85**	**0.75**	**0.705**	**7.752**	**5.47**	**0.003185**	**0.0200**	**16.98**	**1.90**	**0.51**	**7.10**	**0.34**	**0**	**Yes**
111+58.06	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003185	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
112+00.00	39.50	0.04	17.50	0.02	0.85	0.75	0.045	8.520	0.38	0.003185	0.0200	6.26	0.97	0.72	0.72	0.13	0	Yes
112+50.00	39.50	0.08	17.50	0.04	0.85	0.75	0.099	8.520	0.84	0.003185	0.0200	8.41	1.19	0.70	1.42	0.17	0	Yes
113+00.00	39.50	0.13	17.50	0.06	0.85	0.75	0.152	8.520	1.30	0.003185	0.0200	9.89	1.32	0.63	2.05	0.20	0	Yes
113+50.00	39.50	0.17	17.50	0.08	0.85	0.75	0.206	8.520	1.75	0.003185	0.0200	11.08	1.43	0.58	2.64	0.22	0	Yes
114+00.00	39.50	0.22	17.50	0.10	0.85	0.75	0.259	8.520	2.21	0.003185	0.0200	12.09	1.51	0.55	3.19	0.24	0	Yes
114+50.00	39.50	0.26	17.50	0.12	0.85	0.75	0.313	8.520	2.67	0.003185	0.0200	12.97	1.59	0.53	3.71	0.26	0	Yes
115+14.64	**39.50**	**0.32**	**17.50**	**0.14**	**0.85**	**0.75**	**0.382**	**8.520**	**3.26**	**0.003185**	**0.0200**	**13.98**	**1.67**	**0.65**	**4.36**	**0.28**	**0**	**Yes**
115+14.64	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003185	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
116+00.00	39.50	0.08	17.50	0.03	0.85	0.75	0.092	8.520	0.78	0.003185	0.0200	8.18	1.16	1.22	1.22	0.16	0	Yes
116+50.00	39.50	0.12	17.50	0.05	0.85	0.75	0.145	8.520	1.24	0.003185	0.0200	9.72	1.31	0.64	1.86	0.19	0	Yes
117+00.00	39.50	0.17	17.50	0.07	0.85	0.75	0.199	8.520	1.69	0.003185	0.0200	10.94	1.41	0.59	2.45	0.22	0	Yes
117+50.00	39.50	0.21	17.50	0.09	0.85	0.75	0.252	8.520	2.15	0.003185	0.0200	11.96	1.50	0.55	3.00	0.24	0	Yes
118+00.00	39.50	0.26	17.50	0.11	0.85	0.75	0.306	8.520	2.61	0.003185	0.0200	12.86	1.58	0.53	3.53	0.26	0	Yes
118+50.00	**39.50**	**0.30**	**17.50**	**0.13**	**0.85**	**0.75**	**0.360**	**8.520**	**3.06**	**0.003185**	**0.0200**	**13.66**	**1.64**	**0.51**	**4.04**	**0.27**	**0**	**Yes**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

South Bound and North Bound: Station 118+50 to Station 128+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inlet} (cfs)	Q100 Contained RW?
128+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002500	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
128+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002500	0.0200	7.00	0.93	0.90	0.90	0.14	0	Yes
127+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002500	0.0200	9.08	1.11	0.75	1.65	0.18	0	Yes
126+62.95	39.50	0.17	17.50	0.08	0.85	0.75	0.201	8.520	1.71	0.002500	0.0200	11.48	1.29	1.12	2.77	0.23	0	Yes
126+62.95	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002500	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
126+00.00	39.50	0.06	17.50	0.03	0.85	0.75	0.067	8.520	0.57	0.002500	0.0200	7.63	0.98	1.07	1.07	0.15	0	Yes
125+50.00	39.50	0.10	17.50	0.05	0.85	0.75	0.121	8.520	1.03	0.002500	0.0200	9.50	1.14	0.73	1.80	0.19	0	Yes
125+00.00	39.50	0.15	17.50	0.07	0.85	0.75	0.175	8.520	1.49	0.002500	0.0200	10.90	1.25	0.67	2.46	0.22	0	Yes
124+50.00	39.50	0.19	17.50	0.09	0.85	0.75	0.228	8.520	1.95	0.002500	0.0200	12.06	1.34	0.62	3.09	0.24	0	Yes
124+00.00	39.50	0.24	17.50	0.11	0.85	0.75	0.282	8.520	2.40	0.002500	0.0200	13.05	1.41	0.59	3.68	0.26	0	Yes
123+50.00	39.50	0.28	17.50	0.13	0.85	0.75	0.336	8.520	2.86	0.002500	0.0200	13.93	1.47	0.57	4.24	0.28	0	Yes
123+00.00	39.50	0.33	17.50	0.15	0.85	0.75	0.389	8.520	3.32	0.002500	0.0200	14.72	1.53	0.54	4.79	0.29	0	Yes
122+36.43	39.50	0.39	17.50	0.17	0.85	0.75	0.457	8.520	3.90	0.002500	0.0200	15.64	1.59	0.67	5.45	0.31	0	Yes
122+36.43	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002500	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
122+00.00	39.50	0.03	17.50	0.01	0.85	0.75	0.039	8.520	0.33	0.002500	0.0200	6.22	0.86	0.71	0.71	0.12	0	Yes
121+50.00	39.50	0.08	17.50	0.03	0.85	0.75	0.093	8.520	0.79	0.002500	0.0200	8.60	1.07	0.78	1.49	0.17	0	Yes
121+00.00	39.50	0.12	17.50	0.05	0.85	0.75	0.146	8.520	1.25	0.002500	0.0200	10.20	1.20	0.70	2.19	0.20	0	Yes
120+50.00	39.50	0.17	17.50	0.07	0.85	0.75	0.200	8.520	1.70	0.002500	0.0200	11.47	1.29	0.64	2.83	0.23	0	Yes
120+00.00	39.50	0.21	17.50	0.09	0.85	0.75	0.253	8.520	2.16	0.002500	0.0200	12.54	1.37	0.61	3.44	0.25	0	Yes
119+50.00	39.50	0.26	17.50	0.12	0.85	0.75	0.307	8.520	2.62	0.002500	0.0200	13.47	1.44	0.58	4.02	0.27	0	Yes
119+00.00	39.50	0.31	17.50	0.14	0.85	0.75	0.361	8.520	3.07	0.002500	0.0200	14.31	1.50	0.56	4.57	0.29	0	Yes
118+50.00	39.50	0.35	17.50	0.16	0.85	0.75	0.414	8.520	3.53	0.002500	0.0200	15.07	1.55	0.54	5.11	0.30	0	Yes

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

North Bound: Station 128+50 to 137+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
128+50.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
129+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	8.520	0.56	0.002706	0.0200	7.47	1.01	0.83	0.83	0.15	0	Yes
129+50.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	8.520	1.13	0.002706	0.0200	9.69	1.20	0.69	1.52	0.19	0	Yes
130+00.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	8.520	1.69	0.002706	0.0200	11.28	1.33	0.63	2.15	0.23	0	Yes
130+50.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	8.520	2.26	0.002706	0.0200	12.56	1.43	0.58	2.73	0.25	0	Yes
131+00.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	8.520	2.82	0.002706	0.0200	13.66	1.51	0.55	3.28	0.27	0	Yes
131+50.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	8.520	3.39	0.002706	0.0200	14.62	1.58	0.53	3.80	0.29	0	Yes
132+00.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	8.520	3.95	0.002706	0.0200	15.49	1.65	0.51	4.31	0.31	0	Yes
132+50.00	39.50	0.36	34.50	0.32	0.85	0.70	0.530	8.520	4.52	0.002706	0.0200	16.29	1.70	0.49	4.80	0.33	0	Yes
133+00.00	**39.50**	**0.41**	**34.50**	**0.36**	**0.85**	**0.70**	**0.596**	**8.520**	**5.08**	**0.002706**	**0.0200**	**17.03**	**1.75**	**0.48**	**5.28**	**0.34**	**0**	**Yes**
133+00.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002706	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
133+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	8.520	0.56	0.002706	0.0200	7.47	1.01	0.83	0.83	0.15	0	Yes
134+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	8.520	1.13	0.002706	0.0200	9.69	1.20	0.69	1.52	0.19	0	Yes
134+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	8.520	1.69	0.002706	0.0200	11.28	1.33	0.63	2.15	0.23	0	Yes
135+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	8.520	2.26	0.002706	0.0200	12.56	1.43	0.58	2.73	0.25	0	Yes
135+50.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	8.520	2.82	0.002706	0.0200	13.66	1.51	0.55	3.28	0.27	0	Yes
136+00.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	8.520	3.39	0.002706	0.0200	14.62	1.58	0.53	3.80	0.29	0	Yes
136+50.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	8.520	3.95	0.002706	0.0200	15.49	1.65	0.51	4.31	0.31	0	Yes
137+00.00	**39.50**	**0.36**	**34.50**	**0.32**	**0.85**	**0.70**	**0.530**	**8.520**	**4.52**	**0.002706**	**0.0200**	**16.29**	**1.70**	**0.49**	**4.80**	**0.33**	**0**	**Yes**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

South Bound: Station 128+50 to 137+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpass} (cfs)	Q100 Contained RW?
128+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002706	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
129+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002706	0.0200	6.90	0.96	0.87	0.87	0.14	0	Yes
129+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002706	0.0200	8.95	1.14	0.73	1.60	0.18	0	Yes
130+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002706	0.0200	10.42	1.26	0.66	2.26	0.21	0	Yes
130+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002706	0.0200	11.60	1.36	0.61	2.88	0.23	0	Yes
131+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002706	0.0200	12.61	1.43	0.58	3.46	0.25	0	Yes
131+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002706	0.0200	13.51	1.50	0.55	4.01	0.27	0	Yes
132+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002706	0.0200	14.31	1.56	0.53	4.55	0.29	0	Yes
132+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002706	0.0200	15.05	1.61	0.52	5.06	0.30	0	Yes
133+00.00	**39.50**	**0.41**	**17.50**	**0.18**	**0.85**	**0.75**	**0.482**	**8.520**	**4.11**	**0.002706**	**0.0200**	**15.73**	**1.66**	**0.50**	**5.56**	**0.31**	**0**	**Yes**
133+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002706	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
133+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002706	0.0200	6.90	0.96	0.87	0.87	0.14	0	Yes
134+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002706	0.0200	8.95	1.14	0.73	1.60	0.18	0	Yes
134+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002706	0.0200	10.42	1.26	0.66	2.26	0.21	0	Yes
135+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002706	0.0200	11.60	1.36	0.61	2.88	0.23	0	Yes
135+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002706	0.0200	12.61	1.43	0.58	3.46	0.25	0	Yes
136+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002706	0.0200	13.51	1.50	0.55	4.01	0.27	0	Yes
136+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002706	0.0200	14.31	1.56	0.53	4.55	0.29	0	Yes
137+00.00	**39.50**	**0.36**	**17.50**	**0.16**	**0.85**	**0.75**	**0.429**	**8.520**	**3.65**	**0.002706**	**0.0200**	**15.05**	**1.61**	**0.52**	**5.06**	**0.30**	**0**	**Yes**

Project: Ellworth Road

Subject Pavement Drainage Calculations (100-year flow)

PavementDrainage.xls

Computed By: GL / AFC **Checked By:** 05/20/2005

North Bound: Station 137+00 to 154+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
154+50.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
154+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	8.520	0.56	0.002571	0.0200	7.54	0.99	0.84	0.84	0.15	0	Yes
153+50.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	8.520	1.13	0.002571	0.0200	9.78	1.18	0.71	1.55	0.20	0	Yes
153+00.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	8.520	1.69	0.002571	0.0200	11.39	1.31	0.64	2.19	0.23	0	Yes
152+71.21	39.50	0.16	34.50	0.14	0.85	0.70	0.237	8.520	2.02	0.002571	0.0200	12.16	1.36	0.35	2.54	0.24	0	Yes
152+71.21	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
152+00.00	39.50	0.06	34.50	0.06	0.85	0.70	0.094	8.520	0.80	0.002571	0.0200	8.61	1.08	1.10	1.10	0.17	0	Yes
151+50.00	39.50	0.11	34.50	0.10	0.85	0.70	0.161	8.520	1.37	0.002571	0.0200	10.51	1.24	0.67	1.77	0.21	0	Yes
151+00.00	39.50	0.16	34.50	0.14	0.85	0.70	0.227	8.520	1.93	0.002571	0.0200	11.96	1.35	0.62	2.39	0.24	0	Yes
150+50.00	39.50	0.20	34.50	0.18	0.85	0.70	0.293	8.520	2.50	0.002571	0.0200	13.17	1.44	0.58	2.97	0.26	0	Yes
150+00.00	39.50	0.25	34.50	0.21	0.85	0.70	0.359	8.520	3.06	0.002571	0.0200	14.22	1.51	0.55	3.52	0.28	0	Yes
149+50.00	39.50	0.29	34.50	0.25	0.85	0.70	0.426	8.520	3.63	0.002571	0.0200	15.15	1.58	0.53	4.04	0.30	0	Yes
149+00.00	39.50	0.34	34.50	0.29	0.85	0.70	0.492	8.520	4.19	0.002571	0.0200	15.99	1.64	0.51	4.55	0.32	0	Yes
148+50.00	39.50	0.38	34.50	0.33	0.85	0.70	0.558	8.520	4.76	0.002571	0.0200	16.77	1.69	0.49	5.04	0.34	0	Yes
147+95.49	39.50	0.43	34.50	0.38	0.85	0.70	0.630	8.520	5.37	0.002571	0.0200	17.55	1.74	0.52	5.57	0.35	0	Yes
147+95.49	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
147+50.00	39.50	0.04	34.50	0.04	0.85	0.70	0.060	8.520	0.51	0.002571	0.0200	7.28	0.97	0.78	0.78	0.15	0	Yes
147+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.127	8.520	1.08	0.002571	0.0200	9.61	1.17	0.72	1.50	0.19	0	Yes
146+50.00	39.50	0.13	34.50	0.12	0.85	0.70	0.193	8.520	1.64	0.002571	0.0200	11.26	1.30	0.64	2.14	0.23	0	Yes
146+00.00	39.50	0.18	34.50	0.15	0.85	0.70	0.259	8.520	2.21	0.002571	0.0200	12.57	1.40	0.60	2.74	0.25	0	Yes
145+50.00	39.50	0.22	34.50	0.19	0.85	0.70	0.325	8.520	2.77	0.002571	0.0200	13.70	1.48	0.56	3.30	0.27	0	Yes
145+00.00	39.50	0.27	34.50	0.23	0.85	0.70	0.392	8.520	3.34	0.002571	0.0200	14.68	1.55	0.54	3.84	0.29	0	Yes
144+50.00	39.50	0.31	34.50	0.27	0.85	0.70	0.458	8.520	3.90	0.002571	0.0200	15.57	1.61	0.52	4.36	0.31	0	Yes
144+00.00	39.50	0.36	34.50	0.31	0.85	0.70	0.524	8.520	4.47	0.002571	0.0200	16.38	1.67	0.50	4.86	0.33	0	Yes
143+50.00	39.50	0.40	34.50	0.35	0.85	0.70	0.590	8.520	5.03	0.002571	0.0200	17.13	1.72	0.49	5.35	0.34	0	Yes
143+03.06	39.50	0.45	34.50	0.39	0.85	0.70	0.653	8.520	5.56	0.002571	0.0200	17.78	1.76	0.44	5.79	0.36	0	Yes
143+03.06	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
142+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.070	8.520	0.60	0.002571	0.0200	7.71	1.01	0.88	0.88	0.15	0	Yes
142+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.137	8.520	1.16	0.002571	0.0200	9.89	1.19	0.70	1.58	0.20	0	Yes
141+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.203	8.520	1.73	0.002571	0.0200	11.47	1.31	0.64	2.22	0.23	0	Yes
141+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.269	8.520	2.29	0.002571	0.0200	12.76	1.41	0.59	2.81	0.26	0	Yes
140+50.00	39.50	0.23	34.50	0.20	0.85	0.70	0.335	8.520	2.86	0.002571	0.0200	13.85	1.49	0.56	3.37	0.28	0	Yes
140+00.00	39.50	0.27	34.50	0.24	0.85	0.70	0.402	8.520	3.42	0.002571	0.0200	14.82	1.56	0.54	3.90	0.30	0	Yes
139+50.00	39.50	0.32	34.50	0.28	0.85	0.70	0.468	8.520	3.99	0.002571	0.0200	15.70	1.62	0.51	4.42	0.31	0	Yes
139+00.00	39.50	0.37	34.50	0.32	0.85	0.70	0.534	8.520	4.55	0.002571	0.0200	16.49	1.67	0.50	4.92	0.33	0	Yes
138+11.24	39.50	0.45	34.50	0.39	0.85	0.70	0.652	8.520	5.55	0.002571	0.0200	17.77	1.76	0.84	5.76	0.36	0	Yes
138+11.24	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
137+50.00	39.50	0.06	34.50	0.05	0.85	0.70	0.081	8.520	0.69	0.002571	0.0200	8.14	1.04	0.98	0.98	0.16	0	Yes
137+00.00	39.50	0.10	34.50	0.09	0.85	0.70	0.147	8.520	1.26	0.002571	0.0200	10.18	1.21	0.69	1.67	0.20	0	Yes

Project: Ellworth Road

Subject Pavement Drainage Calculations (100-year flow)

PavementDrainage.xls

Computed By: GL / AFC **Checked By:** 05/20/2005

South Bound: Station 137+00 to 154+50

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
154+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
154+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002571	0.0200	6.97	0.94	0.89	0.89	0.14	0	Yes
153+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002571	0.0200	9.03	1.12	0.75	1.63	0.18	0	Yes
153+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002571	0.0200	10.52	1.24	0.67	2.31	0.21	0	Yes
152+71.21	39.50	0.16	17.50	0.07	0.85	0.75	0.192	8.520	1.63	0.002571	0.0200	11.23	1.29	0.37	2.68	0.22	0	Yes
152+71.21	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
152+00.00	39.50	0.06	17.50	0.03	0.85	0.75	0.076	8.520	0.65	0.002571	0.0200	7.95	1.03	1.16	1.16	0.16	0	Yes
151+50.00	39.50	0.11	17.50	0.05	0.85	0.75	0.130	8.520	1.11	0.002571	0.0200	9.71	1.17	0.71	1.87	0.19	0	Yes
151+00.00	39.50	0.16	17.50	0.07	0.85	0.75	0.184	8.520	1.56	0.002571	0.0200	11.05	1.28	0.65	2.52	0.22	0	Yes
150+50.00	39.50	0.20	17.50	0.09	0.85	0.75	0.237	8.520	2.02	0.002571	0.0200	12.17	1.36	0.61	3.13	0.24	0	Yes
150+00.00	39.50	0.25	17.50	0.11	0.85	0.75	0.291	8.520	2.48	0.002571	0.0200	13.13	1.44	0.58	3.71	0.26	0	Yes
149+50.00	39.50	0.29	17.50	0.13	0.85	0.75	0.344	8.520	2.93	0.002571	0.0200	13.99	1.50	0.56	4.27	0.28	0	Yes
149+00.00	39.50	0.34	17.50	0.15	0.85	0.75	0.398	8.520	3.39	0.002571	0.0200	14.77	1.55	0.54	4.80	0.30	0	Yes
148+50.00	39.50	0.38	17.50	0.17	0.85	0.75	0.452	8.520	3.85	0.002571	0.0200	15.49	1.60	0.52	5.32	0.31	0	Yes
147+95.49	39.50	0.43	17.50	0.19	0.85	0.75	0.510	8.520	4.35	0.002571	0.0200	16.21	1.65	0.55	5.87	0.32	0	Yes
147+95.49	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
147+50.00	39.50	0.04	17.50	0.02	0.85	0.75	0.049	8.520	0.42	0.002571	0.0200	6.72	0.92	0.83	0.83	0.13	0	Yes
147+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.102	8.520	0.87	0.002571	0.0200	8.88	1.10	0.75	1.58	0.18	0	Yes
146+50.00	39.50	0.13	17.50	0.06	0.85	0.75	0.156	8.520	1.33	0.002571	0.0200	10.40	1.23	0.68	2.26	0.21	0	Yes
146+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.210	8.520	1.79	0.002571	0.0200	11.61	1.32	0.63	2.89	0.23	0	Yes
145+50.00	39.50	0.22	17.50	0.10	0.85	0.75	0.263	8.520	2.24	0.002571	0.0200	12.65	1.40	0.59	3.48	0.25	0	Yes
145+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.317	8.520	2.70	0.002571	0.0200	13.56	1.47	0.57	4.05	0.27	0	Yes
144+50.00	39.50	0.31	17.50	0.14	0.85	0.75	0.370	8.520	3.16	0.002571	0.0200	14.38	1.53	0.55	4.60	0.29	0	Yes
144+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.424	8.520	3.61	0.002571	0.0200	15.13	1.58	0.53	5.13	0.30	0	Yes
143+50.00	39.50	0.40	17.50	0.18	0.85	0.75	0.478	8.520	4.07	0.002571	0.0200	15.82	1.63	0.51	5.64	0.32	0	Yes
143+03.06	39.50	0.45	17.50	0.20	0.85	0.75	0.528	8.136	4.30	0.002571	0.0200	16.14	1.65	0.47	6.11	0.32	0	Yes
143+03.06	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
142+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.057	8.520	0.48	0.002571	0.0200	7.12	0.95	0.93	0.93	0.14	0	Yes
142+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.110	8.520	0.94	0.002571	0.0200	9.14	1.13	0.74	1.67	0.18	0	Yes
141+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.164	8.520	1.40	0.002571	0.0200	10.60	1.24	0.67	2.34	0.21	0	Yes
141+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.218	8.520	1.85	0.002571	0.0200	11.78	1.34	0.62	2.96	0.24	0	Yes
140+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.271	8.520	2.31	0.002571	0.0200	12.79	1.41	0.59	3.55	0.26	0	Yes
140+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.325	8.520	2.77	0.002571	0.0200	13.69	1.48	0.56	4.12	0.27	0	Yes
139+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.379	8.520	3.22	0.002571	0.0200	14.50	1.53	0.54	4.66	0.29	0	Yes
139+00.00	39.50	0.37	17.50	0.16	0.85	0.75	0.432	8.520	3.68	0.002571	0.0200	15.23	1.59	0.53	5.18	0.30	0	Yes
138+11.24	39.50	0.45	17.50	0.20	0.85	0.75	0.527	8.136	4.29	0.002571	0.0200	16.13	1.65	0.90	6.08	0.32	0	Yes
138+11.24	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002571	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
137+50.00	39.50	0.06	17.50	0.02	0.85	0.75	0.066	8.520	0.56	0.002571	0.0200	7.52	0.99	1.03	1.03	0.15	0	Yes
137+00.00	39.50	0.10	17.50	0.04	0.85	0.75	0.119	8.520	1.02	0.002571	0.0200	9.40	1.15	0.73	1.76	0.19	0	Yes

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

North Bound: Station 154+50 to 161+07.83

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpass} (cfs)	Q100 Contained RW?
154+50.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002615	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
155+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	8.520	0.56	0.002615	0.0200	7.52	1.00	0.84	0.84	0.15	0	Yes
155+50.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	8.520	1.13	0.002615	0.0200	9.75	1.19	0.70	1.54	0.19	0	Yes
156+00.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	8.520	1.69	0.002615	0.0200	11.35	1.31	0.63	2.17	0.23	0	Yes
156+50.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	8.520	2.26	0.002615	0.0200	12.64	1.41	0.59	2.76	0.25	0	Yes
157+00.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	8.520	2.82	0.002615	0.0200	13.75	1.49	0.56	3.32	0.27	0	Yes
157+50.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	8.520	3.39	0.002615	0.0200	14.72	1.56	0.53	3.85	0.29	0	Yes
158+00.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	8.520	3.95	0.002615	0.0200	15.59	1.63	0.51	4.37	0.31	0	Yes
158+50.00	39.50	0.36	34.50	0.32	0.85	0.70	0.530	8.520	4.52	0.002615	0.0200	16.40	1.68	0.50	4.86	0.33	0	Yes
159+00.00	39.50	0.41	34.50	0.36	0.85	0.70	0.596	8.520	5.08	0.002615	0.0200	17.14	1.73	0.48	5.34	0.34	0	Yes
159+43.79	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.654**	**8.520**	**5.58**	**0.002615**	**0.0200**	**17.74**	**1.77**	**0.41**	**5.76**	**0.35**	**0**	**Yes**
159+43.79	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002615	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
160+00.00	39.50	0.05	34.50	0.04	0.85	0.70	0.074	8.520	0.63	0.002615	0.0200	7.85	1.03	0.91	0.91	0.16	0	Yes
160+50.00	39.50	0.10	34.50	0.08	0.85	0.70	0.141	8.520	1.20	0.002615	0.0200	9.97	1.20	0.69	1.60	0.20	0	Yes
161+07.83	**39.50**	**0.15**	**34.50**	**0.13**	**0.85**	**0.70**	**0.217**	**8.520**	**1.85**	**0.002615**	**0.0200**	**11.74**	**1.34**	**0.72**	**2.32**	**0.23**	**0**	**Yes**

South Bound: Station 154+50 to 161+07.83

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{inpass} (cfs)	Q100 Contained RW?
154+50.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002615	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
155+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002615	0.0200	6.94	0.95	0.88	0.88	0.14	0	Yes
155+50.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002615	0.0200	9.00	1.12	0.74	1.62	0.18	0	Yes
156+00.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002615	0.0200	10.48	1.25	0.67	2.29	0.21	0	Yes
156+50.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002615	0.0200	11.68	1.34	0.62	2.91	0.23	0	Yes
157+00.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.002615	0.0200	12.70	1.42	0.59	3.50	0.25	0	Yes
157+50.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.002615	0.0200	13.59	1.48	0.56	4.06	0.27	0	Yes
158+00.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.002615	0.0200	14.40	1.54	0.54	4.61	0.29	0	Yes
158+50.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.002615	0.0200	15.14	1.59	0.52	5.13	0.30	0	Yes
159+00.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.002615	0.0200	15.83	1.64	0.51	5.64	0.32	0	Yes
159+43.79	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.529**	**8.136**	**4.31**	**0.002615**	**0.0200**	**16.11**	**1.66**	**0.44**	**6.08**	**0.32**	**0**	**Yes**
159+43.79	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002615	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
160+00.00	39.50	0.05	17.50	0.02	0.85	0.75	0.060	8.520	0.51	0.002615	0.0200	7.25	0.97	0.96	0.96	0.15	0	Yes
160+50.00	39.50	0.10	17.50	0.04	0.85	0.75	0.114	8.520	0.97	0.002615	0.0200	9.21	1.14	0.73	1.69	0.18	0	Yes
160+97.99	**39.50**	**0.14**	**17.50**	**0.06**	**0.85**	**0.75**	**0.165**	**8.520**	**1.41**	**0.002615**	**0.0200**	**10.59**	**1.25**	**0.64**	**2.33**	**0.21**	**0**	**Yes**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

North Bound: Station 161+07.83 to Station 179+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
179+00.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
178+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	8.520	0.56	0.003072	0.0200	7.29	1.06	0.79	0.79	0.15	0	Yes
178+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	8.520	1.13	0.003072	0.0200	9.46	1.26	0.66	1.45	0.19	0	Yes
177+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	8.520	1.69	0.003072	0.0200	11.01	1.40	0.60	2.05	0.22	0	Yes
177+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	8.520	2.26	0.003072	0.0200	12.27	1.50	0.56	2.60	0.25	0	Yes
176+50.00	39.50	0.23	34.50	0.20	0.85	0.70	0.331	8.520	2.82	0.003072	0.0200	13.34	1.59	0.53	3.13	0.27	0	Yes
176+00.00	39.50	0.27	34.50	0.24	0.85	0.70	0.398	8.520	3.39	0.003072	0.0200	14.28	1.66	0.50	3.63	0.29	0	Yes
175+50.00	39.50	0.32	34.50	0.28	0.85	0.70	0.464	8.520	3.95	0.003072	0.0200	15.13	1.73	0.48	4.11	0.30	0	Yes
175+00.00	39.50	0.36	34.50	0.32	0.85	0.70	0.530	8.520	4.52	0.003072	0.0200	15.91	1.79	0.47	4.58	0.32	0	Yes
174+50.00	39.50	0.41	34.50	0.36	0.85	0.70	0.596	8.520	5.08	0.003072	0.0200	16.63	1.84	0.45	5.03	0.33	0	Yes
174+20.49	**39.50**	**0.43**	**34.50**	**0.38**	**0.85**	**0.70**	**0.635**	**8.520**	**5.41**	**0.003072**	**0.0200**	**17.03**	**1.87**	**0.26**	**5.29**	**0.34**	**0**	**Yes**
174+20.49	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
173+50.00	39.50	0.06	34.50	0.06	0.85	0.70	0.093	8.520	0.80	0.003072	0.0200	8.30	1.15	1.02	1.02	0.17	0	Yes
173+00.00	39.50	0.11	34.50	0.10	0.85	0.70	0.160	8.520	1.36	0.003072	0.0200	10.14	1.32	0.63	1.65	0.20	0	Yes
172+50.00	39.50	0.15	34.50	0.14	0.85	0.70	0.226	8.520	1.92	0.003072	0.0200	11.55	1.44	0.58	2.23	0.23	0	Yes
172+00.00	39.50	0.20	34.50	0.17	0.85	0.70	0.292	8.520	2.49	0.003072	0.0200	12.72	1.54	0.54	2.77	0.25	0	Yes
171+50.00	39.50	0.25	34.50	0.21	0.85	0.70	0.358	8.520	3.05	0.003072	0.0200	13.74	1.62	0.52	3.28	0.27	0	Yes
171+00.00	39.50	0.29	34.50	0.25	0.85	0.70	0.425	8.520	3.62	0.003072	0.0200	14.64	1.69	0.49	3.78	0.29	0	Yes
170+50.00	39.50	0.34	34.50	0.29	0.85	0.70	0.491	8.520	4.18	0.003072	0.0200	15.46	1.75	0.48	4.25	0.31	0	Yes
170+00.00	39.50	0.38	34.50	0.33	0.85	0.70	0.557	8.520	4.75	0.003072	0.0200	16.21	1.81	0.46	4.71	0.32	0	Yes
169+28.03	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.653**	**8.520**	**5.56**	**0.003072**	**0.0200**	**17.20**	**1.88**	**0.64**	**5.35**	**0.34**	**0**	**Yes**
169+28.03	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
169+00.00	39.50	0.03	34.50	0.02	0.85	0.70	0.037	8.520	0.32	0.003072	0.0200	5.87	0.92	0.51	0.51	0.12	0	Yes
168+50.00	39.50	0.07	34.50	0.06	0.85	0.70	0.103	8.520	0.88	0.003072	0.0200	8.62	1.18	0.70	1.21	0.17	0	Yes
168+00.00	39.50	0.12	34.50	0.10	0.85	0.70	0.170	8.520	1.45	0.003072	0.0200	10.38	1.34	0.62	1.84	0.21	0	Yes
167+50.00	39.50	0.16	34.50	0.14	0.85	0.70	0.236	8.520	2.01	0.003072	0.0200	11.74	1.46	0.57	2.41	0.23	0	Yes
167+00.00	39.50	0.21	34.50	0.18	0.85	0.70	0.302	8.520	2.57	0.003072	0.0200	12.88	1.55	0.54	2.95	0.26	0	Yes
166+50.00	39.50	0.25	34.50	0.22	0.85	0.70	0.368	8.520	3.14	0.003072	0.0200	13.88	1.63	0.51	3.46	0.28	0	Yes
166+00.00	39.50	0.30	34.50	0.26	0.85	0.70	0.435	8.520	3.70	0.003072	0.0200	14.77	1.70	0.49	3.95	0.30	0	Yes
165+50.00	39.50	0.34	34.50	0.30	0.85	0.70	0.501	8.520	4.27	0.003072	0.0200	15.57	1.76	0.47	4.42	0.31	0	Yes
165+00.00	39.50	0.39	34.50	0.34	0.85	0.70	0.567	8.520	4.83	0.003072	0.0200	16.32	1.82	0.46	4.88	0.33	0	Yes
164+35.91	**39.50**	**0.45**	**34.50**	**0.39**	**0.85**	**0.70**	**0.652**	**8.520**	**5.56**	**0.003072**	**0.0200**	**17.19**	**1.88**	**0.57**	**5.45**	**0.34**	**0**	**Yes**
164+35.91	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
164+00.00	39.50	0.03	34.50	0.03	0.85	0.70	0.048	8.520	0.41	0.003072	0.0200	6.44	0.97	0.61	0.61	0.13	0	Yes
163+50.00	39.50	0.08	34.50	0.07	0.85	0.70	0.114	8.520	0.97	0.003072	0.0200	8.94	1.21	0.69	1.30	0.18	0	Yes
163+00.00	39.50	0.12	34.50	0.11	0.85	0.70	0.180	8.520	1.53	0.003072	0.0200	10.61	1.36	0.61	1.91	0.21	0	Yes
162+71.87	**39.50**	**0.15**	**34.50**	**0.13**	**0.85**	**0.70**	**0.217**	**8.520**	**1.85**	**0.003072**	**0.0200**	**11.39**	**1.43**	**0.33**	**2.24**	**0.23**	**0**	**Yes**
162+71.87	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
161+50.00	39.50	0.11	34.50	0.10	0.85	0.70	0.162	8.520	1.38	0.003072	0.0200	10.19	1.32	1.53	1.53	0.20	0	Yes
161+07.83	**39.50**	**0.15**	**34.50**	**0.13**	**0.85**	**0.70**	**0.217**	**8.520**	**1.85**	**0.003072**	**0.0200**	**11.39**	**1.43**	**0.49**	**2.03**	**0.23**	**0**	**Yes**

Project:	Ellworth Road
Subject	Pavement Drainage Calculations (100-year flow)
	PavementDrainage.xls
Computed By: GL / AFC	Checked By: 05/20/2005

South Bound: Station 161+07.83 to Station 179+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	i_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
179+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
178+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.003072	0.0200	6.74	1.00	0.83	0.83	0.13	0	Yes
178+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.003072	0.0200	8.74	1.19	0.70	1.53	0.17	0	Yes
177+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.003072	0.0200	10.17	1.32	0.63	2.16	0.20	0	Yes
177+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.003072	0.0200	11.33	1.42	0.59	2.74	0.23	0	Yes
176+50.00	39.50	0.23	17.50	0.10	0.85	0.75	0.268	8.520	2.28	0.003072	0.0200	12.32	1.50	0.55	3.30	0.25	0	Yes
176+00.00	39.50	0.27	17.50	0.12	0.85	0.75	0.322	8.520	2.74	0.003072	0.0200	13.19	1.57	0.53	3.83	0.26	0	Yes
175+50.00	39.50	0.32	17.50	0.14	0.85	0.75	0.375	8.520	3.20	0.003072	0.0200	13.97	1.64	0.51	4.34	0.28	0	Yes
175+00.00	39.50	0.36	17.50	0.16	0.85	0.75	0.429	8.520	3.65	0.003072	0.0200	14.69	1.69	0.49	4.83	0.29	0	Yes
174+50.00	39.50	0.41	17.50	0.18	0.85	0.75	0.482	8.520	4.11	0.003072	0.0200	15.36	1.74	0.48	5.31	0.31	0	Yes
174+10.32	**39.50**	**0.44**	**17.50**	**0.20**	**0.85**	**0.75**	**0.525**	**8.520**	**4.47**	**0.003072**	**0.0200**	**15.85**	**1.78**	**0.37**	**5.68**	**0.32**	**0**	**Yes**
174+10.32	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
173+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.065	8.520	0.55	0.003072	0.0200	7.23	1.05	0.96	0.96	0.14	0	Yes
173+00.00	39.50	0.10	17.50	0.04	0.85	0.75	0.118	8.520	1.01	0.003072	0.0200	9.06	1.22	0.68	1.64	0.18	0	Yes
172+50.00	39.50	0.15	17.50	0.06	0.85	0.75	0.172	8.520	1.46	0.003072	0.0200	10.43	1.35	0.62	2.26	0.21	0	Yes
172+00.00	39.50	0.19	17.50	0.08	0.85	0.75	0.225	8.520	1.92	0.003072	0.0200	11.54	1.44	0.58	2.83	0.23	0	Yes
171+50.00	39.50	0.24	17.50	0.10	0.85	0.75	0.279	8.520	2.38	0.003072	0.0200	12.51	1.52	0.55	3.38	0.25	0	Yes
171+00.00	39.50	0.28	17.50	0.12	0.85	0.75	0.333	8.520	2.83	0.003072	0.0200	13.36	1.59	0.52	3.91	0.27	0	Yes
170+50.00	39.50	0.33	17.50	0.14	0.85	0.75	0.386	8.520	3.29	0.003072	0.0200	14.13	1.65	0.51	4.41	0.28	0	Yes
170+00.00	39.50	0.37	17.50	0.16	0.85	0.75	0.440	8.520	3.75	0.003072	0.0200	14.83	1.70	0.49	4.90	0.30	0	Yes
169+18.19	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.528**	**8.520**	**4.50**	**0.003072**	**0.0200**	**15.88**	**1.78**	**0.76**	**5.67**	**0.32**	**0**	**Yes**
169+18.19	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
169+00.00	39.50	0.02	17.50	0.01	0.85	0.75	0.020	8.520	0.17	0.003072	0.0200	4.61	0.78	0.39	0.39	0.09	0	Yes
168+50.00	39.50	0.06	17.50	0.03	0.85	0.75	0.073	8.520	0.62	0.003072	0.0200	7.57	1.09	0.77	1.16	0.15	0	Yes
168+00.00	39.50	0.11	17.50	0.05	0.85	0.75	0.127	8.520	1.08	0.003072	0.0200	9.30	1.25	0.67	1.83	0.19	0	Yes
167+50.00	39.50	0.15	17.50	0.07	0.85	0.75	0.180	8.520	1.54	0.003072	0.0200	10.62	1.36	0.61	2.44	0.21	0	Yes
167+00.00	39.50	0.20	17.50	0.09	0.85	0.75	0.234	8.520	1.99	0.003072	0.0200	11.71	1.45	0.57	3.01	0.23	0	Yes
166+50.00	39.50	0.24	17.50	0.11	0.85	0.75	0.288	8.520	2.45	0.003072	0.0200	12.65	1.53	0.54	3.56	0.25	0	Yes
166+00.00	39.50	0.29	17.50	0.13	0.85	0.75	0.341	8.520	2.91	0.003072	0.0200	13.48	1.60	0.52	4.08	0.27	0	Yes
165+50.00	39.50	0.33	17.50	0.15	0.85	0.75	0.395	8.520	3.36	0.003072	0.0200	14.24	1.66	0.50	4.58	0.28	0	Yes
165+00.00	39.50	0.38	17.50	0.17	0.85	0.75	0.448	8.520	3.82	0.003072	0.0200	14.94	1.71	0.49	5.07	0.30	0	Yes
164+26.07	**39.50**	**0.45**	**17.50**	**0.20**	**0.85**	**0.75**	**0.528**	**8.520**	**4.50**	**0.003072**	**0.0200**	**15.88**	**1.78**	**0.69**	**5.76**	**0.32**	**0**	**Yes**
164+26.07	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.003072	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
164+00.00	39.50	0.02	17.50	0.01	0.85	0.75	0.028	8.520	0.24	0.003072	0.0200	5.28	0.85	0.51	0.51	0.11	0	Yes
163+50.00	39.50	0.07	17.50	0.03	0.85	0.75	0.082	8.520	0.69	0.003072	0.0200	7.88	1.12	0.75	1.26	0.16	0	Yes
163+00.00	39.50	0.11	17.50	0.05	0.85	0.75	0.135	8.520	1.15	0.003072	0.0200	9.53	1.27	0.66	1.91	0.19	0	Yes
162+50.00	39.50	0.16	17.50	0.07	0.85	0.75	0.189	8.520	1.61	0.003072	0.0200	10.80	1.38	0.61	2.52	0.22	0	Yes
162+00.00	39.50	0.20	17.50	0.09	0.85	0.75	0.242	8.520	2.06	0.003072	0.0200	11.86	1.47	0.57	3.09	0.24	0	Yes
161+50.00	39.50	0.25	17.50	0.11	0.85	0.75	0.296	8.520	2.52	0.003072	0.0200	12.78	1.54	0.54	3.63	0.26	0	Yes
160+97.99	**39.50**	**0.30**	**17.50**	**0.13**	**0.85**	**0.75**	**0.352**	**8.520**	**3.00**	**0.003072**	**0.0200**	**13.64**	**1.61**	**0.54**	**4.17**	**0.27**	**0**	**Yes**

Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

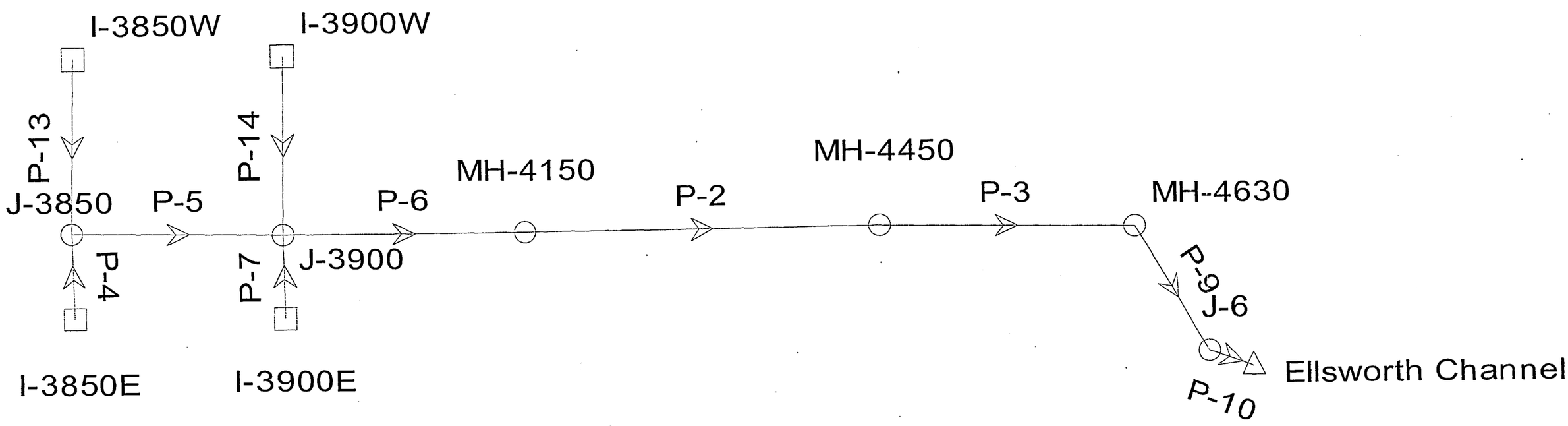
Project:	Ellworth Road		
Subject	Pavement Drainage Calculations (100-year flow)		
			PavementDrainage.xls
Computed By:	GL / AFC	**Checked By:**	05/20/2005

North Bound: Station 179+00 to Station 181+00

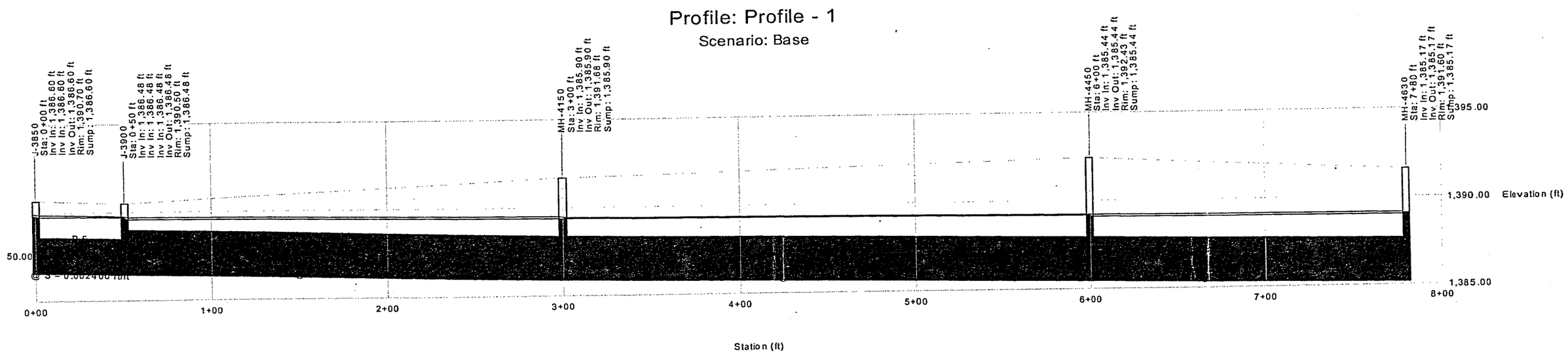
Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
179+00.00	39.50	0.00	34.50	0.00	0.85	0.70	0.000	8.520	0.00	0.002500	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
179+50.00	39.50	0.05	34.50	0.04	0.85	0.70	0.066	8.520	0.56	0.002500	0.0200	7.58	0.98	0.85	0.85	0.15	0	Yes
180+00.00	39.50	0.09	34.50	0.08	0.85	0.70	0.133	8.520	1.13	0.002500	0.0200	9.83	1.17	0.71	1.56	0.20	0	Yes
180+50.00	39.50	0.14	34.50	0.12	0.85	0.70	0.199	8.520	1.69	0.002500	0.0200	11.45	1.29	0.65	2.21	0.23	0	Yes
181+00.00	39.50	0.18	34.50	0.16	0.85	0.70	0.265	8.520	2.26	0.002500	0.0200	12.75	1.39	0.60	2.81	0.25	0	Yes

South Bound: Station 179+00 to Station 181+00

Station	Pv_W (ft)	Pv_A (acres)	RW_W (ft)	RW_A (acres)	C_pv	C_RW	Total CA (acres)	I_{100} (in/hr)	Q100 (cfs)	So (ft/ft)	Sx (ft/ft)	Tsp (ft)	V (fps)	Δt (min)	Travel T (min)	d (ft)	Q_{bypass} (cfs)	Q100 Contained RW?
179+00.00	39.50	0.00	17.50	0.00	0.85	0.75	0.000	8.520	0.00	0.002500	0.0200	0.00	0.00	0.00	0.00	0.00	0	Yes
179+50.00	39.50	0.05	17.50	0.02	0.85	0.75	0.054	8.520	0.46	0.002500	0.0200	7.00	0.93	0.90	0.90	0.14	0	Yes
180+00.00	39.50	0.09	17.50	0.04	0.85	0.75	0.107	8.520	0.91	0.002500	0.0200	9.08	1.11	0.75	1.65	0.18	0	Yes
180+50.00	39.50	0.14	17.50	0.06	0.85	0.75	0.161	8.520	1.37	0.002500	0.0200	10.57	1.22	0.68	2.33	0.21	0	Yes
181+00.00	39.50	0.18	17.50	0.08	0.85	0.75	0.214	8.520	1.83	0.002500	0.0200	11.78	1.32	0.63	2.96	0.24	0	Yes


I-3850W
I-3900W
P-13
P-14
J-3850
P-5
P-6
MH-4150
P-2
MH-4450
P-3
MH-4630
P-4
P-7
J-3900
P-9
J-6
Ellsworth Channel
P-10
I-3850E
I-3900E

Profile
Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-13	I-3850W	J-3850	2.62	0.61	1.59	1.59	2.81	4.50	63.00	0.006032	24 inch	0.013	17.57	1,386.98	1,386.60	1,390.72	1,390.70	1.74	2.10	1,389.88	1,389.86	
P-4	I-3850E	J-3850	2.48	0.58	1.44	1.44	2.80	4.05	24.00	0.007500	24 inch	0.013	19.59	1,386.78	1,386.60	1,390.72	1,390.70	1.94	2.10	1,389.87	1,389.86	
P-5	J-3850	J-3900	N/A	N/A	N/A	3.03	2.75	8.39	50.00	0.002400	24 inch	0.013	11.08	1,386.60	1,386.48	1,390.70	1,390.50	2.10	2.02	1,389.77	1,389.70	
P-6	J-3900	MH-4150	N/A	N/A	N/A	4.22	2.72	11.58	250.00	0.002320	30 inch	0.013	19.76	1,386.48	1,385.90	1,390.50	1,391.68	1.52	3.28	1,389.62	1,389.42	
P-2	MH-4150	MH-4450	N/A	N/A	N/A	4.22	2.59	10.99	300.00	0.001533	30 inch	0.013	16.06	1,385.90	1,385.44	1,391.68	1,392.43	3.28	4.49	1,389.38	1,389.16	
P-3	MH-4450	MH-4630	N/A	N/A	N/A	4.22	2.41	10.24	180.00	0.001500	30 inch	0.013	15.89	1,385.44	1,385.17	1,392.43	1,391.60	4.49	3.93	1,389.13	1,389.02	
P-14	I-3900W	J-3900	0.95	0.59	0.56	0.56	3.76	2.11	65.00	0.003538	24 inch	0.013	13.46	1,386.71	1,386.48	1,390.58	1,390.50	1.87	2.02	1,389.71	1,389.70	
P-7	I-3900E	J-3900	0.98	0.65	0.63	0.63	3.89	2.48	25.00	0.000400	24 inch	0.013	4.52	1,386.49	1,386.48	1,390.58	1,390.50	2.09	2.02	1,389.70	1,389.70	
P-9	MH-4630	J-6	N/A	N/A	N/A	4.22	2.30	9.76	116.00	0.007414	30 inch	0.013	35.32	1,385.17	1,384.31	1,391.60	1,392.40	3.93	5.59	1,388.98	1,388.91	
P-10	J-6	Ellsworth Chan	N/A	N/A	N/A	4.22	2.22	9.44	5.00	0.018000	30 inch	0.013	55.03	1,384.31	1,384.22	1,392.40	1,387.50	5.59	0.78	1,388.91	1,388.91	

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-3850W	In Sag	25.09	25.09	2.81	4.50	4.50	0.00	100.0	4.50	0.00	4.50	4.50		0.059	Grate Inle		2.92	2.90	5.50	1.42	0.39	16.89
I-3850E	In Sag	25.19	25.19	2.80	4.05	4.05	0.00	100.0	4.05	0.00	4.05	4.05		0.059	Grate Inle		3.10	3.09	5.50	1.42	0.37	15.72
I-3900W	In Sag	13.78	13.78	3.76	2.11	2.11	0.00	100.0	2.11	0.00	2.11	2.11		0.059	Grate Inle		3.00	3.00	5.50	1.42	0.26	10.11
I-3900E	In Sag	12.84	12.84	3.89	2.48	2.48	0.00	100.0	2.48	0.00	2.48	2.48		0.059	Grate Inle		3.22	3.21	5.50	1.42	0.28	11.27

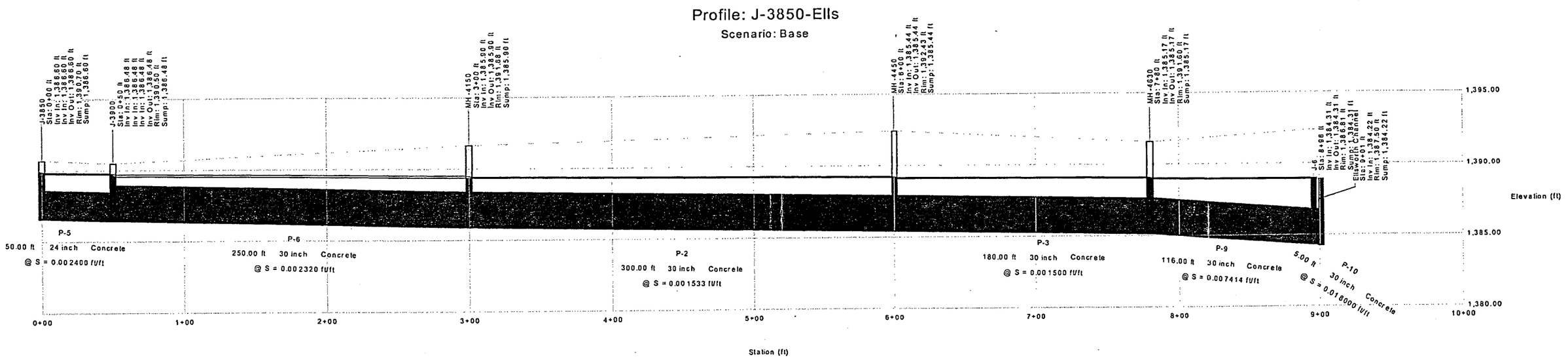
Scenario: Base

Q_{100}

M-64

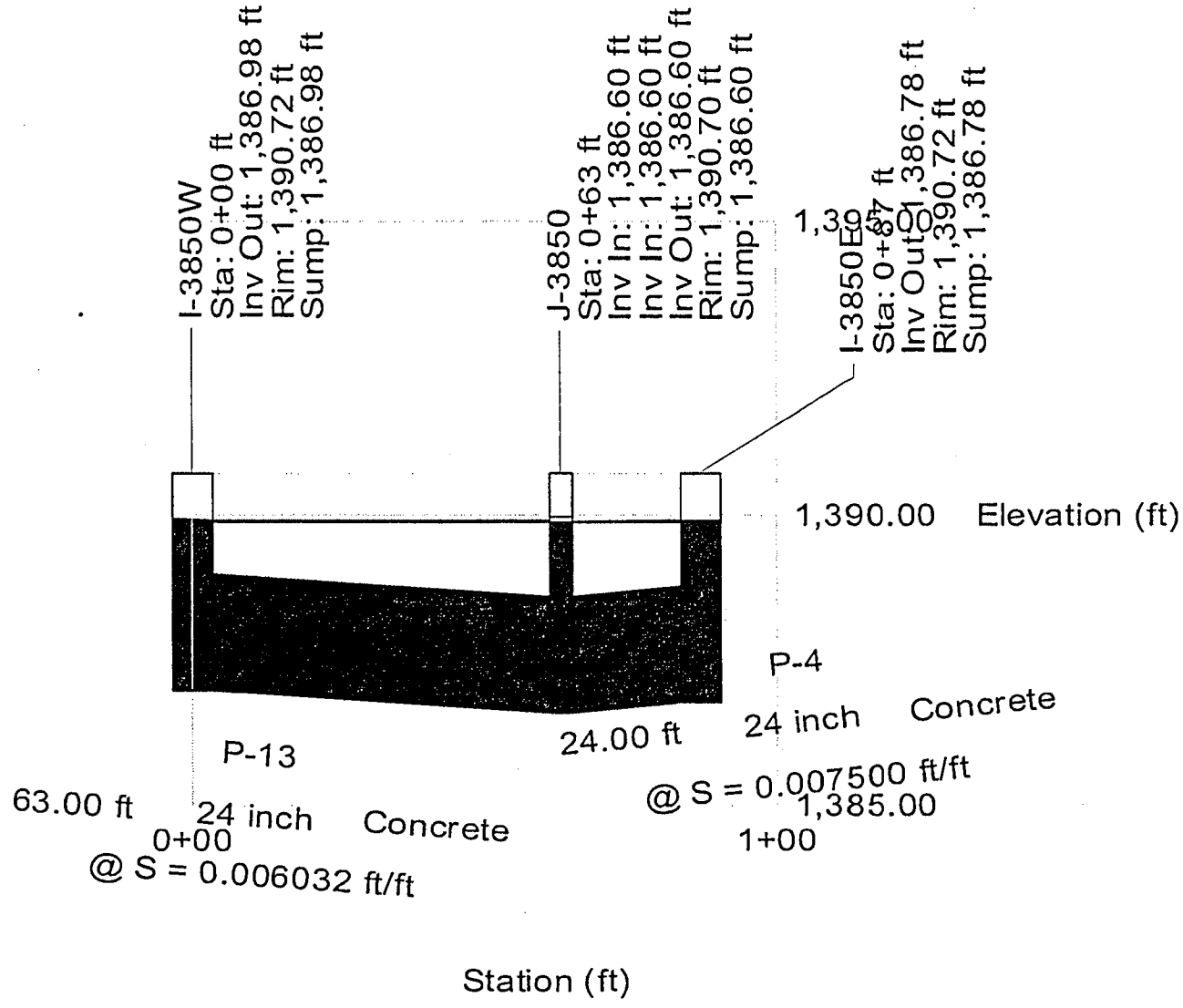
Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-3850W	In Sag	25.09	25.09	4.42	7.09	7.09	0.00	100.0	7.09	0.00	7.09	7.09		0.059	Grate Inle		3.78	3.74	5.50	1.42	0.51	22.93
I-3850E	In Sag	25.19	25.19	4.40	6.37	6.37	0.00	100.0	6.37	0.00	6.37	6.37		0.059	Grate Inle		3.97	3.94	5.50	1.42	0.48	21.34
I-3900W	In Sag	13.78	13.78	5.87	3.30	3.30	0.00	100.0	3.30	0.00	3.30	3.30		0.059	Grate Inle		3.81	3.80	5.50	1.42	0.33	13.69
I-3900E	In Sag	12.84	12.84	6.05	3.86	3.86	0.00	100.0	3.86	0.00	3.86	3.86		0.059	Grate Inle		4.03	4.02	5.50	1.42	0.36	15.23

Profile
Scenario: Base



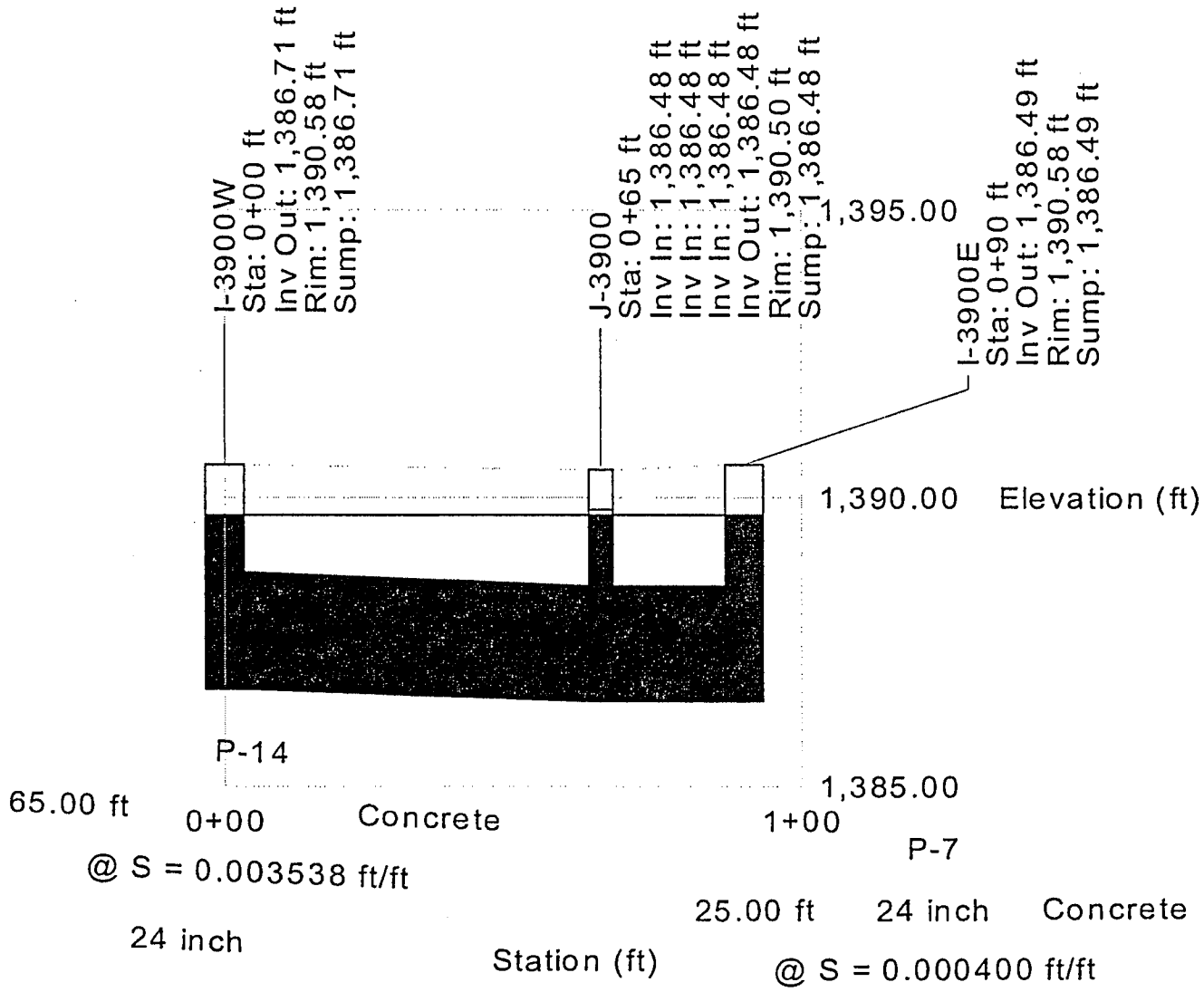
Profile: 3850W-E

Scenario: Base

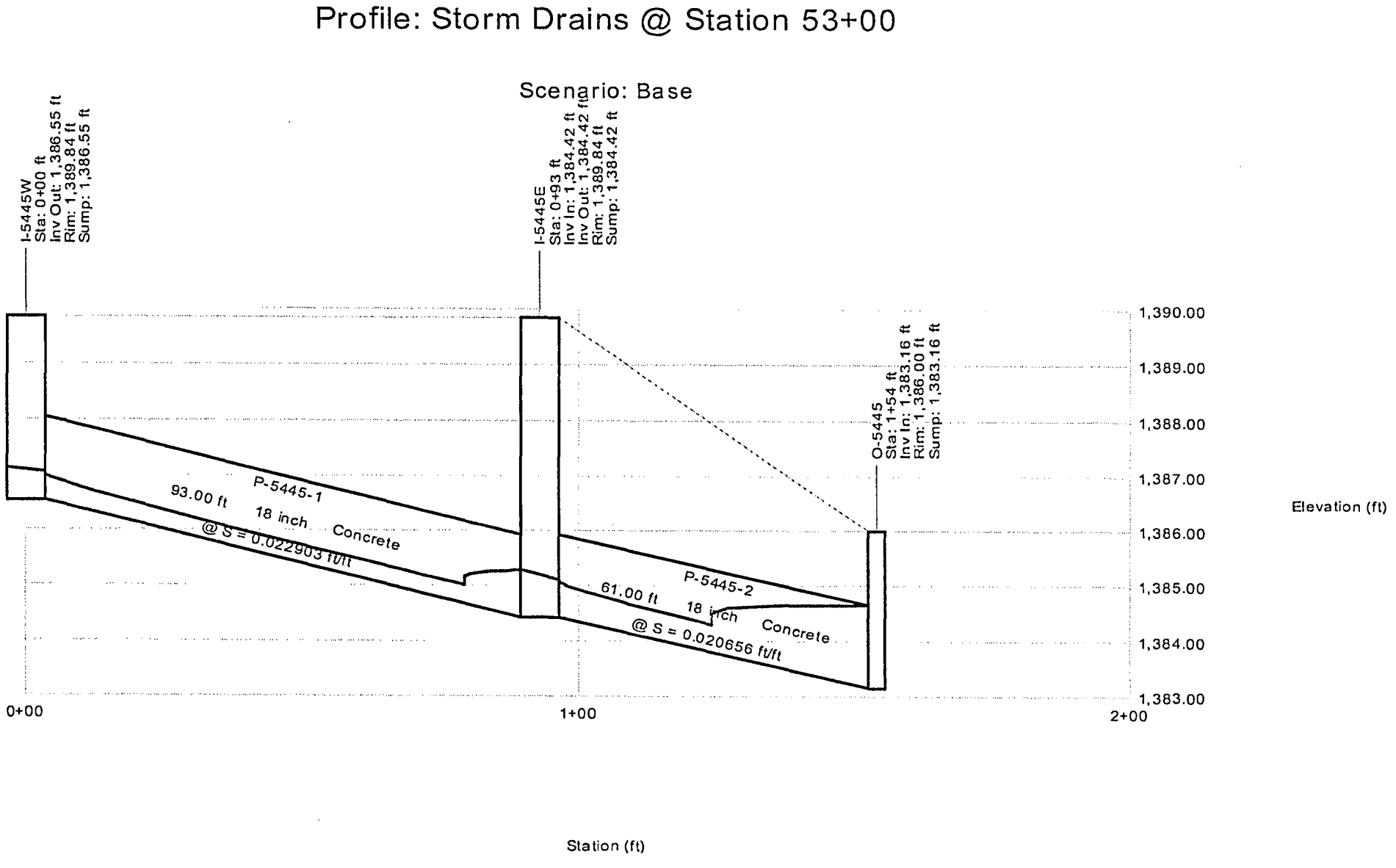


Profile: 3900W-E

Scenario: Base

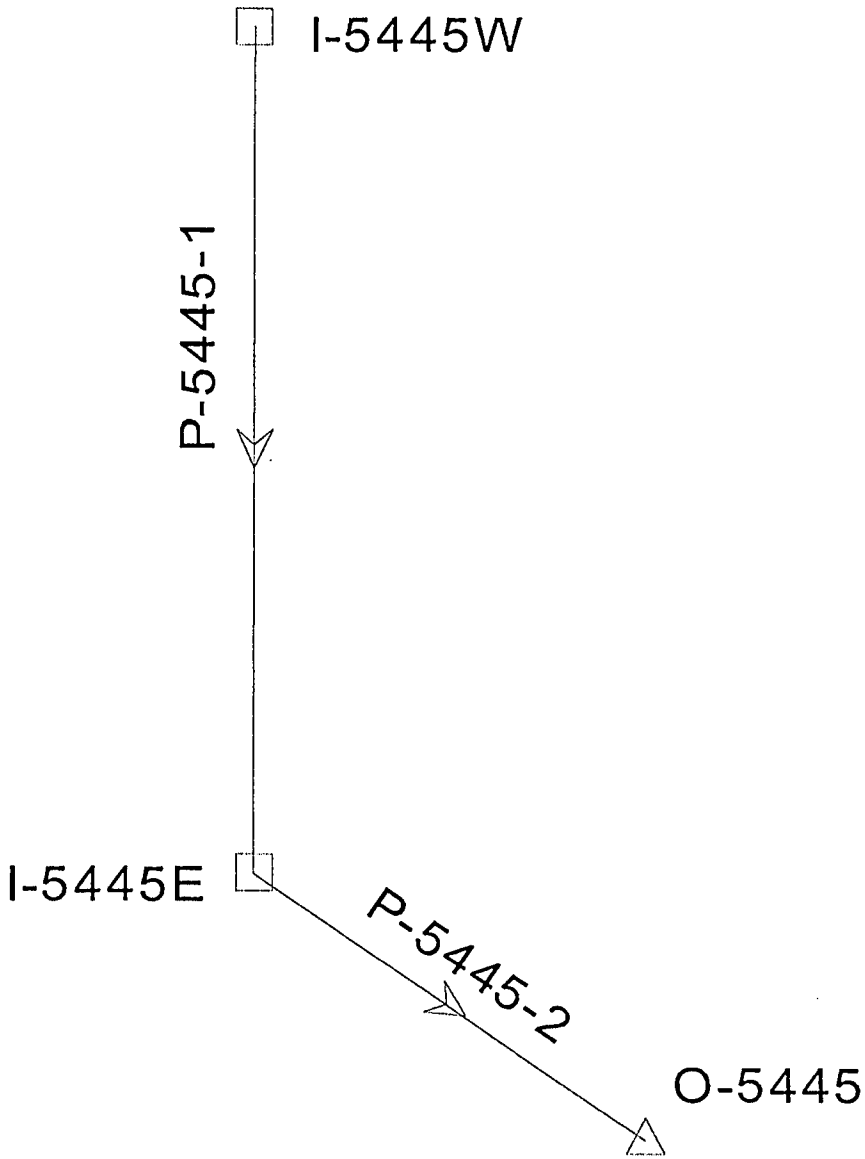


Profile
Scenario: Base



Scenario: Base

Storm Drains @ Station 54+45.09



Title: Ellsworth Road
n:\...\stormcad\rev-5-13-05\p_5445stm.stm
05/19/05 08:33:24 AM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-5445E	On Grad	7.35	7.35	4.99	2.97	2.97	7.35	57.9	3.39	1.25	1.72	1.72		0.059	Grate Inl	0.002714	0.86	0.70	5.50	1.42	0.32	13.29
I-5445W	On Grad	7.35	7.35	4.99	2.97	2.97	7.35	57.9	1.72	1.25	1.72	1.72		0.059	Grate Inl	0.002714	0.58	0.49	5.50	1.42	0.32	13.29

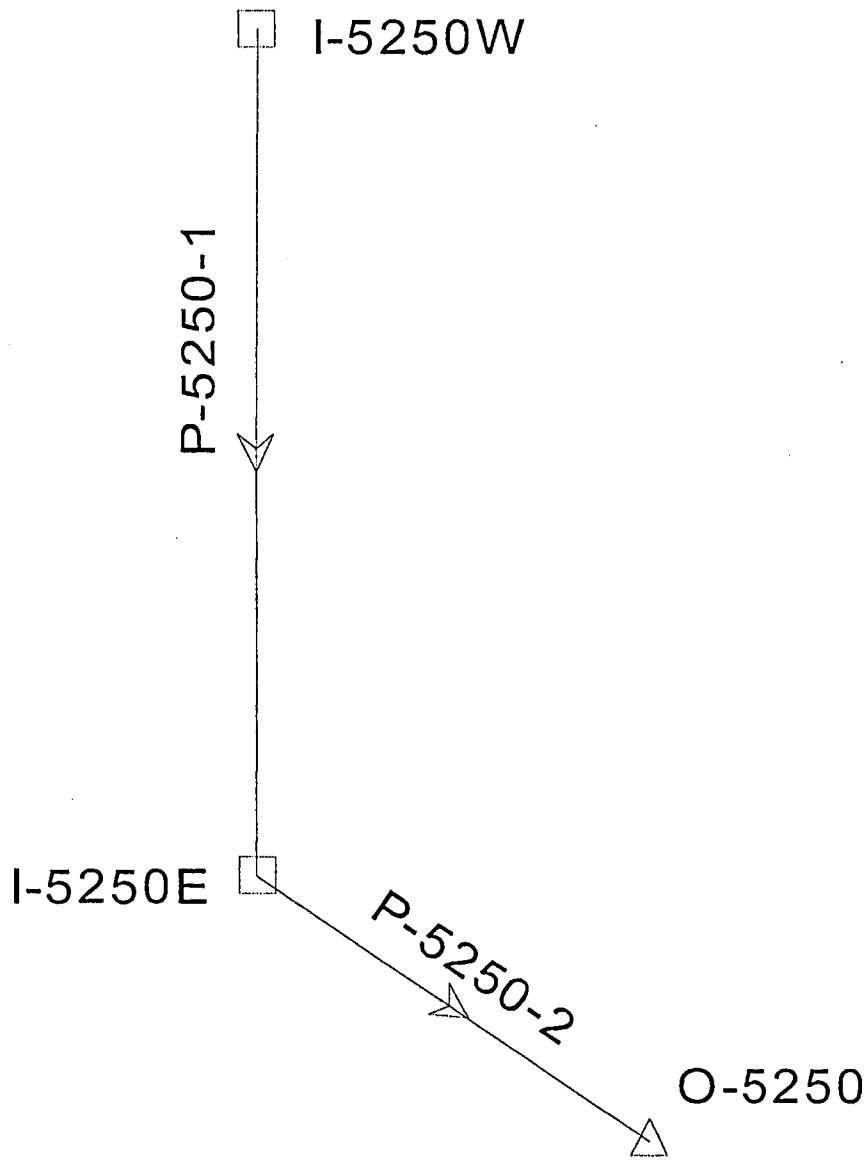
Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-5445-	I-5445W	I-5445E	0.72	0.82	0.59	0.34	4.99	1.72	93.00	0.022903	18 inch	0.013	15.90	1,386.55	1,384.42	1,389.84	1,389.84	1.79	3.92	1,387.04	1,385.28	
P-5445-1	I-5445E	O-5445	0.72	0.82	0.59	0.68	4.92	3.39	61.00	0.020656	18 inch	0.013	15.10	1,384.42	1,383.16	1,389.84	1,386.00	3.92	1.34	1,385.12	1,384.66	

Scenario: Base

Storm Drains @ Station 52+50



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_5250.stm
05/19/05 08:53:44 AM

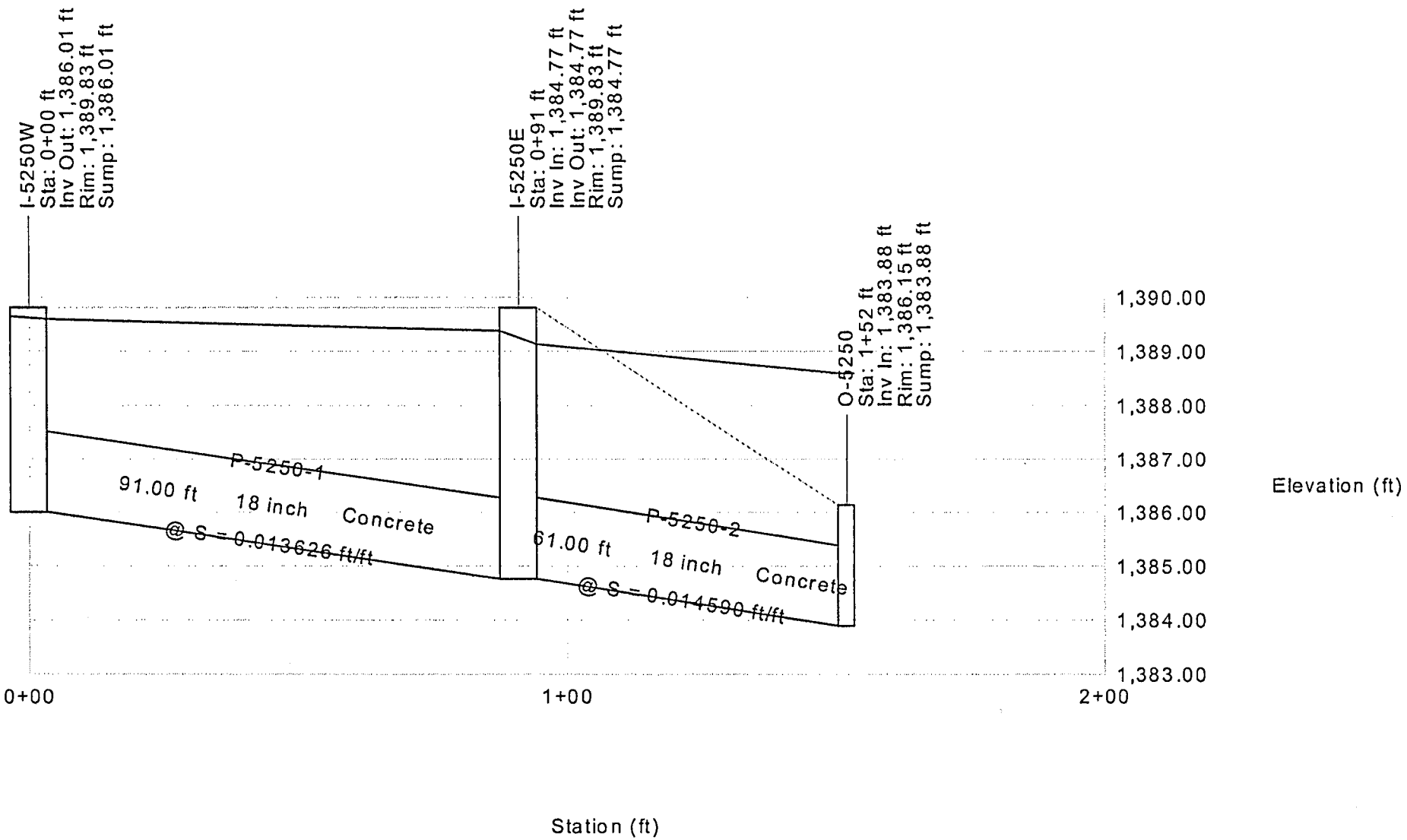
© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Profile: Storm Drains @ Station 52+50

Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-5250-	I-5250W	I-5250E	1.05	0.82	0.86	0.86	4.41	5.08	91.00	0.013626	18 inch	0.013	12.26	1,386.01	1,384.77	1,389.83	1,389.83	2.32	3.56	1,389.60	1,389.39	
P-5250-	I-5250E	O-5250	1.05	0.82	0.86	1.72	4.27	9.90	61.00	0.014590	18 inch	0.013	12.69	1,384.77	1,383.88	1,389.83	1,386.15	3.56	0.77	1,389.14	1,388.60	

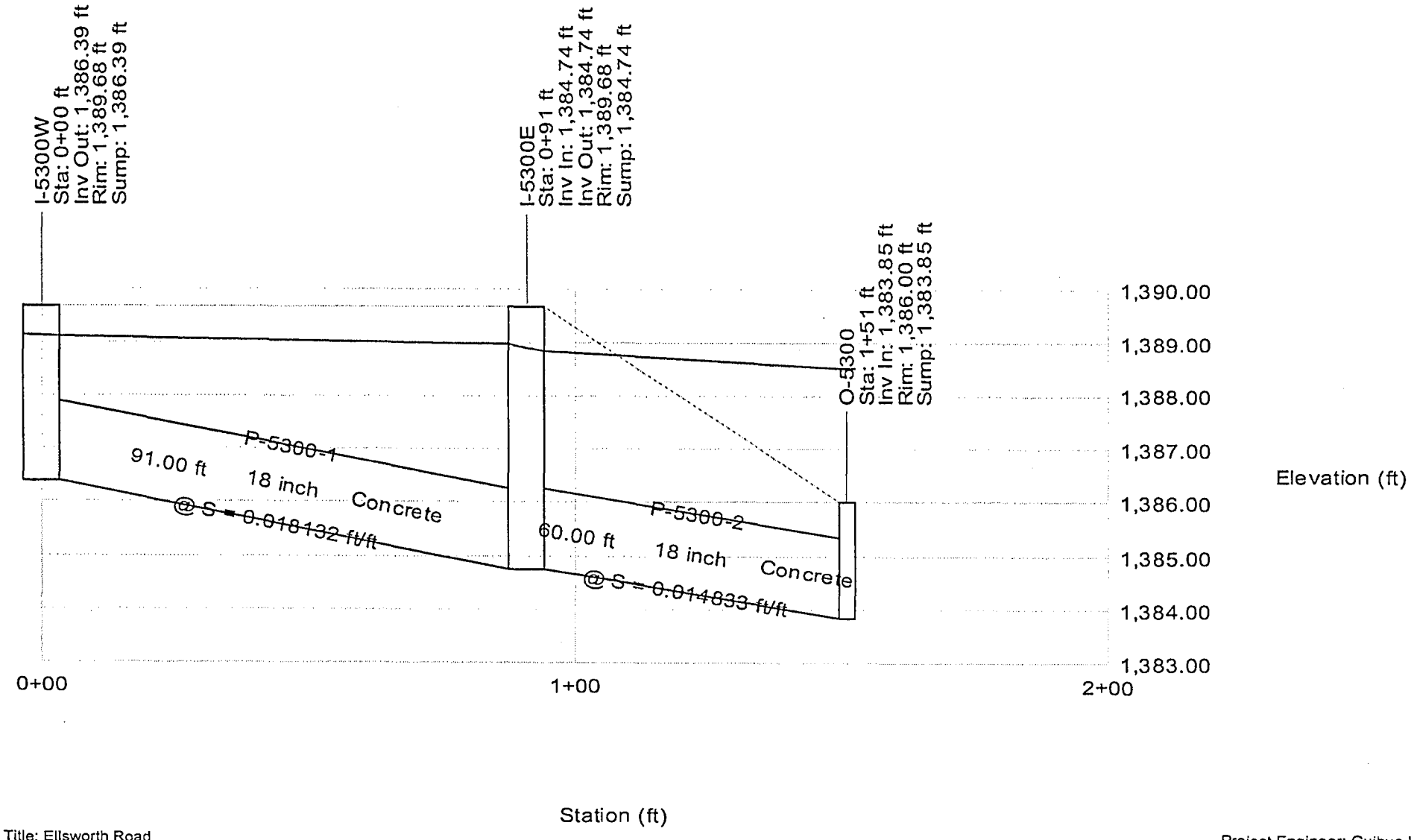
Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-5250E	In Sag	9.45	9.45	4.41	3.83	3.83	0.00	100.0	7.40	0.00	3.83	3.83	6.00	0.059	Combination In		4.62	4.37	5.50	1.42	0.36	15.13
I-5250W	In Sag	9.45	9.45	4.41	3.83	3.83	0.00	100.0	3.83	0.00	3.83	3.83	6.00	0.059	Combination In		3.65	3.59	5.50	1.42	0.36	15.13

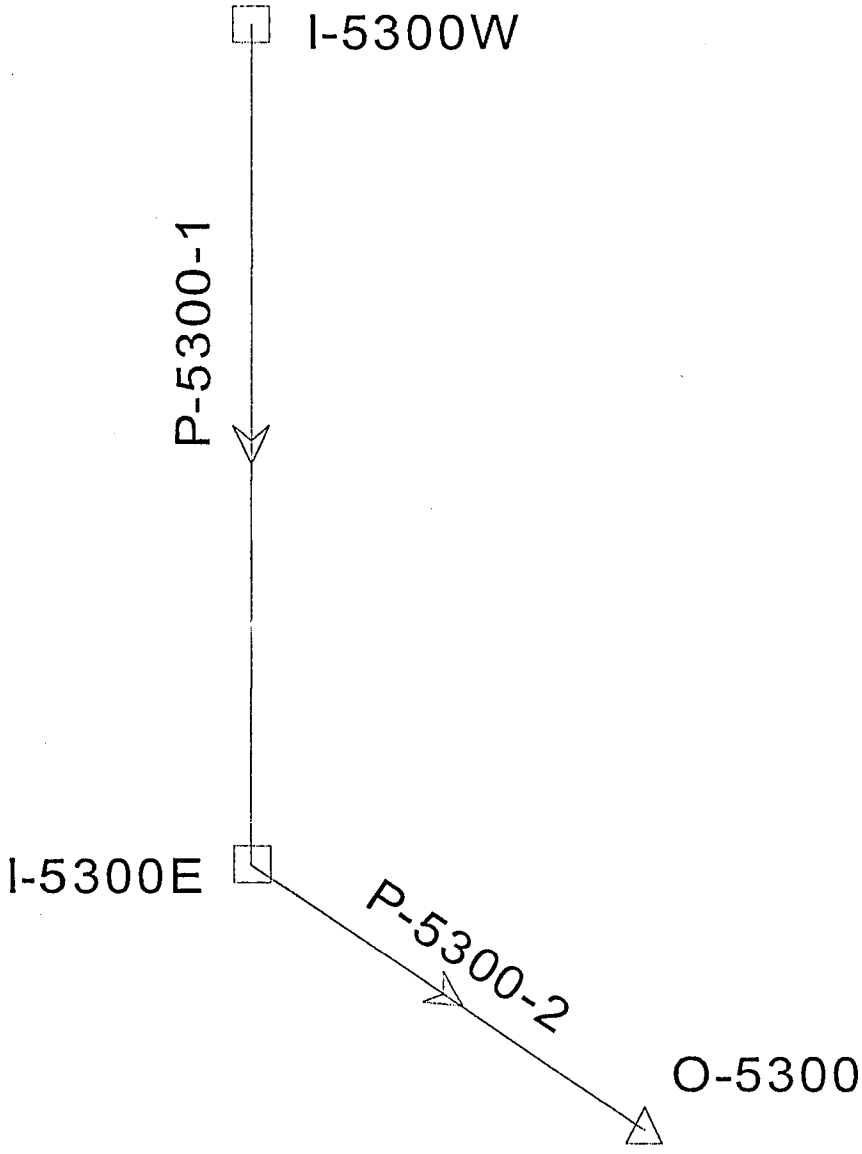
Profile: Storm Drain @ Station 53+00

Scenario: Base



Scenario: Base

Storm Drains @ Station 53+00



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-5300E	In Sag	1.86	1.86	0.00	5.64	1.21	1.25	2.46	0.00	100.0	2.42	0.00	1.21	0.00	2.46	6.00	0.059	Combination Ir		3.98	3.92	5.50	1.42	0.24	9.28
I-5300W	In Sag	1.86	1.86	0.00	5.64	1.21	1.25	2.46	0.00	100.0	1.21	0.00	1.21	0.00	2.46	6.00	0.059	Combination Ir		2.40	2.38	5.50	1.42	0.24	9.28

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-5300-	I-5300W	I-5300E	0.26	0.82	0.21	0.21	5.64	2.46	91.00	0.018132	18 inch	0.013	14.14	1,386.39	1,384.74	1,389.68	1,389.68	1.79	3.44	1,388.77	1,388.72	
P-5300-	I-5300E	O-5300	0.26	0.82	0.21	0.43	5.64	4.92	60.00	0.014833	18 inch	0.013	12.79	1,384.74	1,383.85	1,389.68	1,386.00	3.44	0.65	1,388.66	1,388.53	

Scenario: Base

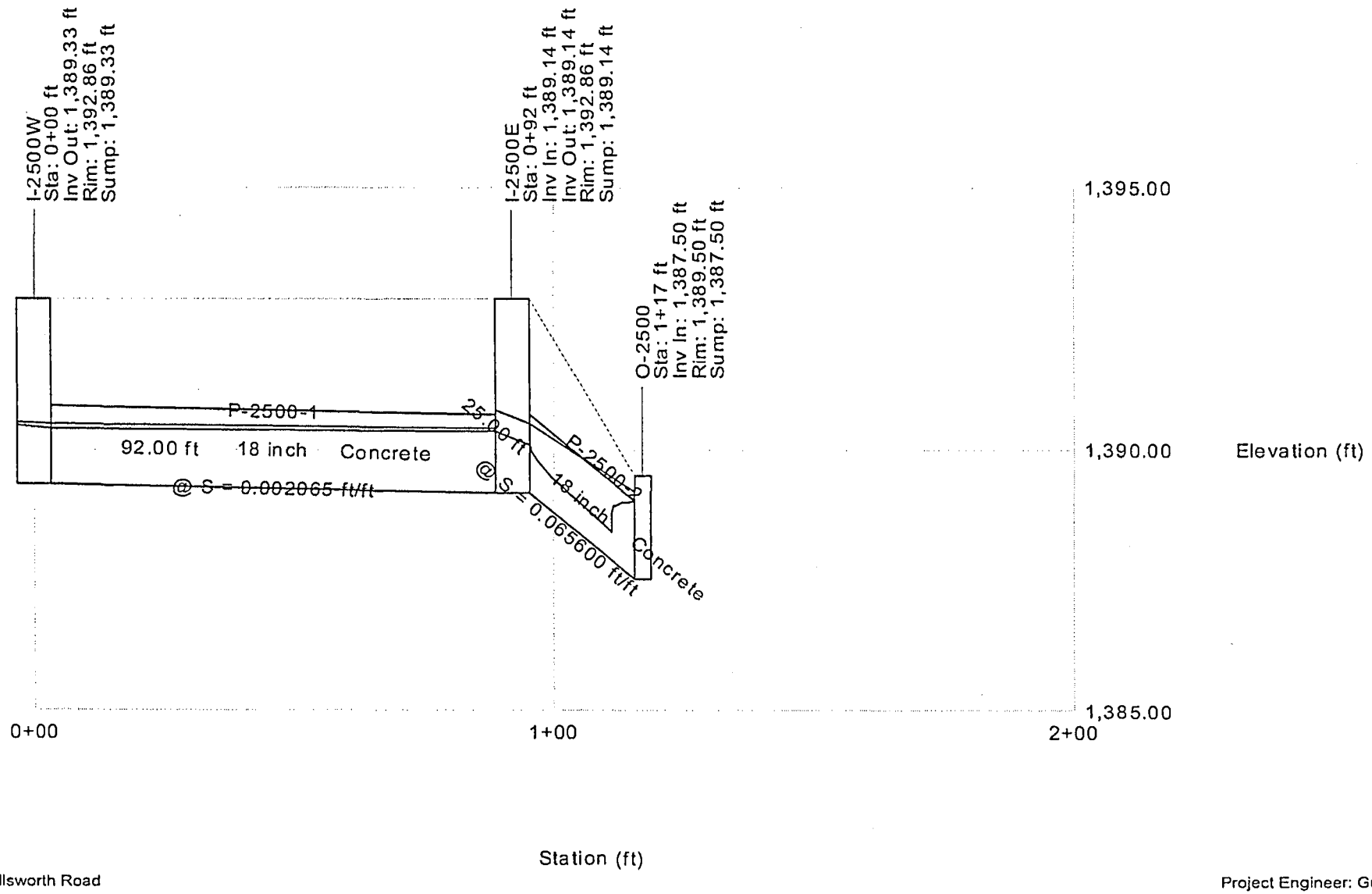
M-64

Q_{100}

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-5300E	In Sag	1.86	1.86	0.00	8.52	1.83	1.25	3.08	0.00	100.0	3.66	0.00	1.83	0.00	3.08	6.00	0.059	Combination Ir		4.09	4.00	5.50	1.42	0.27	10.77
I-5300W	In Sag	1.86	1.86	0.00	8.52	1.83	1.25	3.08	0.00	100.0	1.83	0.00	1.83	0.00	3.08	6.00	0.059	Combination Ir		2.54	2.52	5.50	1.42	0.27	10.77

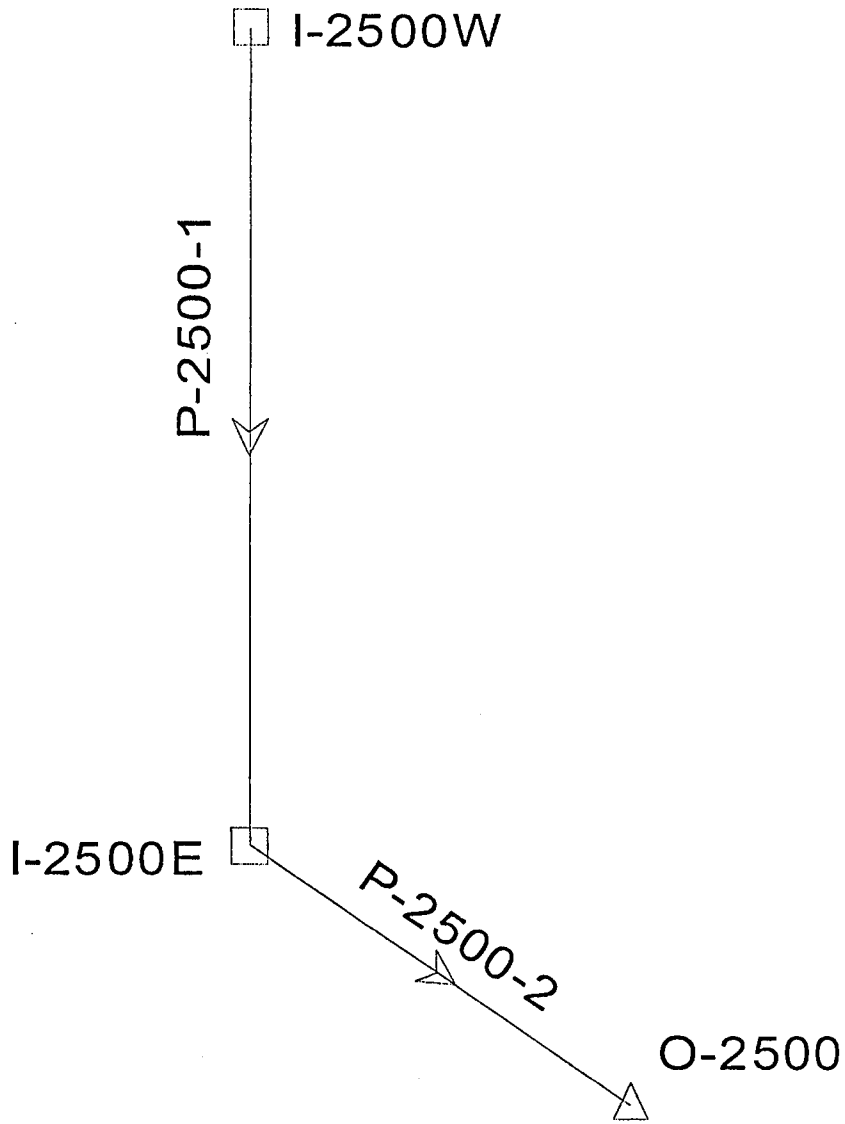
Profile: Storm Drains @ Station 25+00

Scenario: Base



Scenario: Base

Storm Drains & Station 25+00



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_2500.stm
05/19/05 07:58:31 AM

© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-2500-	I-2500W	I-2500E	1.04	0.82	0.85	0.85	3.48	2.99	92.00	0.002065	18 inch	0.013	4.77	1,389.33	1,389.14	1,392.86	1,392.86	2.03	2.22	1,390.40	1,390.32	
P-2500-1	I-2500E	O-2500	1.04	0.82	0.85	1.70	3.44	5.91	25.00	0.065600	18 inch	0.013	26.90	1,389.14	1,387.50	1,392.86	1,389.50	2.22	0.50	1,390.08	1,389.00	

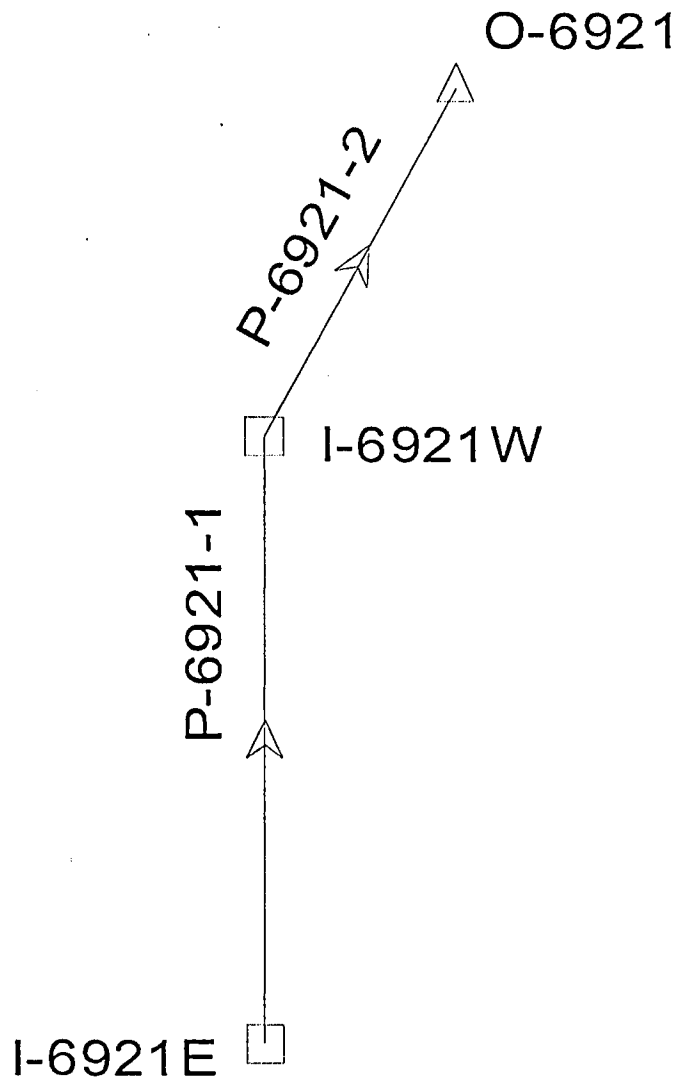
Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-2500E	In Sag	16.57	16.57	3.48	2.99	2.99	0.00	100.0	5.91	0.00	2.99	2.99	6.00	0.059	Combination In		1.18	0.94	5.50	1.42	0.27	10.55
I-2500W	In Sag	16.50	16.50	3.48	2.99	2.99	0.00	100.0	2.99	0.00	2.99	2.99	6.00	0.059	Combination In		1.10	1.07	5.50	1.42	0.27	10.56

Scenario: Base

Storm Drains @ Station 69+21.47

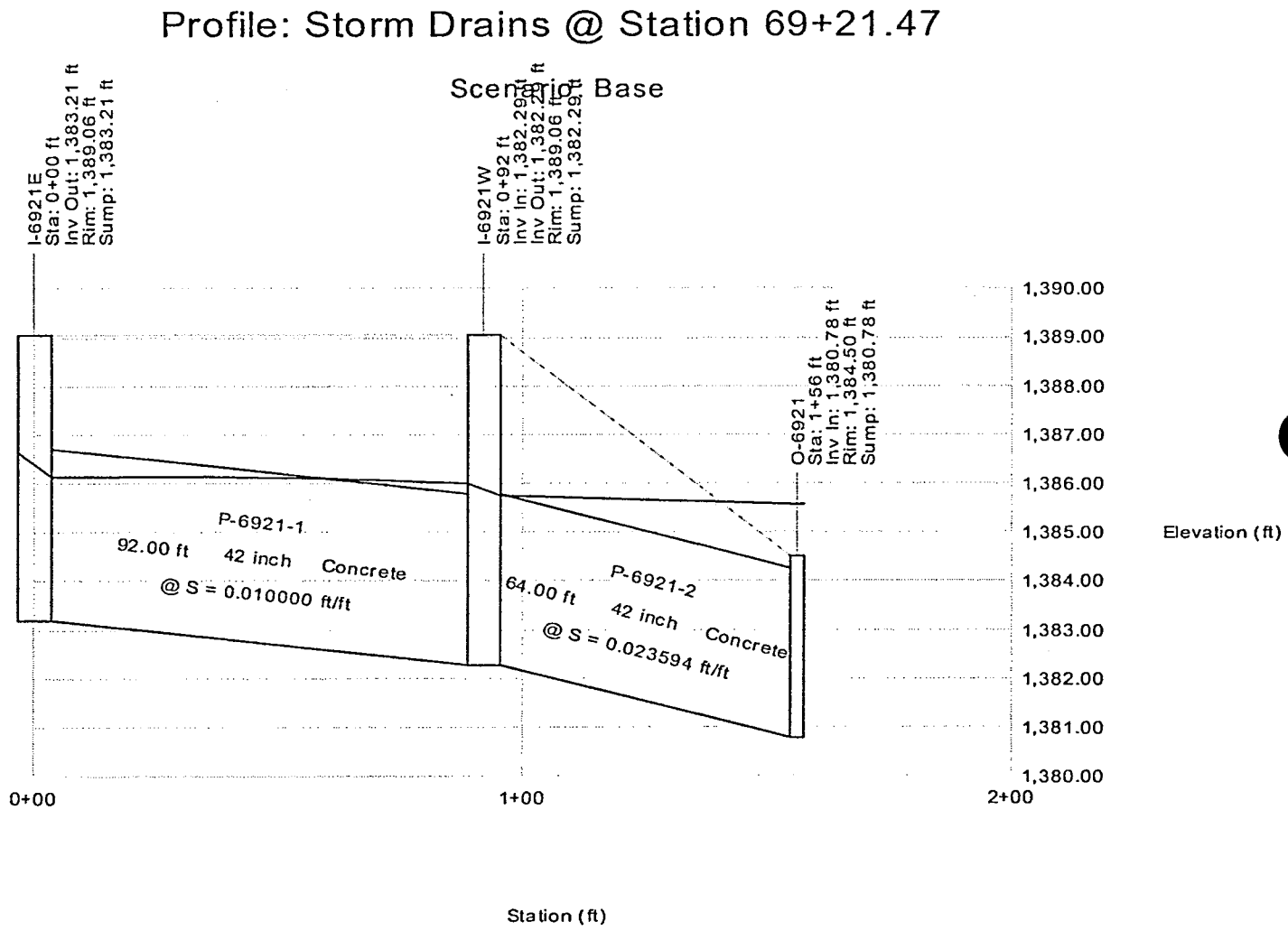


Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_6921.stm
05/19/05 09:32:16 AM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Profile
Scenario: Base



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-6921E	On Grad	11.47	11.47	4.07	4.06	4.06	11.47	56.5	2.30	1.77	2.30	2.30		0.059	Grate Inl	0.002526	2.05	1.55	5.50	1.42	0.36	15.21
I-6921W	On Grad	11.47	11.47	4.07	4.06	4.06	11.47	56.5	4.57	1.77	2.30	2.30		0.059	Grate Inl	0.002526	2.23	2.05	5.50	1.42	0.36	15.21

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-6921-	I-6921E	I-6921W	1.21	0.82	0.99	0.56	4.07	25.40	94.00	0.014681	42 inch	0.013	121.90	1,383.67	1,382.29	1,389.06	1,389.06	1.89	3.27	1,385.22	1,384.52	
P-6921-1	I-6921W	O-6921	1.21	0.82	0.99	1.12	4.05	27.67	65.00	0.019846	42 inch	0.013	141.73	1,382.29	1,381.00	1,389.06	1,384.50	3.27	0.00	1,384.34	1,384.50	

Scenario: Base

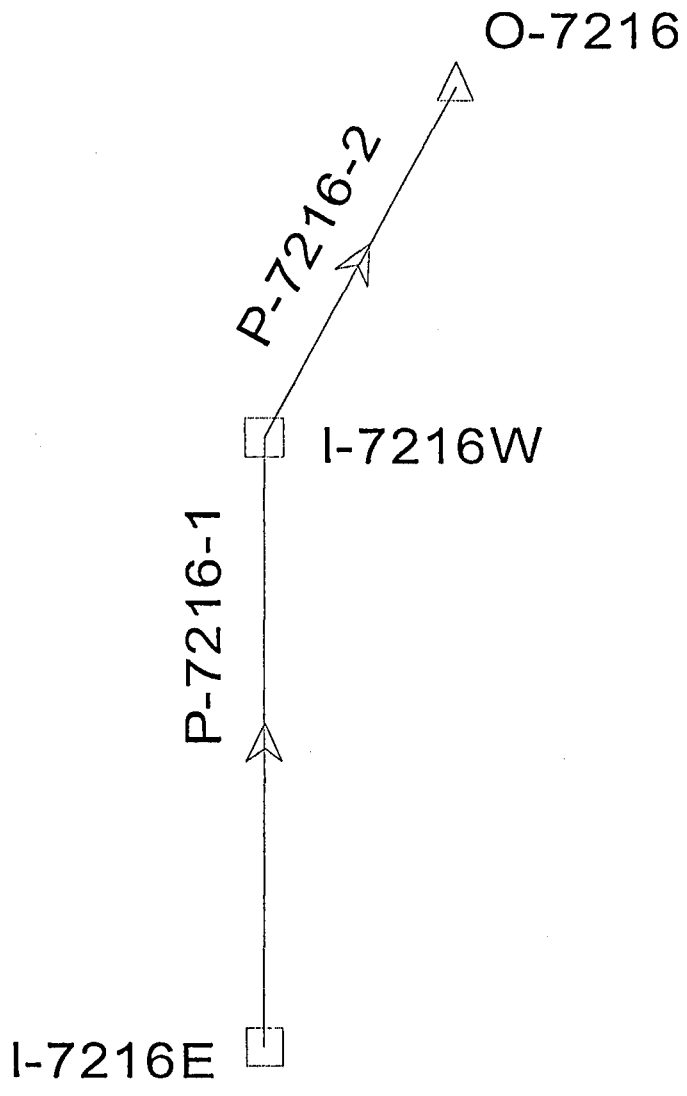
M-64

Q100

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-6921E	On Grad	11.47	11.47	6.32	6.31	6.31	11.47	51.2	3.23	3.08	3.23	3.23		0.059	Grate Inl	0.002526	2.08	1.58	5.50	1.42	0.42	18.01
I-6921W	On Grad	11.47	11.47	6.32	6.31	6.31	11.47	51.2	6.43	3.08	3.23	3.23		0.059	Grate Inl	0.002526	2.22	2.01	5.50	1.42	0.42	18.01

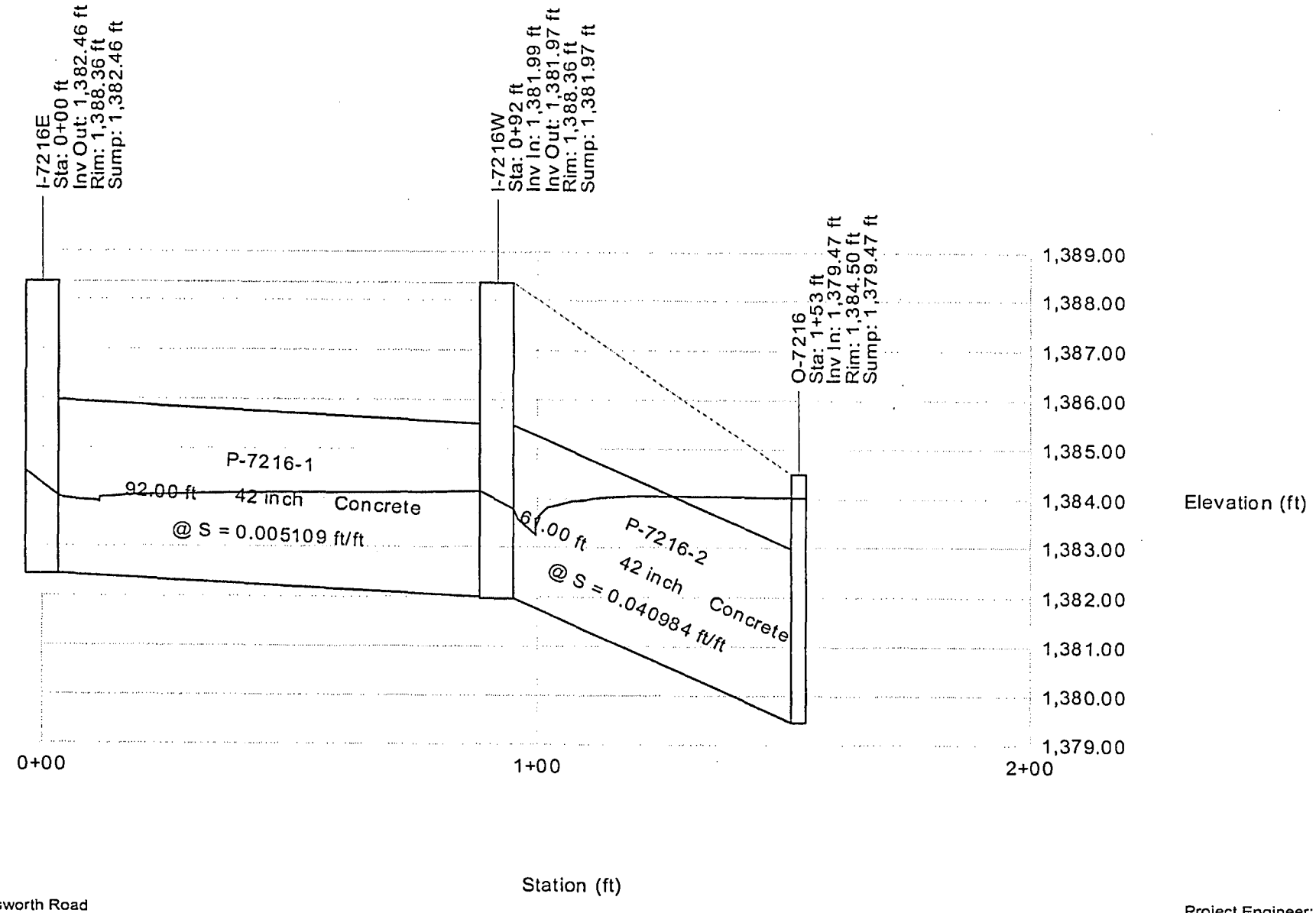
Scenario: Base

Storm Drains @ Station 72+16.74



Profile
Scenario: Base

Storm Drains @ Station 72+16.75



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_7216.stm
05/19/05 10:41:59 AM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-7216E	On Grad	3.36	3.36	3.36	5.64	1.82	1.77	3.59	1.53	57.5	1.04	0.77	1.04	0.75	2.06		0.059	Grate Inl	0.002526	2.04	1.54	5.50	1.42	0.35	14.50
I-7216W	On Grad	3.36	3.36	3.36	5.64	1.82	1.77	3.59	1.53	57.5	2.09	0.77	1.04	0.75	2.06		0.059	Grate Inl	0.002526	2.10	1.76	5.50	1.42	0.35	14.50

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-7216-	I-7216E	I-7216W	0.39	0.82	0.32	0.18	5.64	25.16	92.00	0.005109	42 inch	0.013	71.91	1,382.46	1,381.99	1,388.36	1,388.36	2.40	2.87	1,384.00	1,384.07	
P-7216-	I-7216W	O-7216	0.39	0.82	0.32	0.37	5.64	32.29	61.00	0.040984	42 inch	0.013	203.67	1,381.97	1,379.47	1,388.36	1,384.50	2.89	1.53	1,383.73	1,384.02	

Scenario: Base

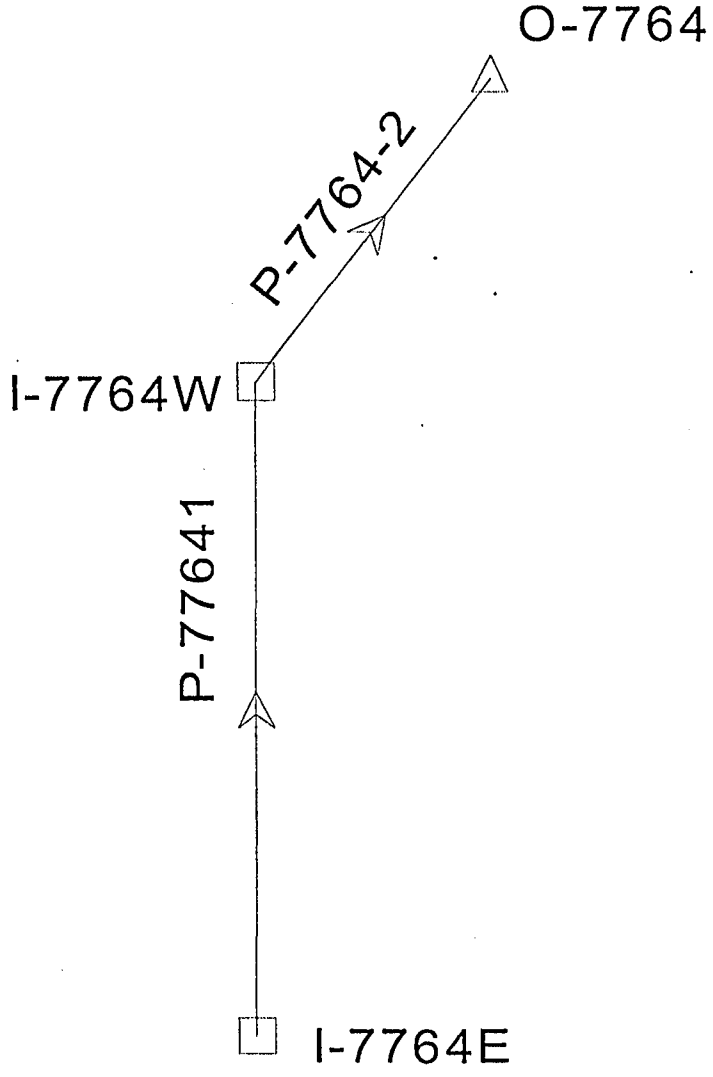
M-64

Q_{100}

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-7216E	On Grad	3.36	3.36	3.36	8.52	2.74	1.77	4.51	2.04	54.7	1.50	1.24	1.50	0.80	2.47		0.059	Grate Inl	0.002526	2.06	1.56	5.50	1.42	0.37	15.84
I-7216W	On Grad	3.36	3.36	3.36	8.52	2.74	1.77	4.51	2.04	54.7	3.00	1.24	1.50	0.80	2.47		0.059	Grate Inl	0.002526	2.13	1.78	5.50	1.42	0.37	15.84

Scenario: Base

Storm Drains @ Station 77+64.64

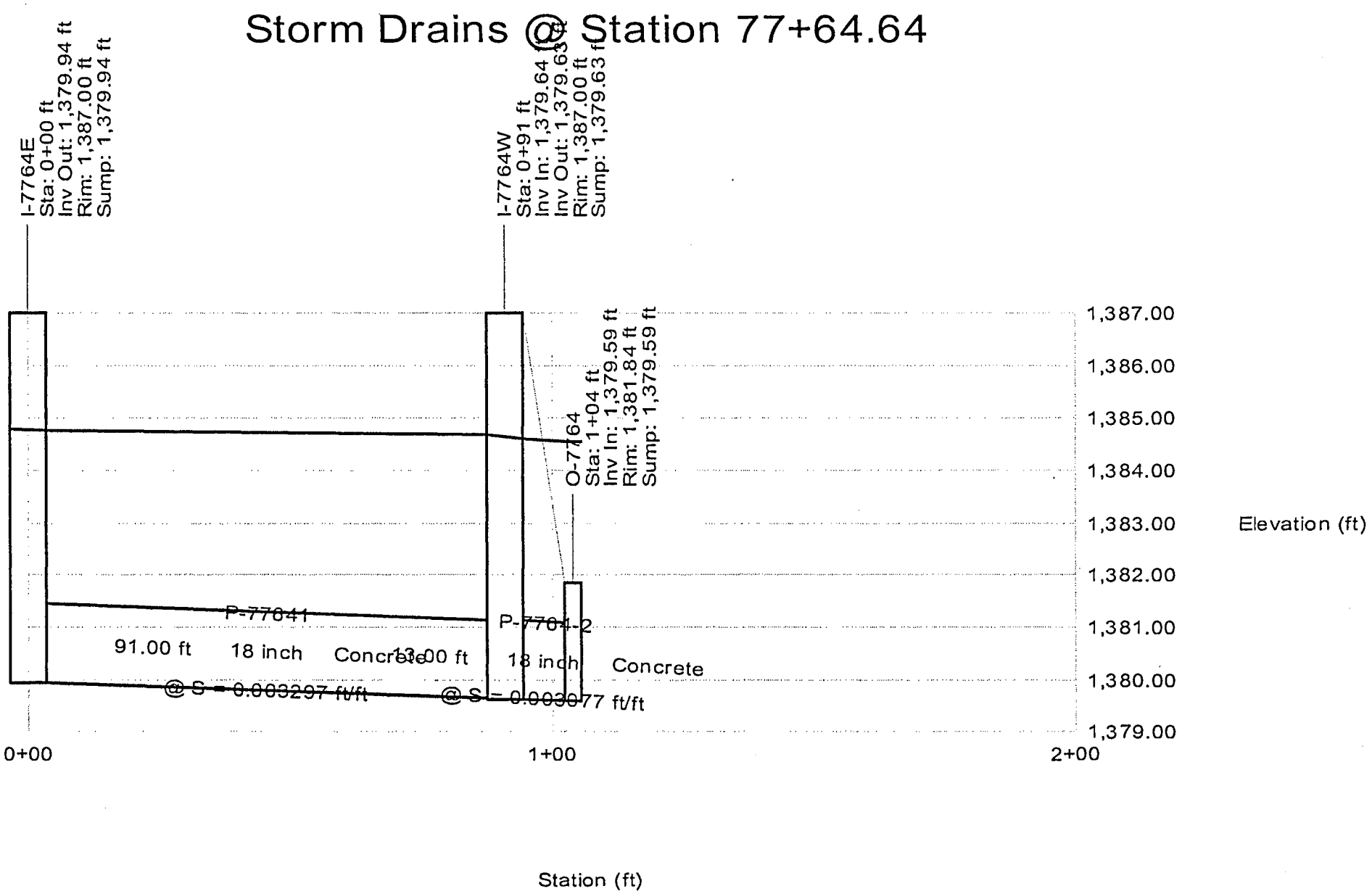


Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_7764.stm
05/19/05 11:28:11 AM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Profile
Scenario: Base



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-7764W	On Grad	6.40	6.40	6.40	5.25	3.12	1.53	4.65	2.07	55.5	3.30	1.39	1.73	0.68	2.58		0.059	Grate Inle	0.002526	5.06	4.97	5.50	1.42	0.38	16.03
I-7764E	On Grad	6.40	6.40	6.40	5.25	3.12	1.53	4.65	2.07	55.5	1.73	1.39	1.73	0.68	2.58		0.059	Grate Inle	0.002526	4.84	4.82	5.50	1.42	0.38	16.03

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-77641	I-7764E	I-7764W	0.72	0.82	0.59	0.33	5.25	3.00	91.00	0.003297	18 inch	0.013	6.03	1,379.94	1,379.64	1,387.00	1,387.00	5.56	5.86	1,384.76	1,384.69	
P-7764-	I-7764W	O-7764	0.72	0.82	0.59	0.65	5.01	5.84	13.00	0.003077	18 inch	0.013	5.83	1,379.63	1,379.59	1,387.00	1,381.84	5.87	0.75	1,384.60	1,384.56	

Scenario: Base

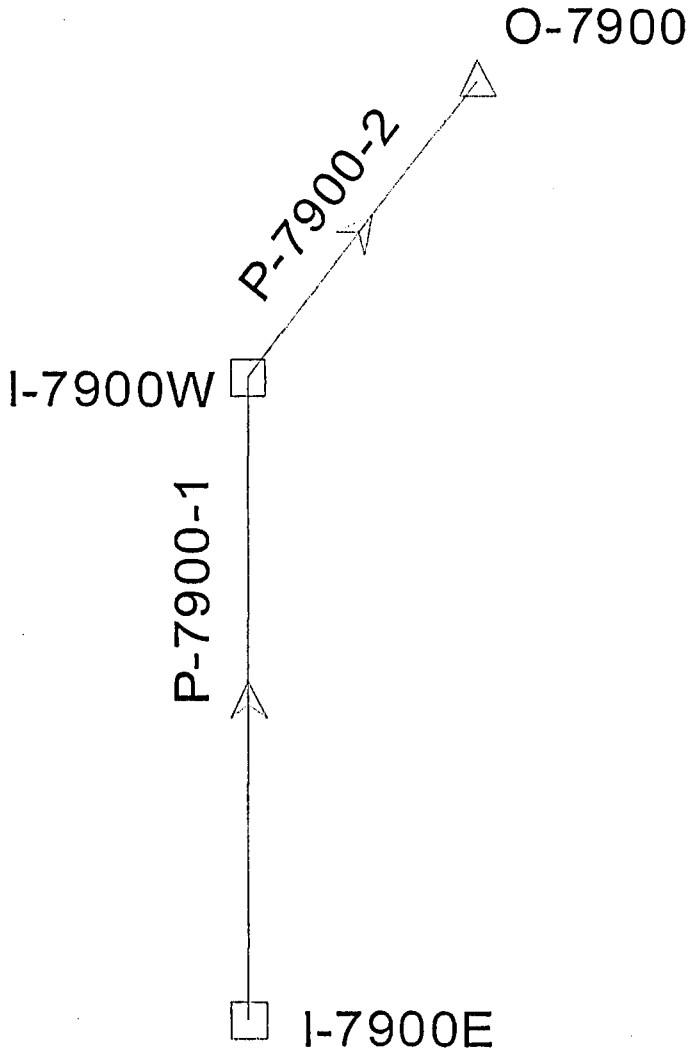
Q_{100}

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-7764W	On Grad	6.40	6.40	6.40	7.98	4.75	1.53	6.28	3.02	51.9	4.75	2.29	2.46	0.74	3.26		0.059	Grate Inl	0.002526	5.12	4.99	5.50	1.42	0.41	17.97
I-7764E	On Grad	6.40	6.40	6.40	7.98	4.75	1.53	6.28	3.02	51.9	2.46	2.29	2.46	0.74	3.26		0.059	Grate Inl	0.002526	4.95	4.92	5.50	1.42	0.41	17.97

Scenario: Base

Storm Drains @ Station 79+00

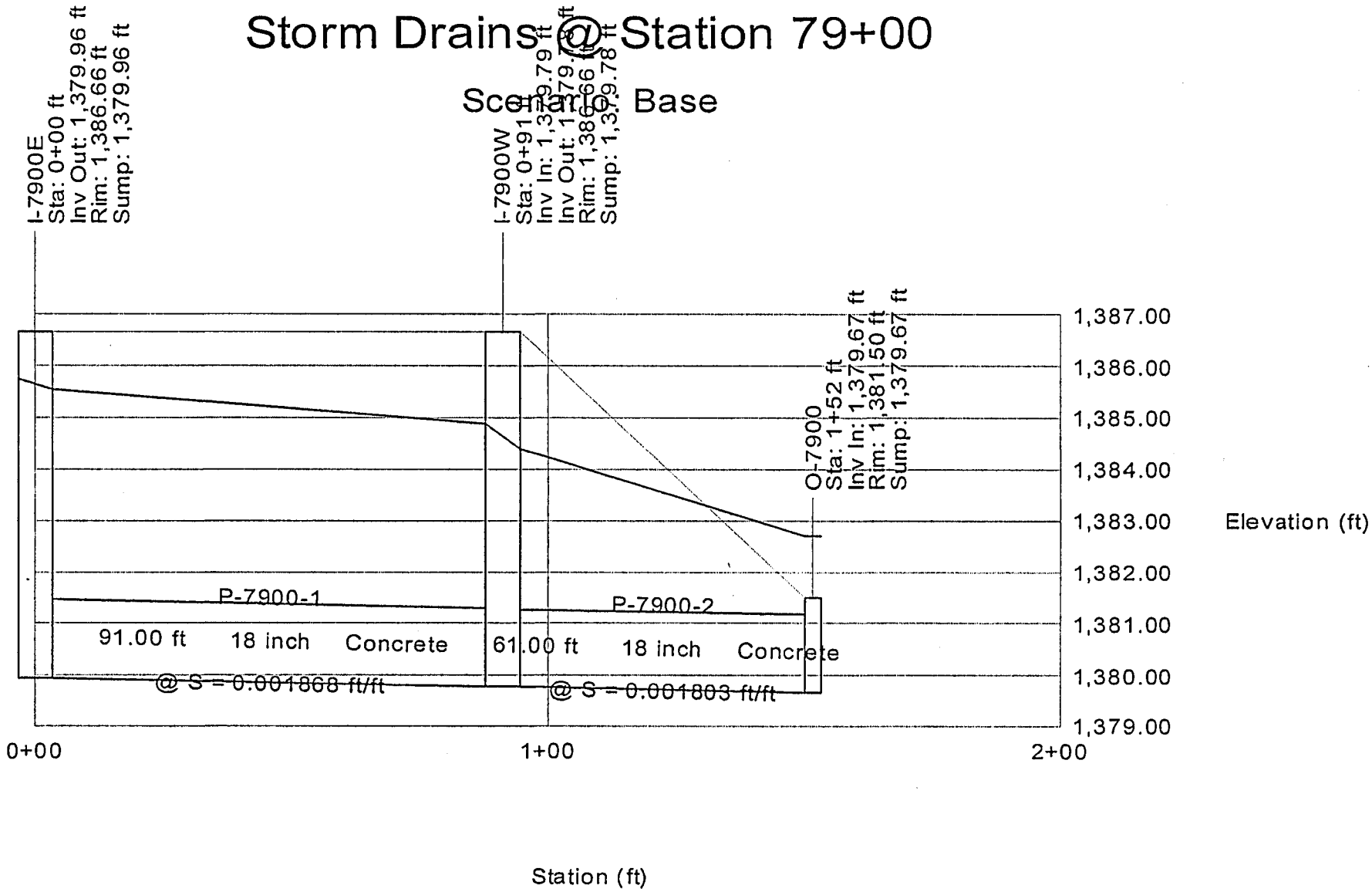


Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_7900.stm
05/19/05 01:29:06 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Profile
Scenario: Base



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_7900.stm
05/19/05 01:29:27 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-7900W	In Sag	9.42	9.42	0.00	4.42	3.72	2.07	5.79	0.00	100.0	7.27	0.00	3.72	0.00	5.79	6.00	0.059	Combination In		4.43	3.93	5.50	1.42	0.38	16.20
I-7900E	In Sag	9.42	9.42	0.00	4.42	3.72	2.07	5.79	0.00	100.0	3.72	0.00	3.72	0.00	5.79	6.00	0.059	Combination In		4.75	4.63	5.50	1.42	0.38	16.20

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-7900-	I-7900E	I-7900W	1.02	0.82	0.84	0.84	4.42	6.81	91.00	0.001868	18 inch	0.013	4.54	1,379.96	1,379.79	1,386.66	1,386.66	5.20	5.37	1,384.59	1,384.21	
P-7900-	I-7900W	O-7900	1.02	0.82	0.84	1.67	4.31	13.45	61.00	0.001803	18 inch	0.013	4.46	1,379.78	1,379.67	1,386.66	1,381.50	5.38	0.33	1,383.71	1,382.71	

Scenario: Base

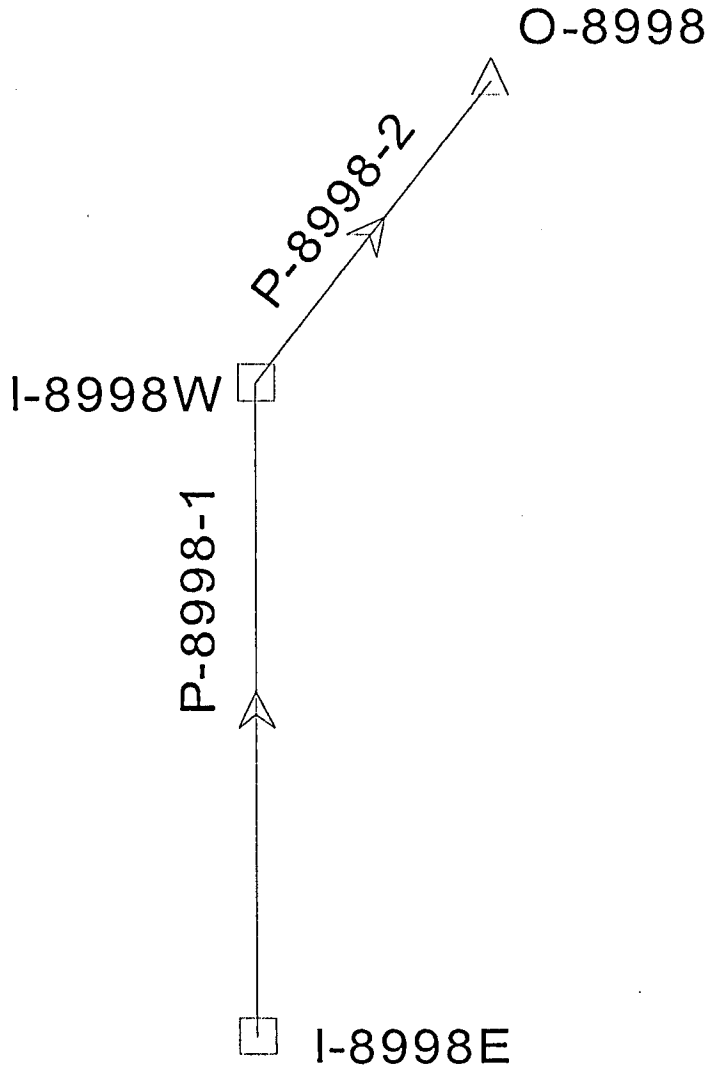
M-64

Q_{100}

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-7900W	In Sag	9.42	9.42	0.00	6.82	5.75	2.07	7.82	0.00	100.0	11.30	0.00	5.75	0.00	7.82	6.00	0.059	Combination In		5.12	4.62	5.50	1.42	0.45	19.52
I-7900E	In Sag	9.42	9.42	0.00	6.82	5.75	2.07	7.82	0.00	100.0	5.75	0.00	5.75	0.00	7.82	6.00	0.059	Combination In		5.78	5.58	5.50	1.42	0.45	19.52

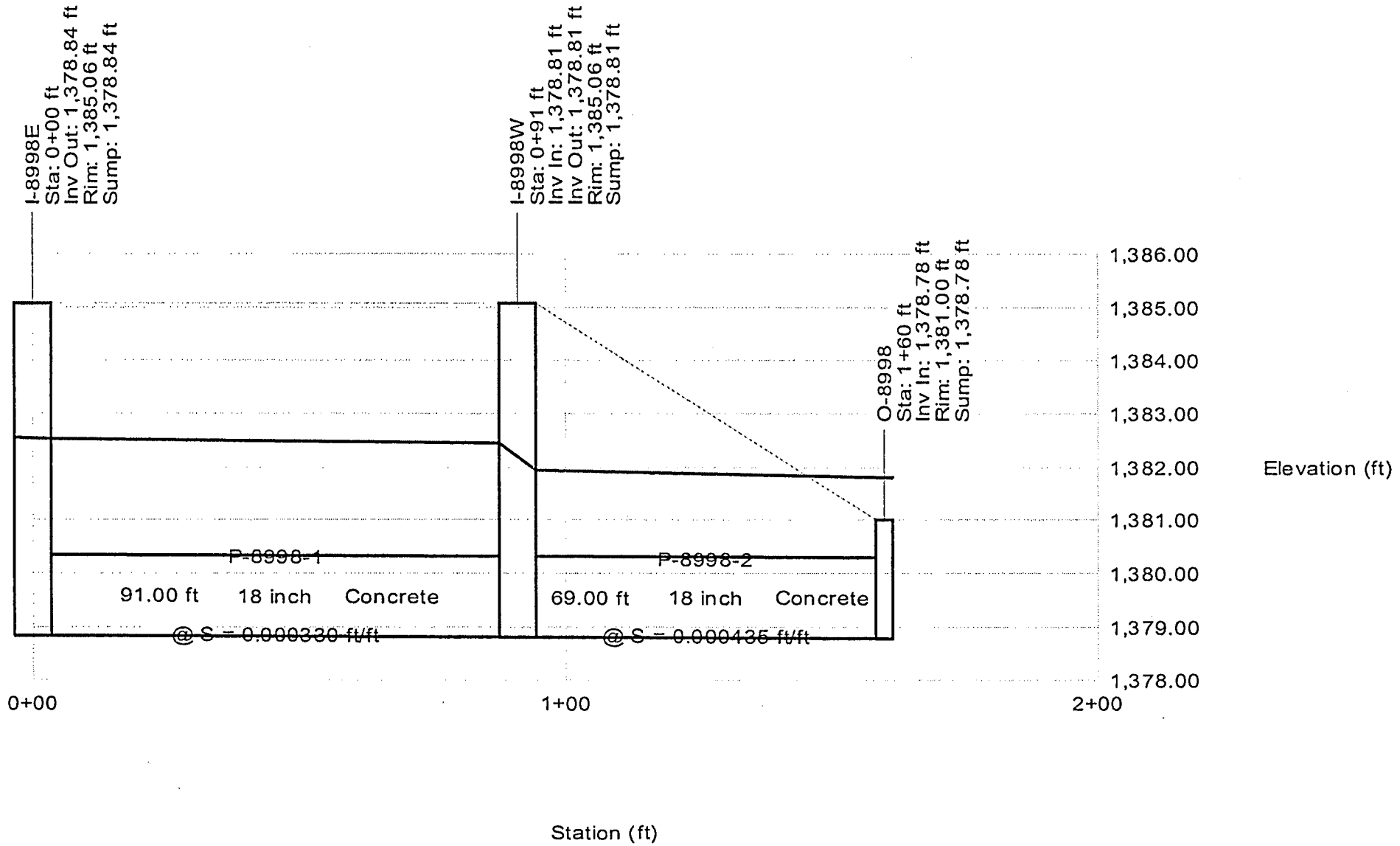
Scenario: Base

Storm Drains @ Station 89+98.24



Profile
Scenario: Base

Storm Drains @ Station 89+98.24



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_8998.stm
05/19/05 01:50:40 PM

© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-8998W	On Grad	4.68	4.68	4.68	5.64	2.75	0.00	2.75	1.32	52.0	2.79	1.32	1.43	0.00	1.43		0.059	Grate Inl	0.005692	3.62	3.12	5.50	1.42	0.28	11.15
I-8998E	On Grad	4.68	4.68	4.68	5.64	2.75	0.00	2.75	1.32	52.0	1.43	1.32	1.43	0.00	1.43		0.059	Grate Inl	0.005692	3.71	3.68	5.50	1.42	0.28	11.15

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-8998-	I-8998E	I-8998W	0.59	0.82	0.48	0.25	5.64	3.27	91.00	0.000330	18 inch	0.013	1.91	1,378.84	1,378.81	1,385.06	1,385.06	4.72	4.75	1,382.52	1,382.43	
P-8998-1	I-8998W	O-8998	0.59	0.82	0.48	0.50	5.50	4.63	69.00	0.000435	18 inch	0.013	2.19	1,378.81	1,378.78	1,385.06	1,381.00	4.75	0.72	1,381.93	1,381.80	

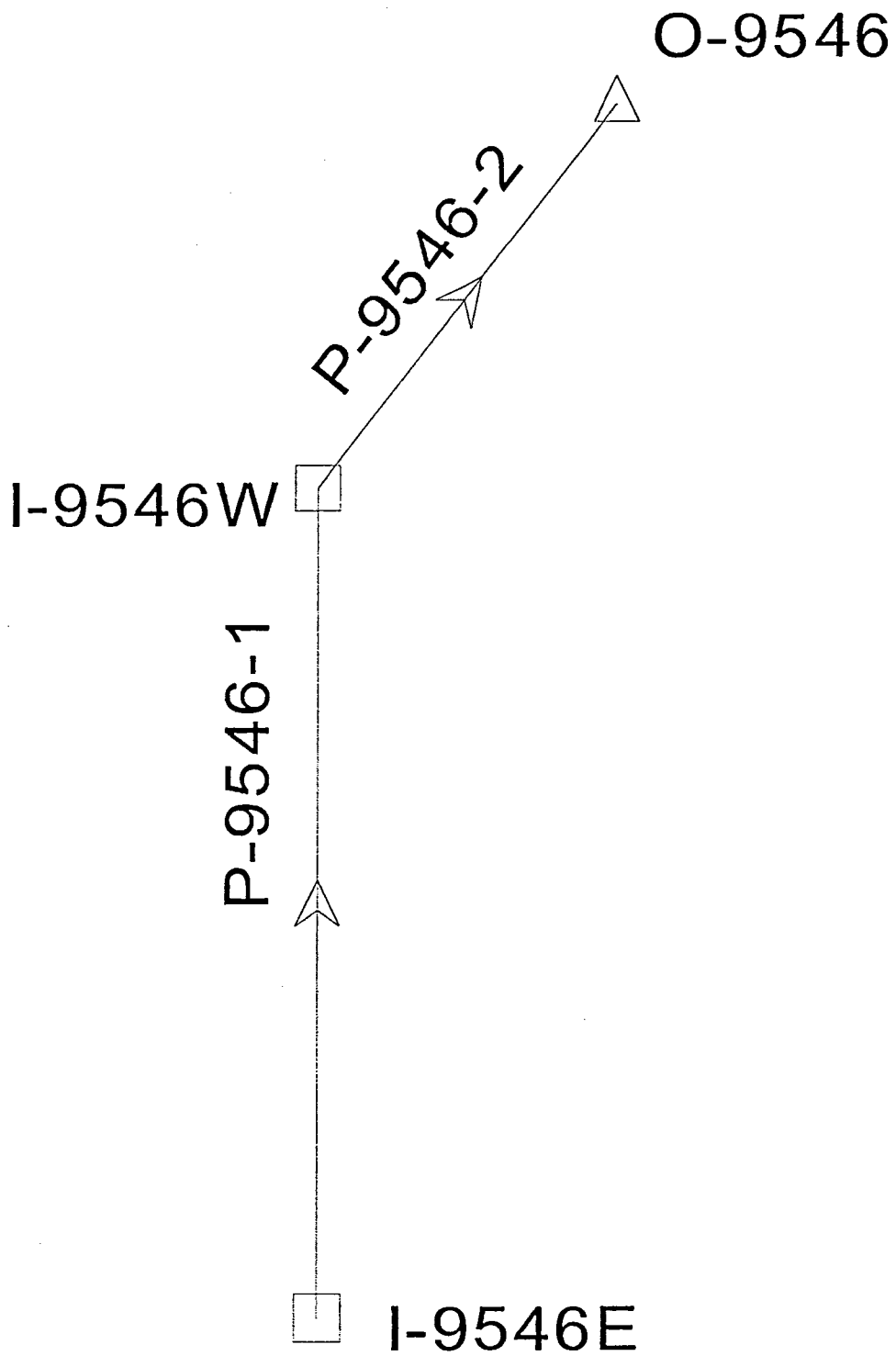
Scenario: Base

M-64

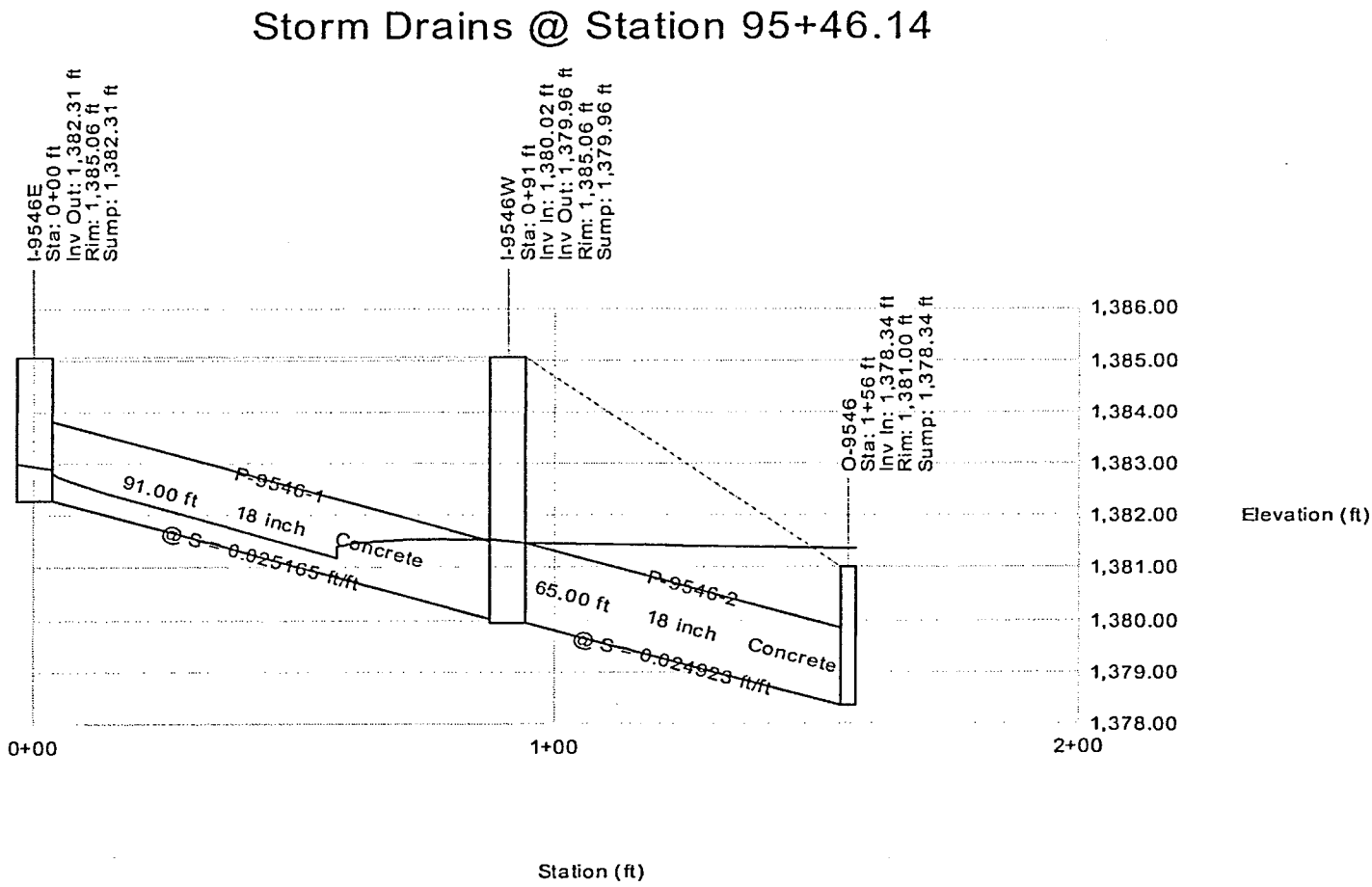
Q100

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-8998W	On Grad	4.68	4.68	4.68	8.52	4.15	0.00	4.15	2.20	47.0	3.83	2.20	1.95	0.00	1.95		0.059	Grate Inle	0.005692	3.69	3.19	5.50	1.42	0.32	13.11
I-8998E	On Grad	4.68	4.68	4.68	8.52	4.15	0.00	4.15	2.21	46.9	1.95	2.21	1.95	0.00	1.95		0.059	Grate Inle	0.005692	3.81	3.78	5.50	1.42	0.32	13.11

Storm Drains @ Station 95+46.14



Profile
Scenario: Base



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-9546W	On Grad	11.58	11.58	11.58	4.05	4.15	0.00	4.15	1.84	55.6	4.58	1.84	2.31	0.00	2.31		0.059	Grate Inl	0.002714	1.59	1.52	5.50	1.42	0.36	15.12
I-9546E	On Grad	11.58	11.58	11.58	4.05	4.15	0.00	4.15	1.84	55.6	2.31	1.84	2.31	0.00	2.31		0.059	Grate Inl	0.002714	0.68	0.57	5.50	1.42	0.36	15.12

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-9546-	I-9546E	I-9546W	1.24	0.82	1.02	0.57	4.05	2.31	91.00	0.025165	18 inch	0.013	16.66	1,382.31	1,380.02	1,385.06	1,385.06	1.25	3.54	1,382.88	1,381.55	
P-9546-1	I-9546W	O-9546	1.24	0.82	1.02	1.13	4.02	4.58	65.00	0.024923	18 inch	0.013	16.58	1,379.96	1,378.34	1,385.06	1,381.00	3.60	1.16	1,381.48	1,381.36	

Scenario: Base

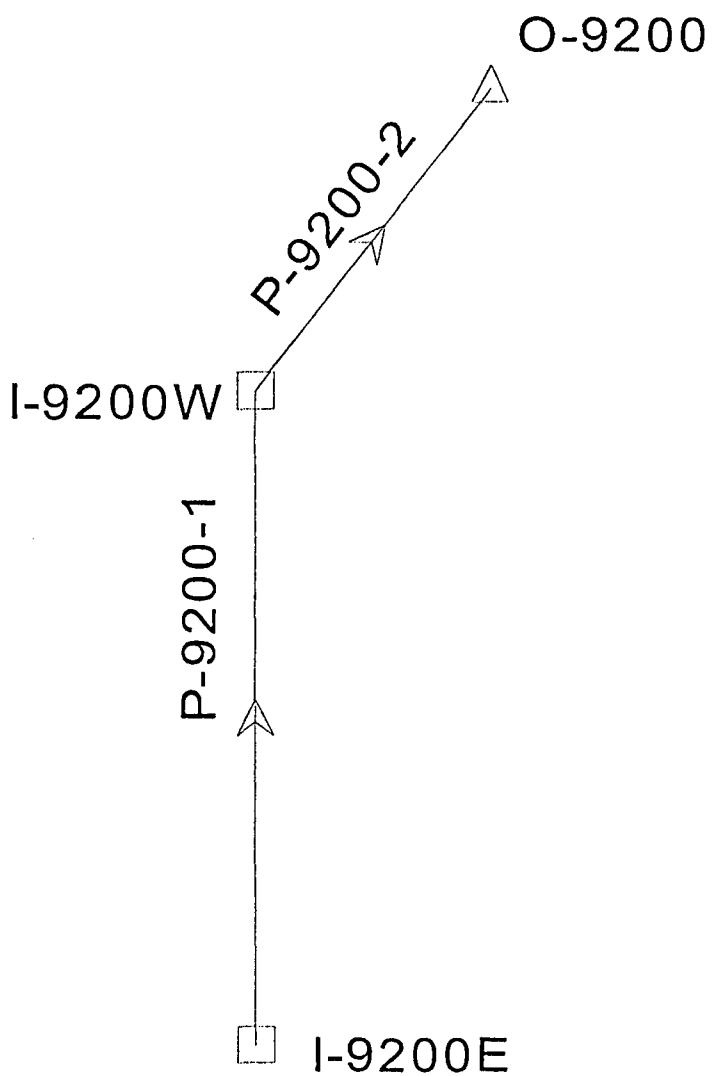
M-64

Q_{100}

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-9546W	On Grad	11.58	11.58	11.58	6.30	6.45	0.00	6.45	3.20	50.3	6.45	3.20	3.25	0.00	3.25		0.059	Grate Inl	0.002714	1.77	1.65	5.50	1.42	0.41	17.91
I-9546E	On Grad	11.58	11.58	11.58	6.30	6.45	0.00	6.45	3.20	50.3	3.25	3.20	3.25	0.00	3.25		0.059	Grate Inl	0.002714	0.82	0.69	5.50	1.42	0.41	17.91

Scenario: Base

Storm Drains @ Station 92+00



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_9200.stm
05/19/05 02:50:01 PM

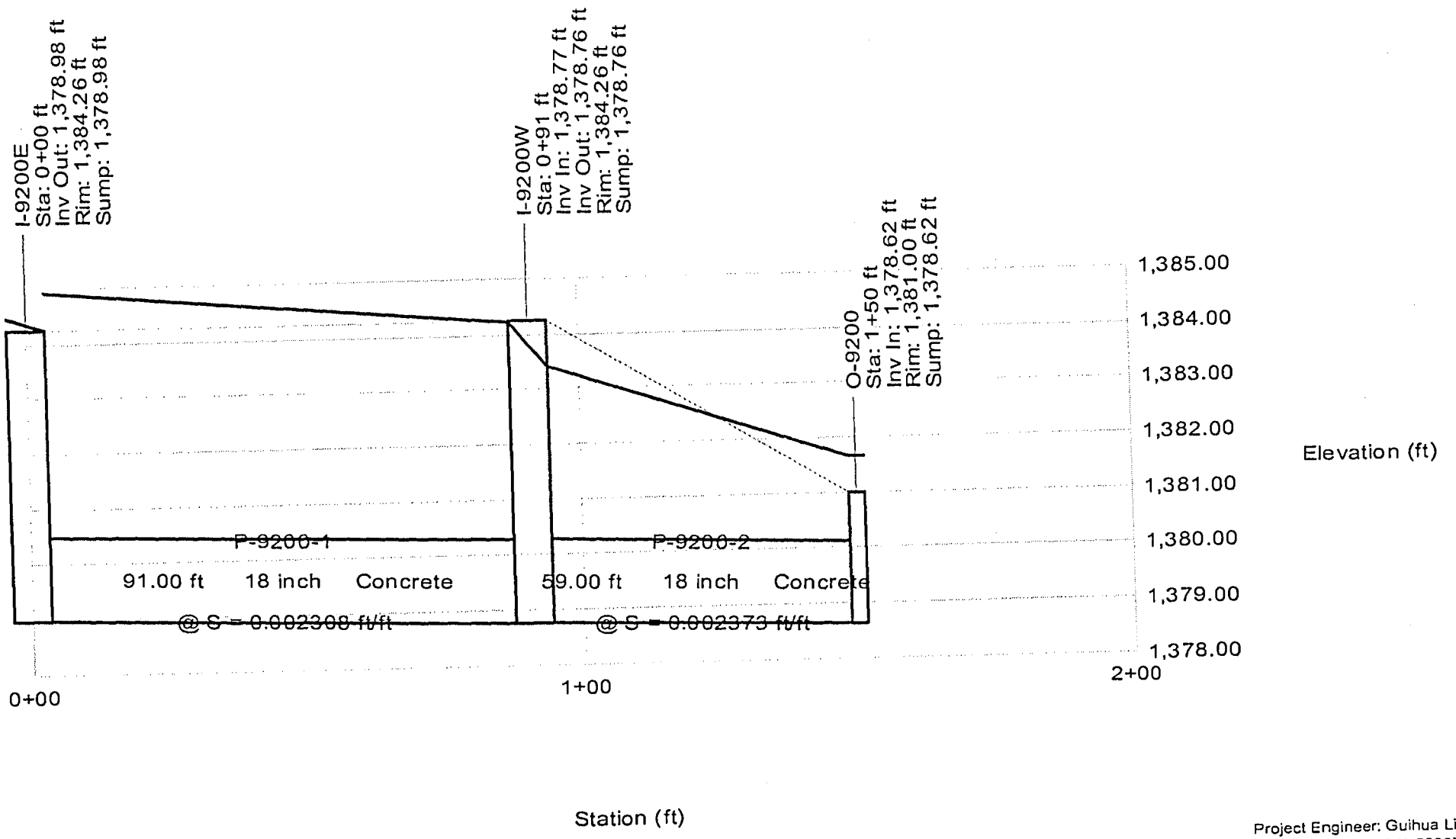
AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Profile
Scenario: Base

Storm Drains @ Station 92+00

Scenario: Base



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_9200.stm
05/19/05 02:51:42 PM

© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-9200W	In Sag	3.89	3.89	0.00	5.64	3.31	3.16	6.47	0.00	100.0	6.61	0.00	3.31	0.00	6.47	6.20	0.059	Combination Ir		5.48	4.65	5.50	1.42	0.40	17.09
I-9200E	In Sag	3.89	3.89	0.00	5.64	3.31	3.16	6.47	0.00	100.0	3.31	0.00	3.31	0.00	6.47	6.20	0.059	Combination Ir		5.49	5.28	5.50	1.42	0.40	17.09

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-9200-	I-9200E	I-9200W	0.71	0.82	0.58	0.58	5.64	9.11	91.00	0.002308	18 inch	0.013	5.05	1,378.98	1,378.77	1,384.26	1,384.26	3.78	3.99	1,384.92	1,384.24	
P-9200-	I-9200W	O-9200	0.71	0.82	0.58	1.16	5.64	18.21	59.00	0.002373	18 inch	0.013	5.12	1,378.76	1,378.62	1,384.26	1,381.00	4.00	0.88	1,383.41	1,381.64	

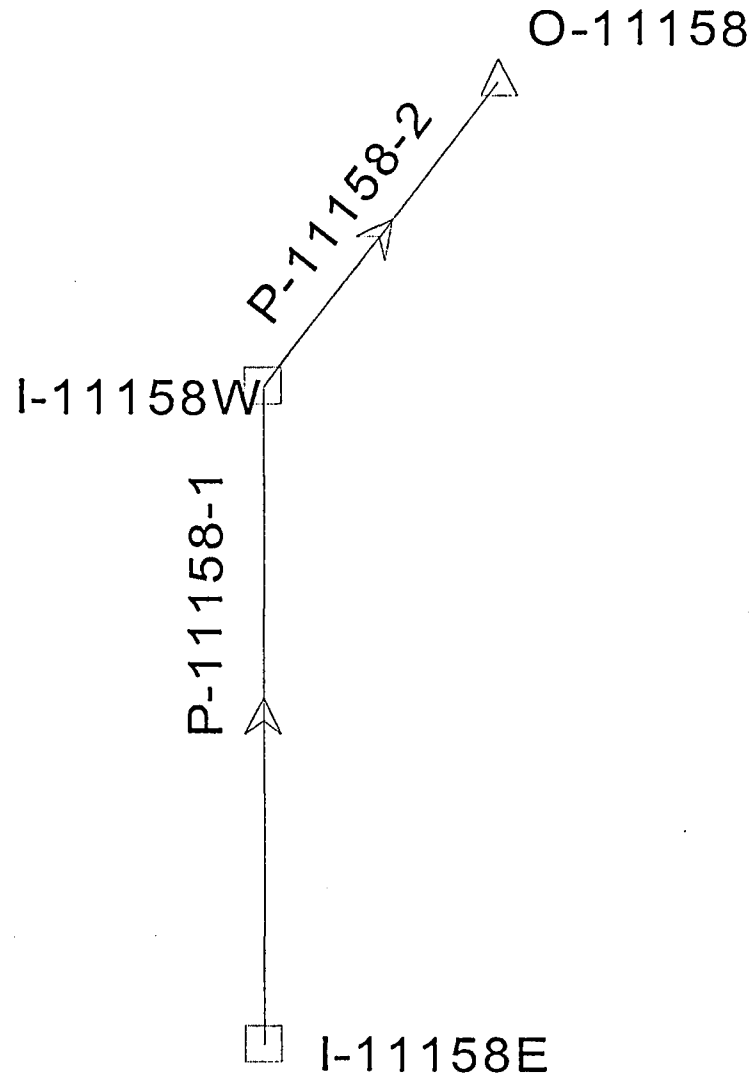
Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-9200W	In Sag	3.89	3.89	0.00	8.52	4.99	3.16	8.15	0.00	100.0	9.99	0.00	4.99	0.00	8.15	6.20	0.059	Combination In		6.53	5.37	5.50	1.42	0.45	19.75
I-9200E	In Sag	3.89	3.89	0.00	8.52	4.99	3.16	8.15	0.00	100.0	4.99	0.00	4.99	0.00	8.15	6.20	0.059	Combination In		5.57	5.28	5.50	1.42	0.45	19.75

Scenario: Base

Storm Drains @ Station 111+58.06



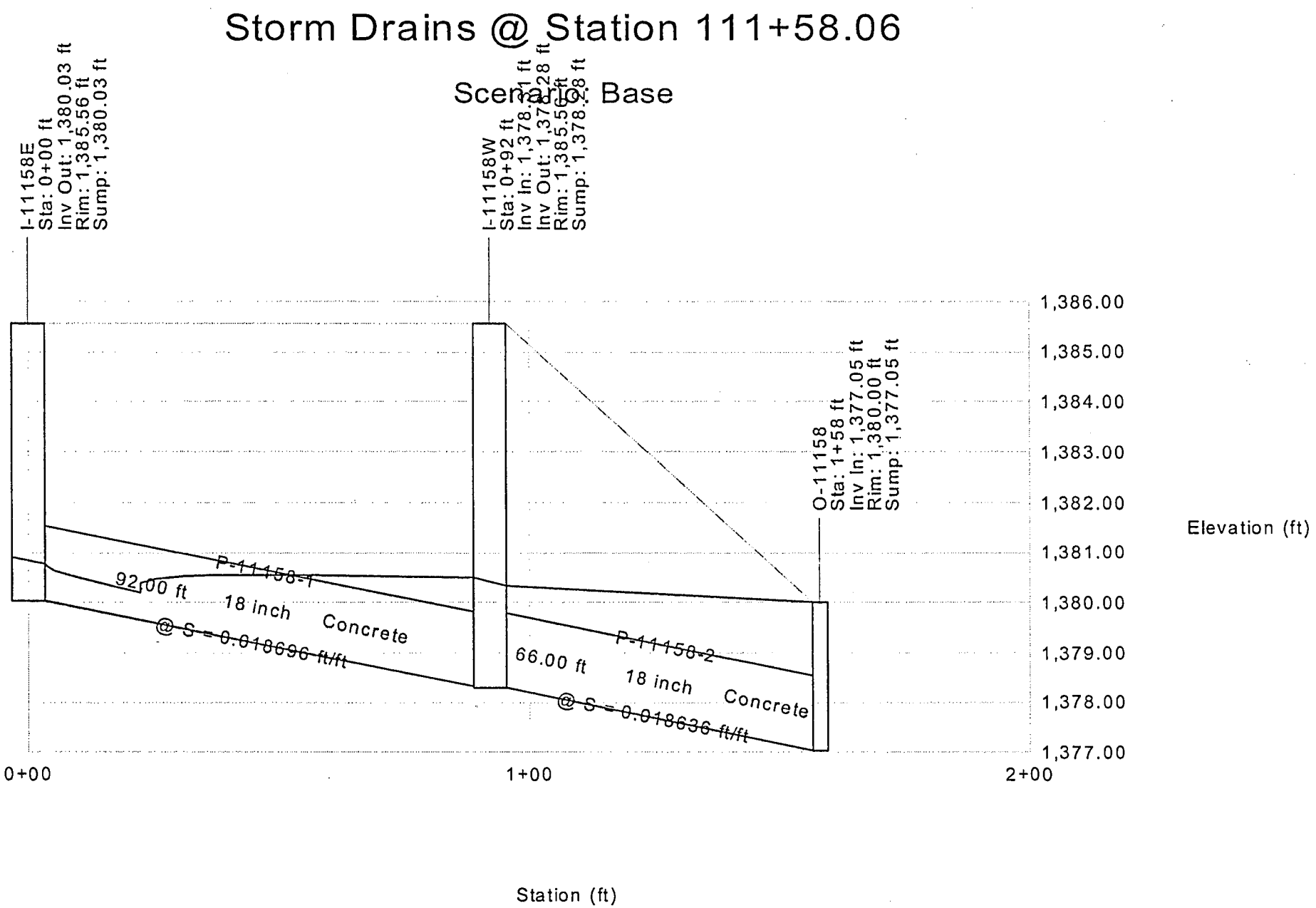
Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_11158.stm
05/19/05 03:14:54 PM

© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Profile
Scenario: Base



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-11158W	On Grad	7.93	7.93	7.93	4.83	3.43	0.00	3.43	1.52	55.7	3.78	1.52	1.91	0.00	1.91		0.059	Grate Inl	0.003185	2.22	2.05	5.50	1.42	0.33	13.63
I-11158E	On Grad	7.93	7.93	7.93	4.83	3.43	0.00	3.43	1.52	55.7	1.91	1.52	1.91	0.00	1.91		0.059	Grate Inl	0.003185	0.89	0.74	5.50	1.42	0.33	13.63

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-11158-	I-11158E	I-11158W	0.86	0.82	0.71	0.39	4.83	3.75	92.00	0.018696	18 inch	0.013	14.36	1,380.03	1,378.31	1,385.56	1,385.56	4.03	5.75	1,380.77	1,380.50	
P-11158-	I-11158W	O-11158	0.86	0.82	0.71	0.79	4.77	7.46	66.00	0.018636	18 inch	0.013	14.34	1,378.28	1,377.05	1,385.56	1,380.00	5.78	1.45	1,380.33	1,380.00	

Scenario: Base

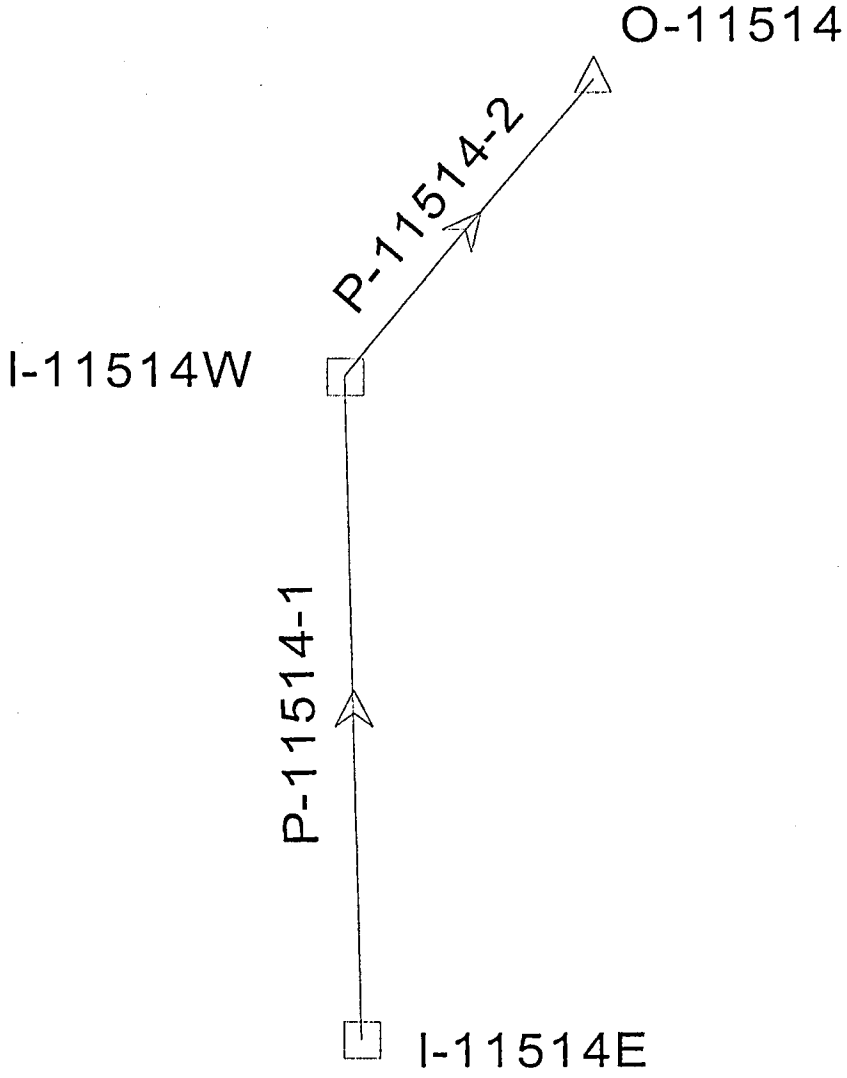
M-64

Q100

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-11158W	On Grad	7.93	7.93	7.93	7.39	5.26	0.00	5.26	2.60	50.5	5.25	2.60	2.66	0.00	2.66		0.059	Grate Inl	0.003185	2.44	2.20	5.50	1.42	0.38	16.06
I-11158E	On Grad	7.93	7.93	7.93	7.39	5.26	0.00	5.26	2.60	50.5	2.66	2.60	2.66	0.00	2.66		0.059	Grate Inl	0.003185	0.98	0.81	5.50	1.42	0.38	16.06

Scenario: Base

Storm Drains @ Station 115+14.64



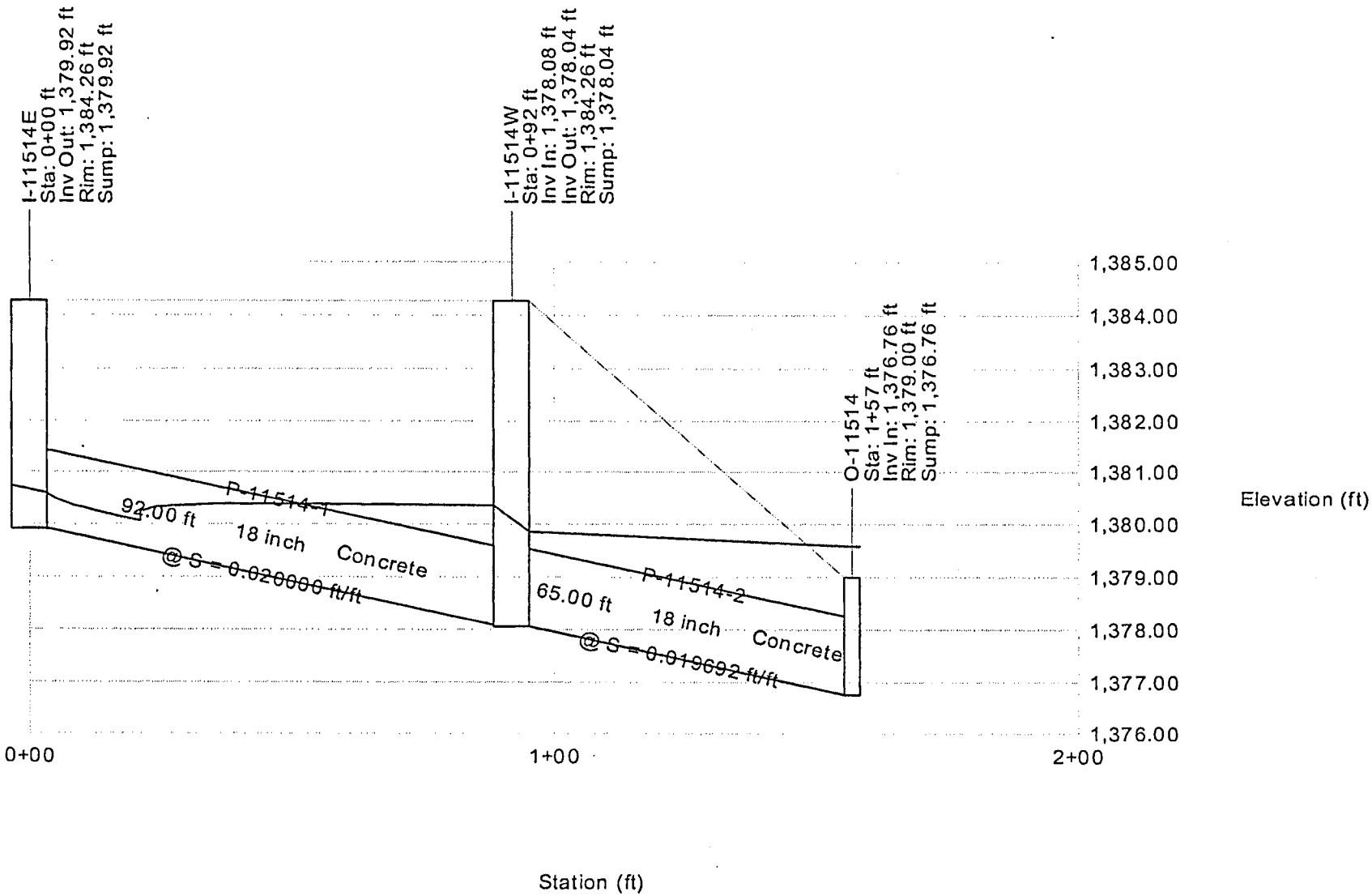
Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_11514.stm
05/19/05 03:42:16 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Profile
Scenario: Base

Storm Drains @ Station 115+14.65



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-11514W	On Grad	3.86	3.86	3.86	5.64	2.14	1.52	3.66	1.65	55.1	2.36	0.96	1.18	0.68	2.02		0.059	Grate Inle	0.003185	2.31	1.81	5.50	1.42	0.33	13.97
I-11514E	On Grad	3.86	3.86	3.86	5.64	2.14	1.52	3.66	1.65	55.1	1.18	0.96	1.18	0.68	2.02		0.059	Grate Inle	0.003185	0.82	0.69	5.50	1.42	0.33	13.97

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-11514-	I-11514W	O-11514	0.46	0.82	0.38	0.42	5.64	6.55	65.00	0.019692	18 inch	0.013	14.74	1,378.04	1,376.76	1,384.26	1,379.00	4.72	0.74	1,379.85	1,379.60	
P-11514-	I-11514E	I-11514W	0.46	0.82	0.38	0.21	5.64	3.28	92.00	0.020000	18 inch	0.013	14.85	1,379.92	1,378.08	1,384.26	1,384.26	2.84	4.68	1,380.61	1,380.35	

Scenario: Base

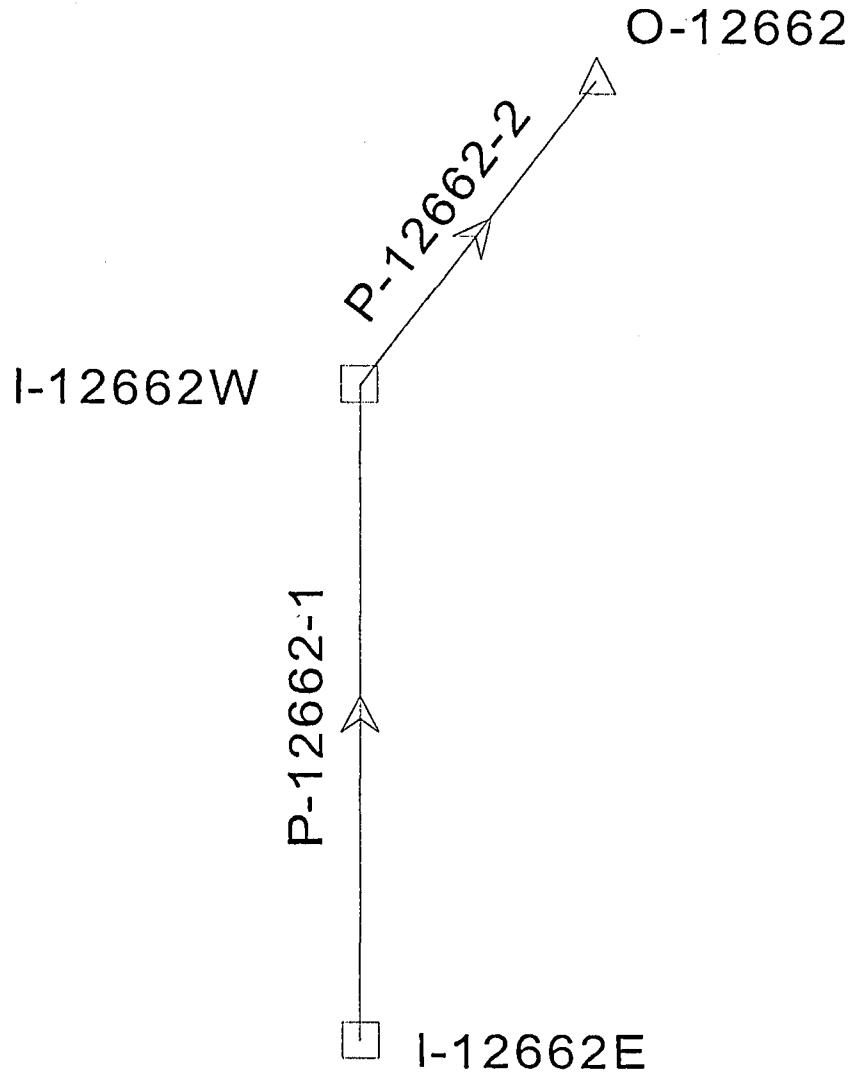
Q_{100}

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-11514W	On Grad	3.86	3.86	3.86	8.52	3.24	1.52	4.76	2.29	51.9	3.36	1.56	1.68	0.73	2.47		0.059	Grate Inl	0.003185	2.39	1.89	5.50	1.42	0.36	15.46
I-11514E	On Grad	3.86	3.86	3.86	8.52	3.24	1.52	4.76	2.29	51.9	1.68	1.56	1.68	0.73	2.47		0.059	Grate Inl	0.003185	0.88	0.74	5.50	1.42	0.36	15.46

Scenario: Base

Storm Drains @ Station 126+62.98



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_12662.stm
05/19/05 03:57:58 PM

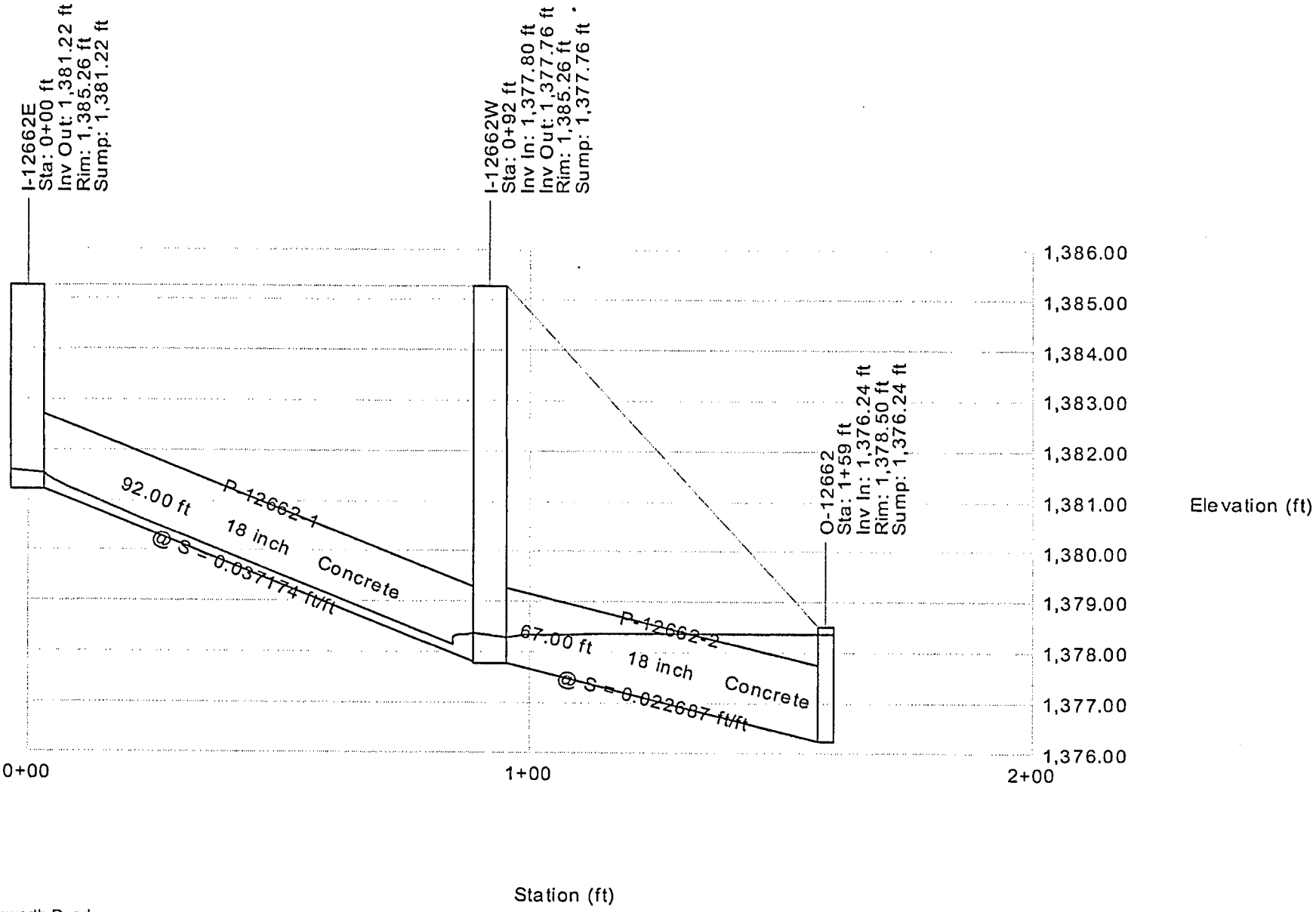
© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Profile
Scenario: Base

Storm Drains @ Station 126+62.94



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_12662.stm
05/19/05 03:58:14 PM

© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-12662W	On Grad	3.09	3.09	3.09	5.64	1.16	0.00	1.16	0.42	63.7	1.48	0.42	0.74	0.00	0.74		0.059	Grate Inl	0.002500	0.59	0.53	5.50	1.42	0.24	9.32
I-12662E	On Grad	3.17	3.17	3.17	5.64	1.16	0.00	1.16	0.42	63.7	0.74	0.42	0.74	0.00	0.74		0.059	Grate Inl	0.002500	0.38	0.32	5.50	1.42	0.24	9.32

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-12662-	I-12662W	O-12662	0.25	0.82	0.20	0.26	5.64	1.48	67.00	0.022687	18 inch	0.013	15.82	1,377.76	1,376.24	1,385.26	1,378.50	6.00	0.76	1,378.29	1,378.36	
P-12662-	I-12662E	I-12662W	0.25	0.82	0.20	0.13	5.64	0.74	92.00	0.037174	18 inch	0.013	20.25	1,381.22	1,377.80	1,385.26	1,385.26	2.54	5.96	1,381.54	1,378.35	

Scenario: Base

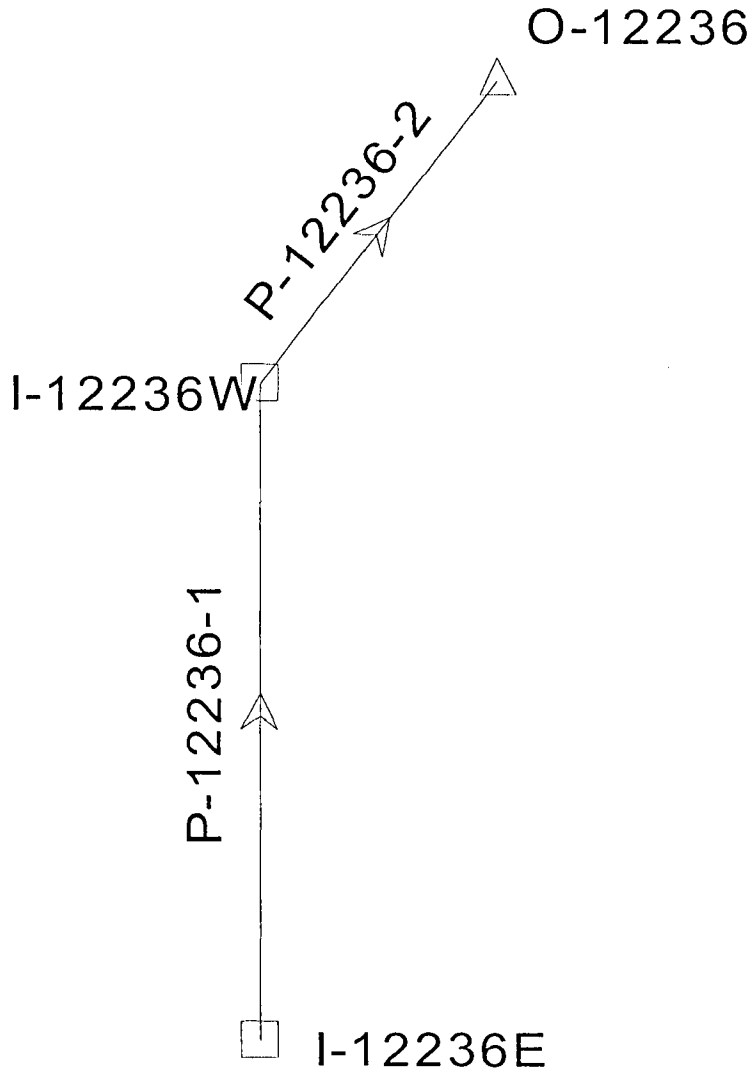
Q_{100}

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-12662W	On Grad	3.09	3.09	3.09	8.52	1.76	0.00	1.76	0.72	58.8	2.07	0.72	1.03	0.00	1.03		0.059	Grate Inle	0.002500	0.66	0.54	5.50	1.42	0.28	10.99
I-12662E	On Grad	3.17	3.17	3.17	8.52	1.76	0.00	1.76	0.72	58.8	1.03	0.72	1.03	0.00	1.03		0.059	Grate Inle	0.002500	0.45	0.38	5.50	1.42	0.28	10.99

Scenario: Base

Storm Drains @ Station 122+36.43



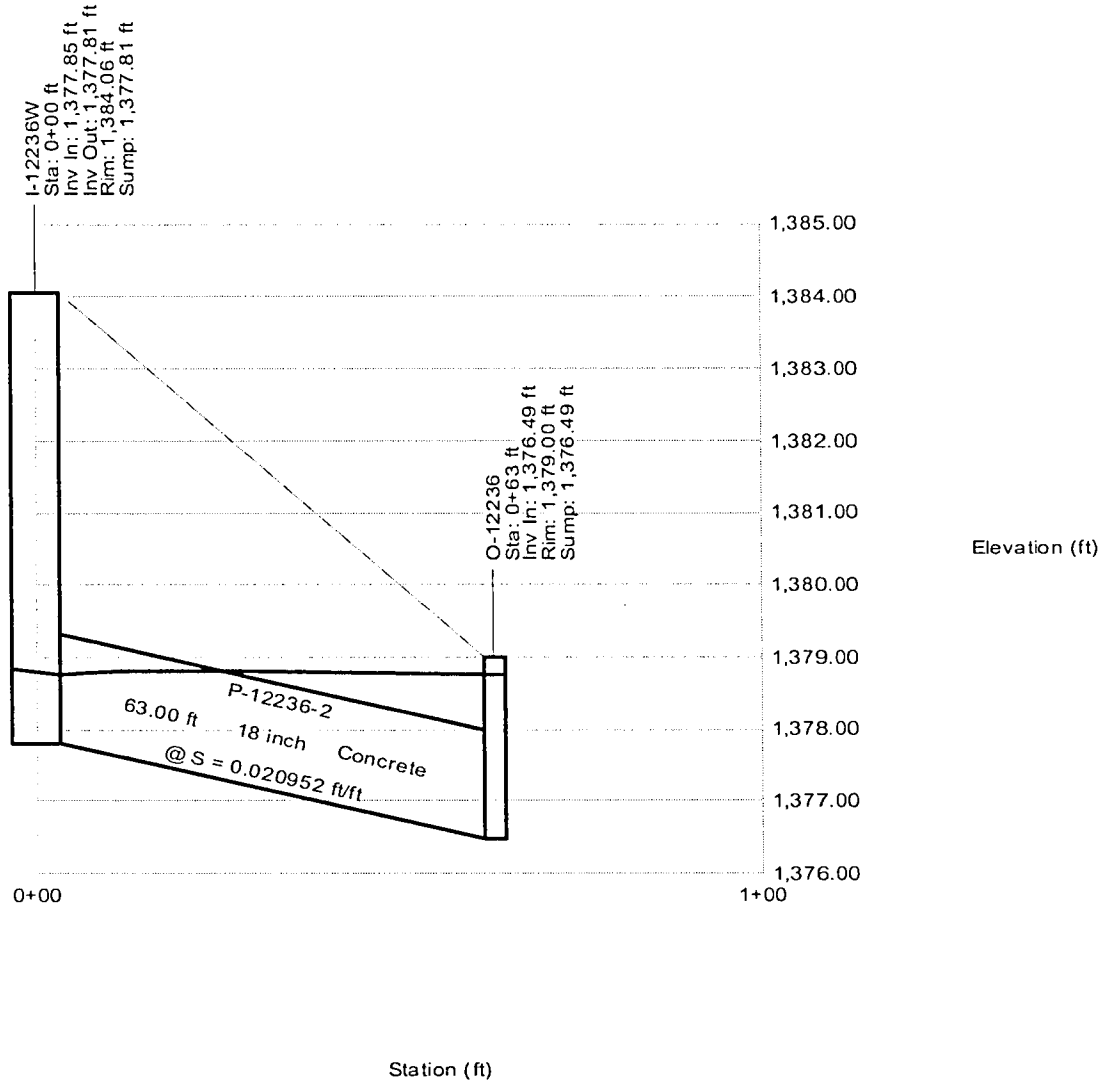
Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_12236.stm
05/20/05 08:22:17 AM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Profile: Connectors @ Stations 53+00

Scenario: Base



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow. To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-12236W	On Grad	5.80	5.80	5.80	5.42	2.51	0.42	2.93	1.21	58.8	2.91	1.03	1.47	0.17	1.72		0.059	Grate Inl	0.002500	1.03	0.95	5.50	1.42	0.32	13.43
I-12236E	On Grad	5.80	5.80	5.80	5.42	2.51	0.42	2.93	1.20	58.9	1.48	1.03	1.48	0.17	1.72		0.020	Grate Inl	0.002500	0.62	0.52	5.50	1.42	0.27	13.65

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-12236-	I-12236W	O-12236	0.56	0.82	0.46	0.54	5.35	3.79	63.00	0.020952	18 inch	0.013	15.20	1,377.81	1,376.49	1,384.06	1,379.00	4.75	1.01	1,378.76	1,378.76	
P-12236-	I-12236E	I-12236W	0.56	0.82	0.46	0.27	5.42	1.91	92.00	0.021087	18 inch	0.013	15.25	1,379.79	1,377.85	1,384.06	1,384.06	2.77	4.71	1,380.31	1,378.84	

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-12236-	I-12236W	O-12236	0.56	0.82	0.46	0.54	5.35	3.79	63.00	0.020952	18 inch	0.013	15.20	1,377.81	1,376.49	1,384.06	1,379.00	4.75	1.01	1,378.76	1,378.76	
P-12236-	I-12236E	I-12236W	0.56	0.82	0.46	0.27	5.42	1.91	92.00	0.021087	18 inch	0.013	15.25	1,379.79	1,377.85	1,384.06	1,384.06	2.77	4.71	1,380.31	1,378.84	

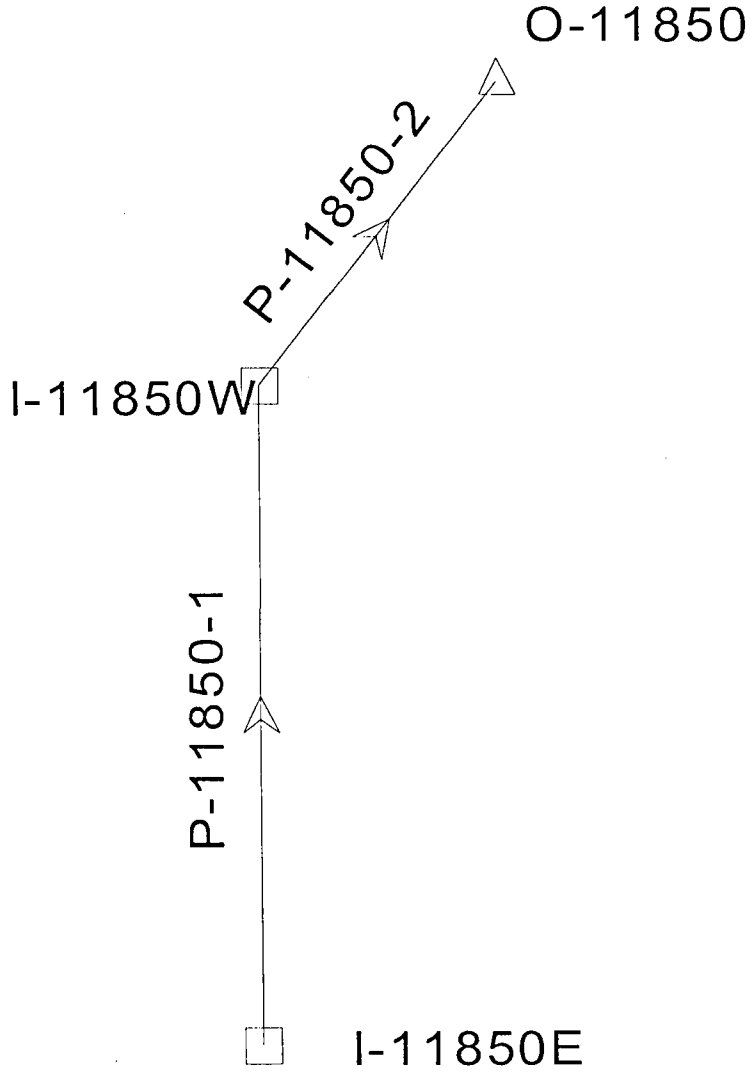
Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-12236W	On Grad	5.80	5.80	5.80	8.21	3.80	0.42	4.22	1.92	54.4	4.09	1.73	2.07	0.19	2.30		0.059	Grate Inl	0.002500	1.07	0.93	5.50	1.42	0.36	15.47
I-12236E	On Grad	5.80	5.80	5.80	8.21	3.80	0.42	4.22	1.92	54.6	2.07	1.73	2.07	0.19	2.30		0.020	Grate Inl	0.002500	0.71	0.60	5.50	1.42	0.31	15.66

Scenario: Base

Storm Drains @ Station 118+50



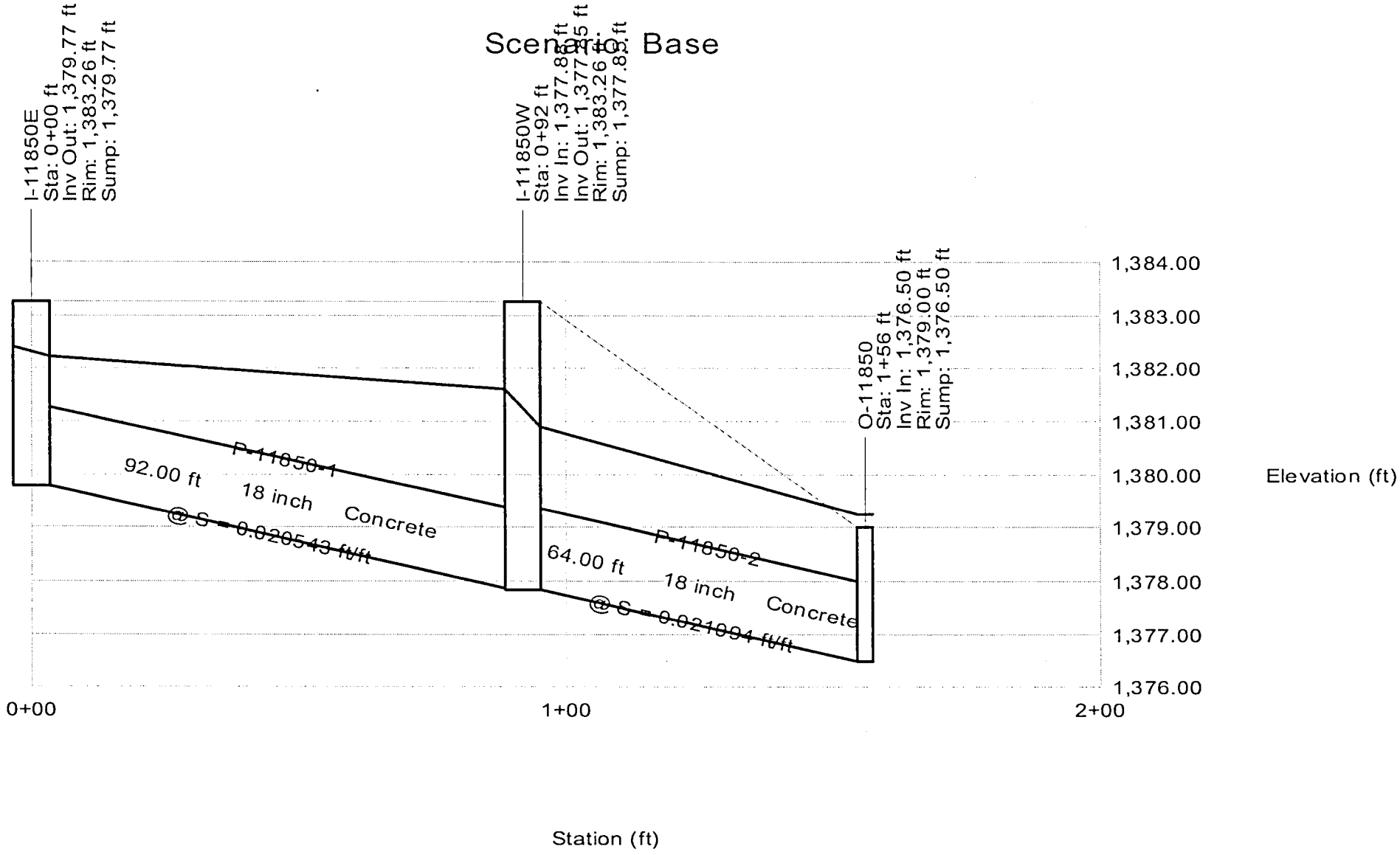
Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_11850.stm
05/20/05 12:45:57 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Storm Drains @ Station 118+42.73

Scenario: Base



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-11850W	In Sag	4.88	4.88	0.00	5.64	4.38	2.86	7.24	0.00	100.0	8.67	0.00	4.38	0.00	7.24	7.00	0.059	Combination Ir		3.76	3.05	5.50	1.42	0.40	17.35
I-11850E	In Sag	4.88	4.88	0.00	5.64	4.38	2.86	7.24	0.00	100.0	4.38	0.00	4.38	0.00	7.24	7.00	0.059	Combination Ir		2.62	2.45	5.50	1.42	0.40	17.35

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-11850-	I-11850W	O-11850	0.94	0.82	0.77	1.54	5.59	16.89	64.00	0.021094	18 inch	0.013	15.26	1,377.85	1,376.50	1,383.26	1,379.00	3.91	1.00	1,380.90	1,379.25	
P-11850-	I-11850E	I-11850W	0.94	0.82	0.77	0.77	5.64	8.49	92.00	0.020543	18 inch	0.013	15.06	1,379.77	1,377.88	1,383.26	1,383.26	1.99	3.88	1,382.22	1,381.61	

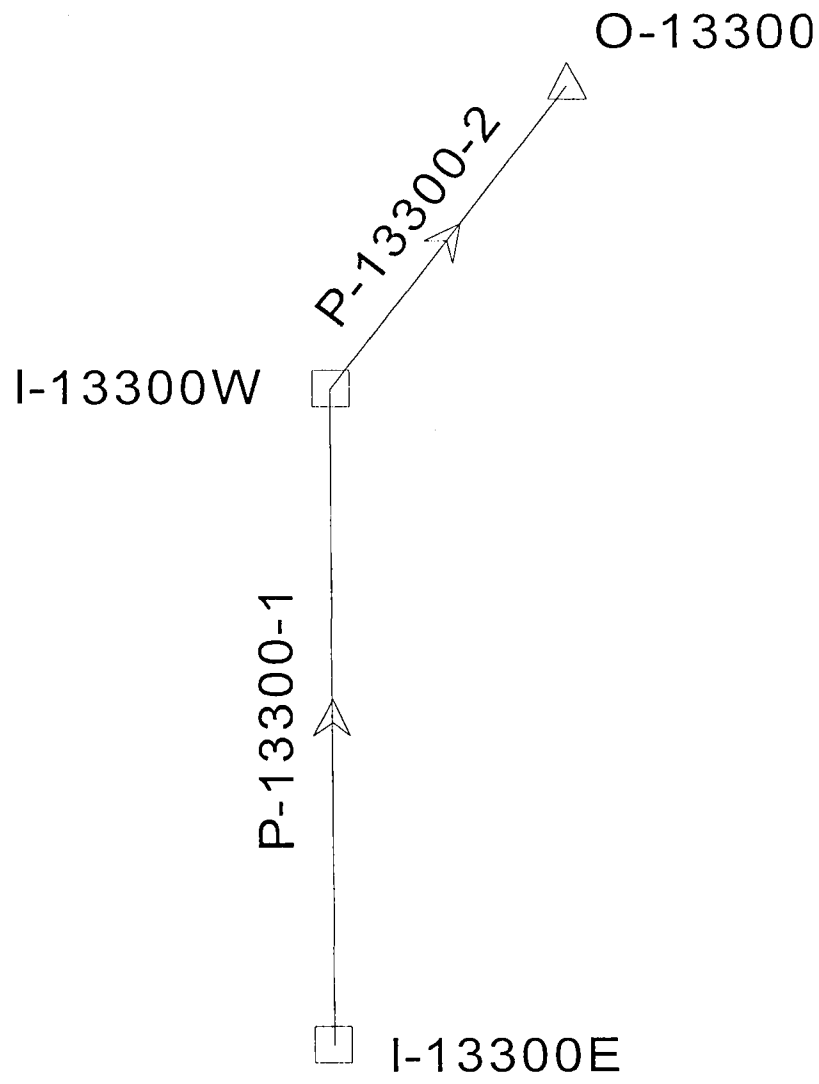
Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-11850W	In Sag	4.88	4.88	0.00	5.64	4.38	2.86	7.24	0.00	100.0	8.67	0.00	4.38	0.00	7.24	6.00	0.059	Combination Ir		3.76	3.05	5.50	1.42	0.43	18.60
I-11850E	In Sag	4.88	4.88	0.00	5.64	4.38	2.86	7.24	0.00	100.0	4.38	0.00	4.38	0.00	7.24	6.00	0.059	Combination Ir		2.62	2.45	5.50	1.42	0.43	18.60

Scenario: Base

Storm Drains @ Station 133+00



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_13300.stm
05/20/05 01:38:51 PM

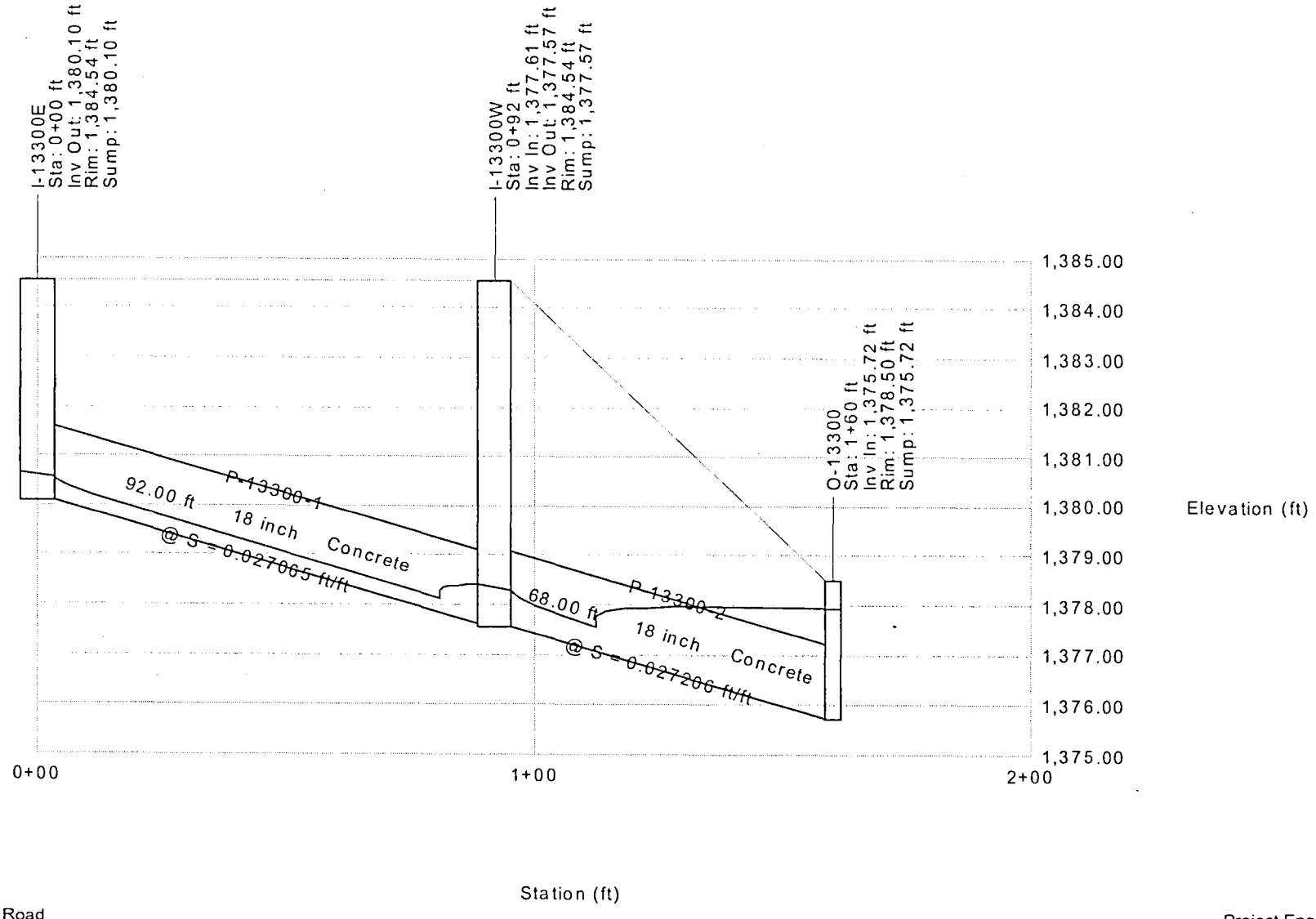
© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

ɔfile
Scenario: Base

Storm drains @ Station 133+00



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_13300.stm
05/20/05 01:39:15 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Scenario: Base

M-64

Q100

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-13300W	On Grad	6.21	6.21	6.21	5.31	2.59	0.00	2.59	0.66	74.3	3.42	0.66	1.92	0.00	1.92		0.059	Grate Inle	0.002706	0.84	0.70	5.50	1.42	0.31	12.60
I-13300E	On Grad	5.88	5.88	5.88	5.40	3.36	0.00	3.36	1.85	45.1	1.52	1.85	1.52	0.00	1.52		0.059	Grate Inle	0.002706	0.55	0.46	5.50	1.42	0.33	13.96

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-13300-	I-13300W	O-13300	0.59	0.82	0.48	0.64	5.31	3.42	68.00	0.027206	18 inch	0.013	17.33	1,377.57	1,375.72	1,384.54	1,378.50	5.47	1.28	1,378.27	1,377.93	
P-13300-	I-13300E	I-13300W	0.77	0.80	0.62	0.28	5.40	1.52	92.00	0.027065	18 inch	0.013	17.28	1,380.10	1,377.61	1,384.54	1,384.54	2.94	5.43	1,380.56	1,378.41	

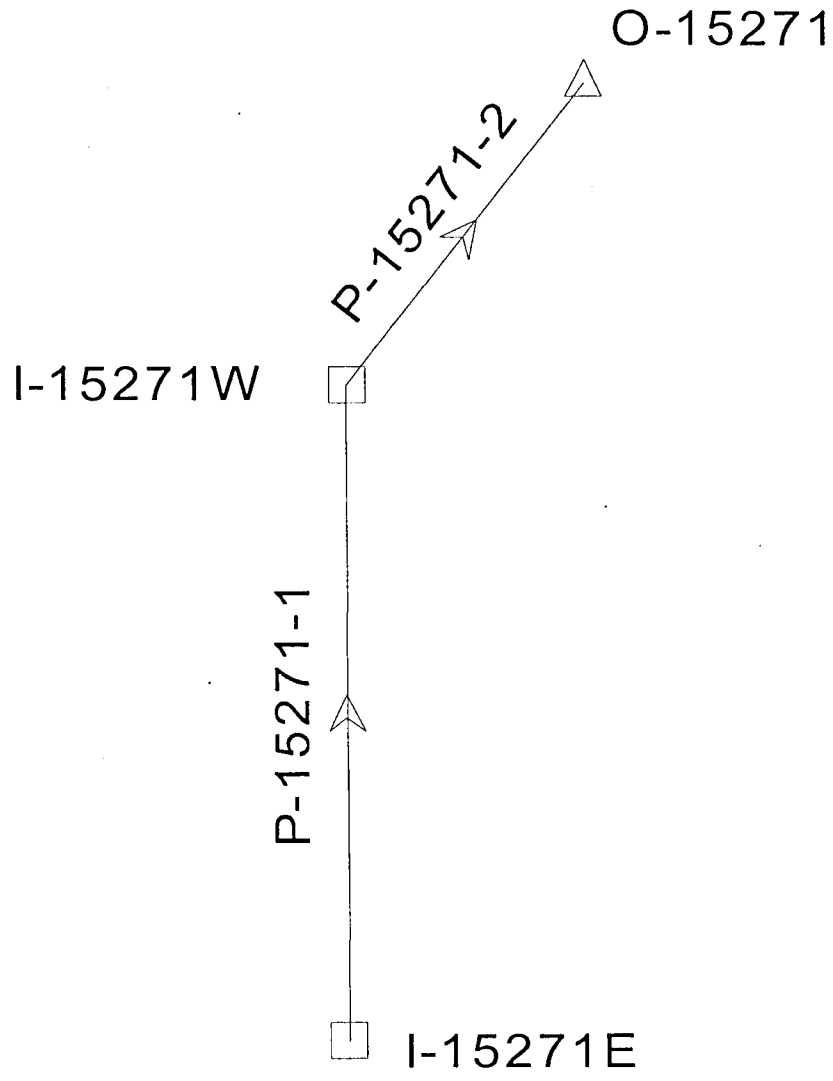
Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-13300W	On Grad	6.21	6.21	6.21	8.06	3.93	0.00	3.93	1.17	70.2	4.78	1.17	2.76	0.00	2.76		0.059	Grate Inl	0.002706	1.01	0.84	5.50	1.42	0.35	14.81
I-13300E	On Grad	5.88	5.88	5.88	8.18	5.10	0.00	5.10	3.05	40.2	2.05	3.05	2.05	0.00	2.05		0.059	Grate Inl	0.002706	0.64	0.54	5.50	1.42	0.38	16.38

Scenario: Base

Storm Drains @ Station 152+71.21

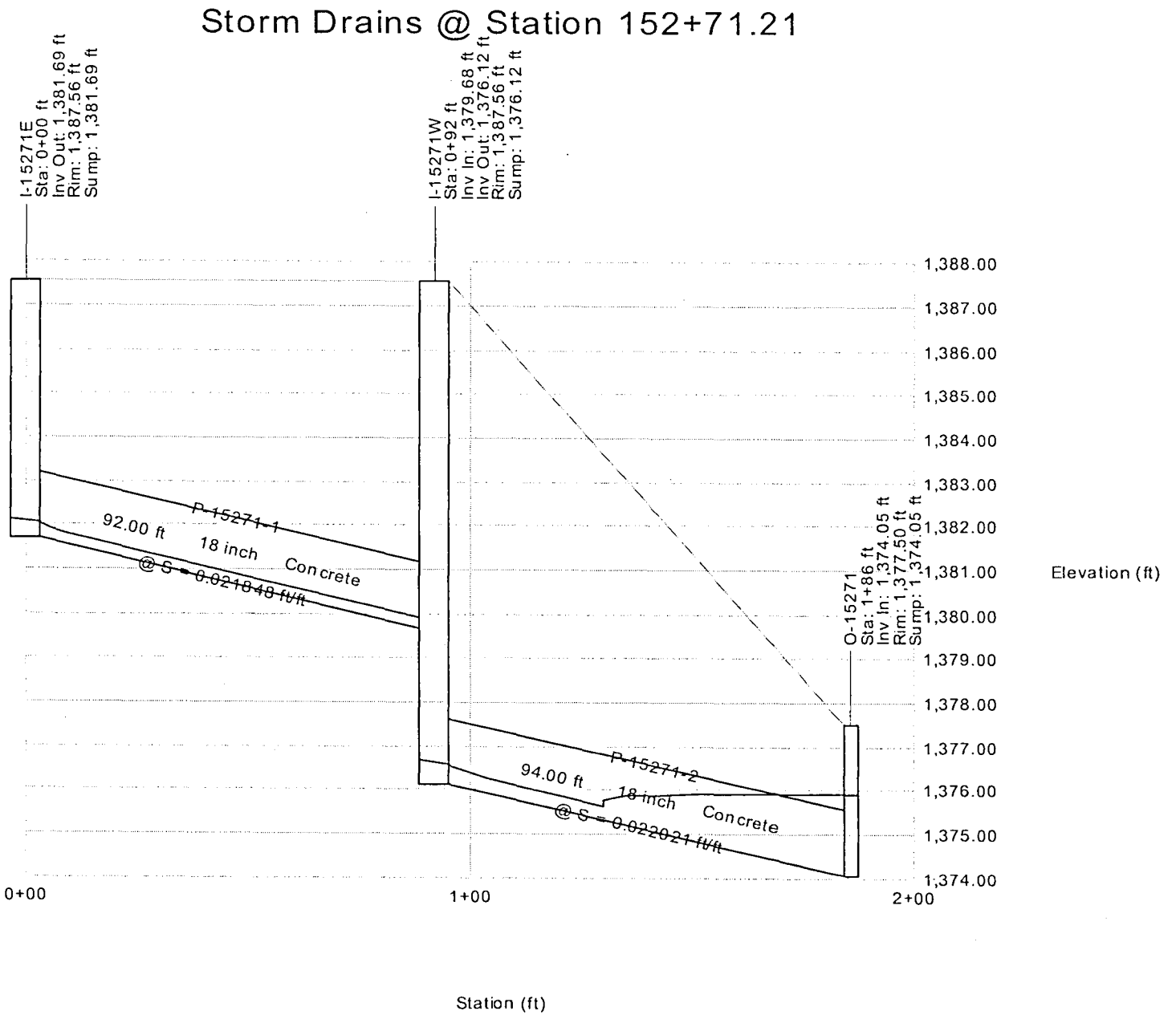


Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_15271.stm
05/20/05 02:06:10 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Profile
Scenario: Base



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_15271.stm
05/20/05 02:06:30 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-15271W	On Grad	2.99	2.99	2.99	5.64	1.07	0.00	1.07	0.38	64.3	1.55	0.38	0.69	0.00	0.69		0.059	Grate Inl	0.002571	0.55	0.47	5.50	1.42	0.23	8.97
I-15271E	On Grad	2.83	2.83	2.83	5.64	1.37	0.00	1.37	0.51	63.0	0.86	0.51	0.86	0.00	0.86		0.059	Grate Inl	0.002571	0.41	0.35	5.50	1.42	0.25	9.90

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-15271-	I-15271W	O-15271	0.23	0.82	0.19	0.27	5.64	1.55	94.00	0.022021	18 inch	0.013	15.59	1,376.12	1,374.05	1,387.56	1,377.50	9.94	1.95	1,376.59	1,375.90	
P-15271-	I-15271E	I-15271W	0.30	0.80	0.24	0.15	5.64	0.86	92.00	0.021848	18 inch	0.013	15.53	1,381.69	1,379.68	1,387.56	1,387.56	4.37	6.38	1,382.04	1,379.92	

Scenario: Base

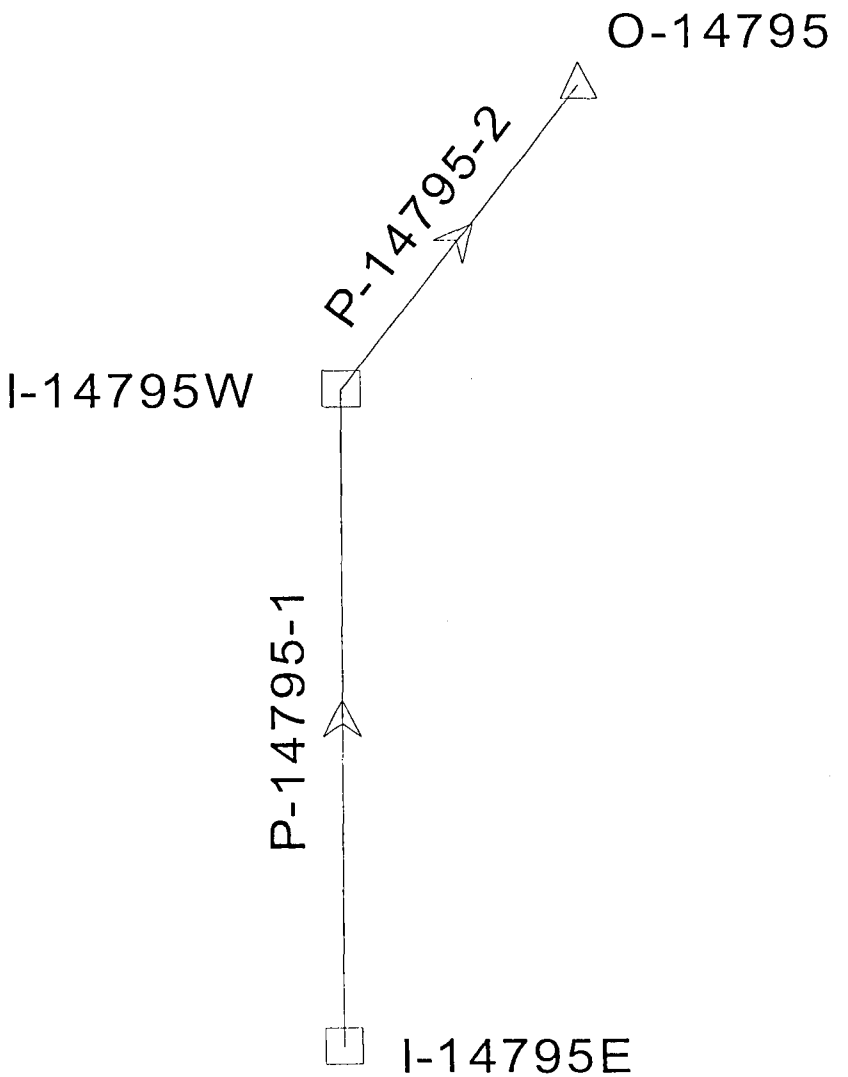
M-64

Q_{100}

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-15271W	On Grad	2.99	2.99	2.99	8.52	1.62	0.00	1.62	0.66	59.5	2.17	0.66	0.96	0.00	0.96		0.059	Grate Inl	0.002571	0.66	0.56	5.50	1.42	0.27	10.58
I-15271E	On Grad	2.83	2.83	2.83	8.52	2.07	0.00	2.07	0.87	58.1	1.20	0.87	1.20	0.00	1.20		0.059	Grate Inl	0.002571	0.48	0.41	5.50	1.42	0.29	11.66

Scenario: Base

Storm Drains @ Station 147+95.54



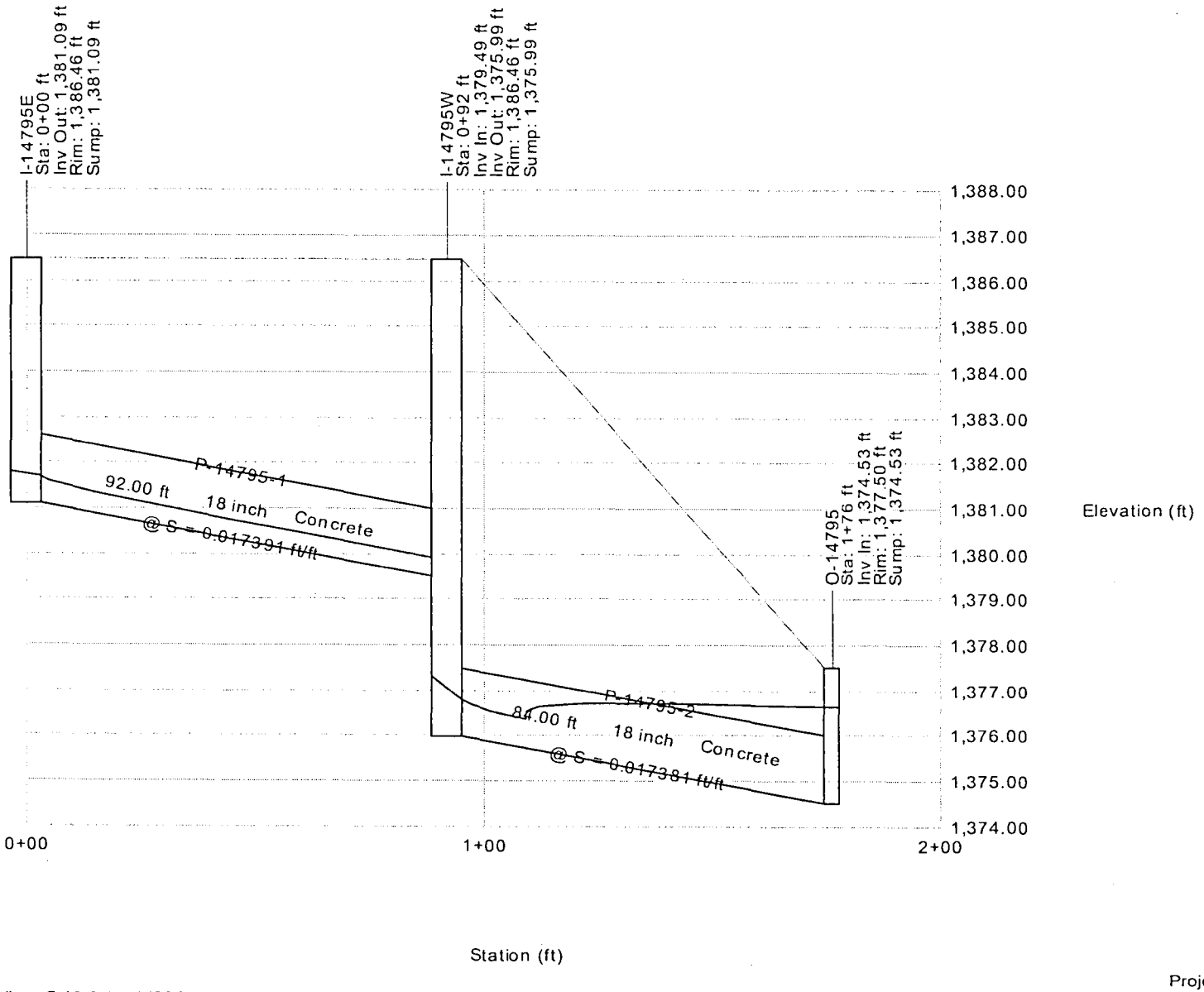
Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_14795.stm
05/20/05 02:48:38 PM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

rofile
Scenario: Base

Storm Drains @ Station 147+95.49



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-14795W	On Grad	6.30	6.30	6.30	5.28	2.70	0.38	3.08	1.30	57.9	3.51	1.14	1.57	0.16	1.79		0.059	Grate Inl	0.002571	1.31	0.81	5.50	1.42	0.33	13.63
I-14795E	On Grad	5.93	5.93	5.93	5.38	3.53	0.51	4.04	1.77	56.1	1.98	1.55	1.98	0.22	2.27		0.059	Grate Inl	0.002571	0.71	0.60	5.50	1.42	0.36	15.13

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-14795-	I-14795W	O-14795	0.62	0.82	0.51	0.66	5.28	4.43	84.00	0.017381	18 inch	0.013	13.85	1,375.99	1,374.53	1,386.46	1,377.50	8.97	1.47	1,376.80	1,376.63	
P-14795-	I-14795E	I-14795W	0.81	0.80	0.65	0.36	5.38	2.52	92.00	0.017391	18 inch	0.013	13.85	1,381.09	1,379.49	1,386.46	1,386.46	3.87	5.47	1,381.69	1,379.92	

Scenario: Base

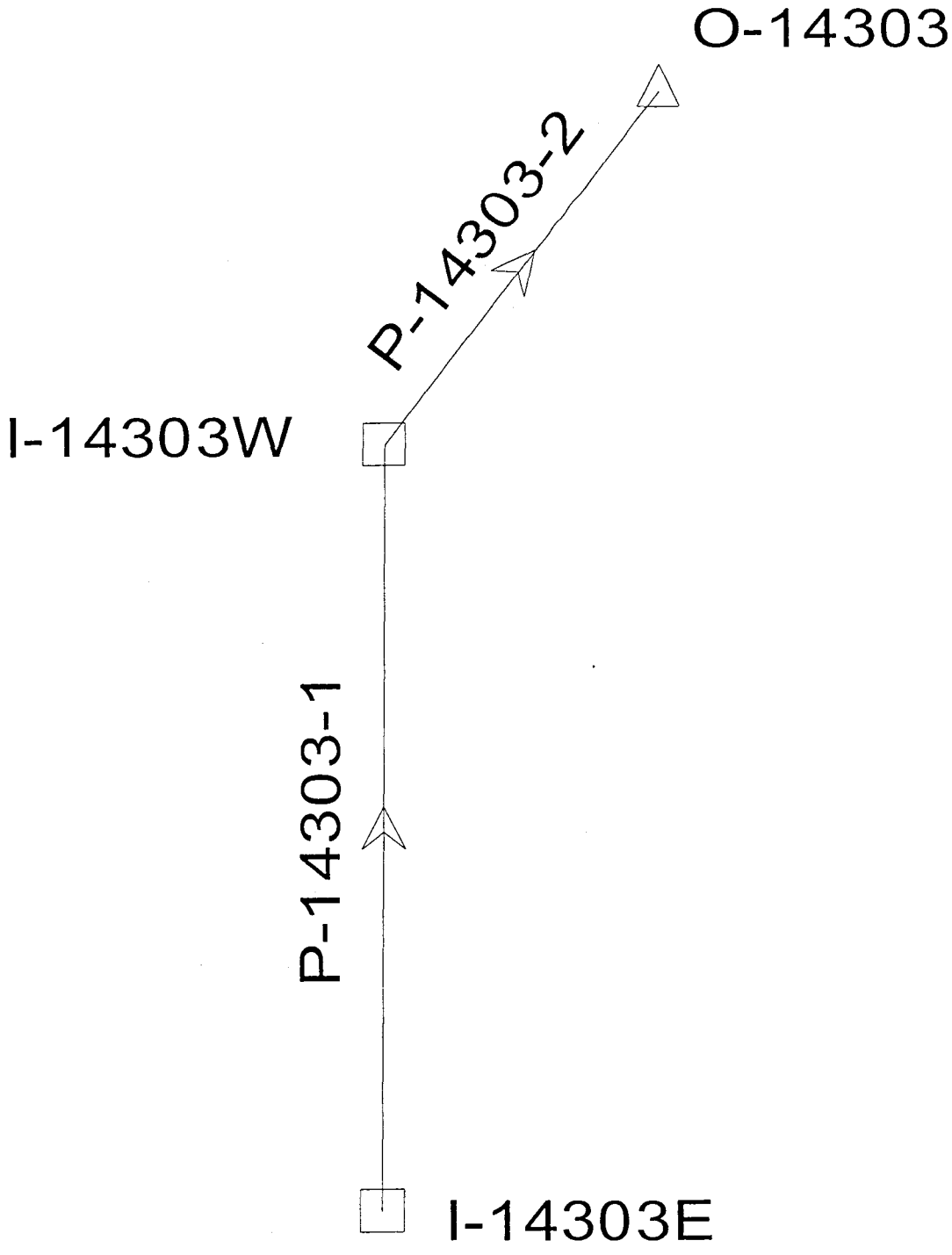
Q_{100}

M-64

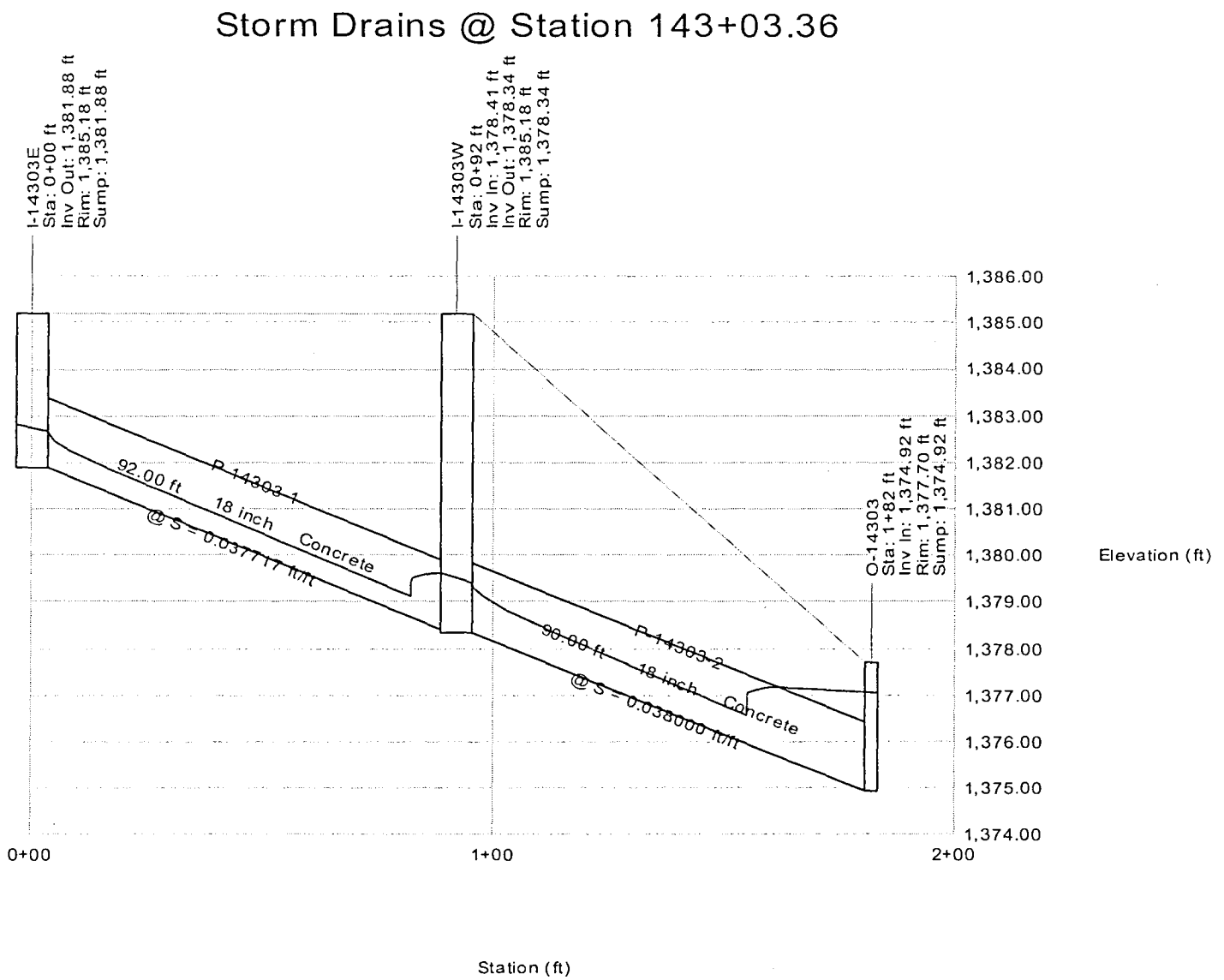
Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-14795W	On Grade	6.30	6.30	6.30	8.02	4.11	0.38	4.49	2.09	53.4	4.91	1.91	2.19	0.18	2.40		0.059	Grate Inle	0.002571	1.43	0.93	5.50	1.42	0.37	15.75
I-14795E	On Grade	5.93	5.93	5.93	8.16	5.35	0.51	5.86	2.84	51.6	2.76	2.59	2.76	0.25	3.03		0.059	Grate Inle	0.002571	0.82	0.69	5.50	1.42	0.40	17.45

Scenario: Base

Storm Drains @ Station 143+03.06



Profile
Scenario: Base



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-14303W	On Grad	5.87	5.87	5.87	5.41	2.90	1.30	4.20	1.85	56.1	3.62	1.27	1.63	0.57	2.36		0.059	Grate Inle	0.002571	1.29	1.05	5.50	1.42	0.36	15.36
I-14303E	On Grad	5.47	5.47	5.47	5.46	3.71	1.77	5.48	2.51	54.1	2.01	1.70	2.01	0.81	2.97		0.059	Grate Inle	0.002571	0.94	0.78	5.50	1.42	0.40	17.01

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-14303-	I-14303W	O-14303	0.65	0.82	0.53	0.66	5.41	7.33	90.00	0.038000	18 inch	0.013	20.48	1,378.34	1,374.92	1,385.18	1,377.70	5.34	1.28	1,379.39	1,377.07	
P-14303-	I-14303E	I-14303W	0.84	0.80	0.68	0.37	5.46	4.17	92.00	0.037717	18 inch	0.013	20.40	1,381.88	1,378.41	1,385.18	1,385.18	1.80	5.27	1,382.66	1,379.63	

Scenario: Base

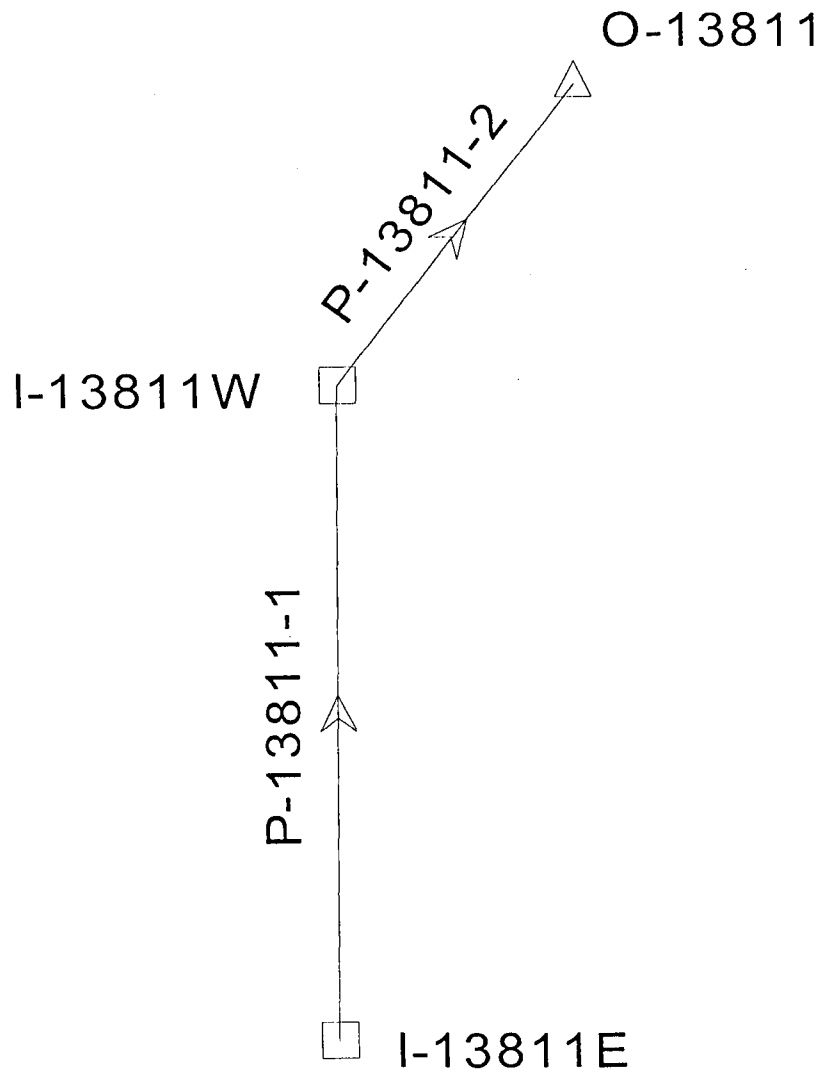
M-64

Q_{100}

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-14303W	On Grad	5.87	5.87	5.87	8.35	4.48	1.30	5.78	2.76	52.2	5.20	2.14	2.34	0.62	3.02		0.059	Grate Inl	0.002571	1.43	1.15	5.50	1.42	0.40	17.36
I-14303E	On Grad	5.47	5.47	5.47	8.43	5.74	1.77	7.51	3.72	50.4	2.89	2.85	2.89	0.88	3.78		0.059	Grate Inl	0.002571	1.03	0.86	5.50	1.42	0.44	19.18

Scenario: Base

Storm Drains @ Station 138+11.24



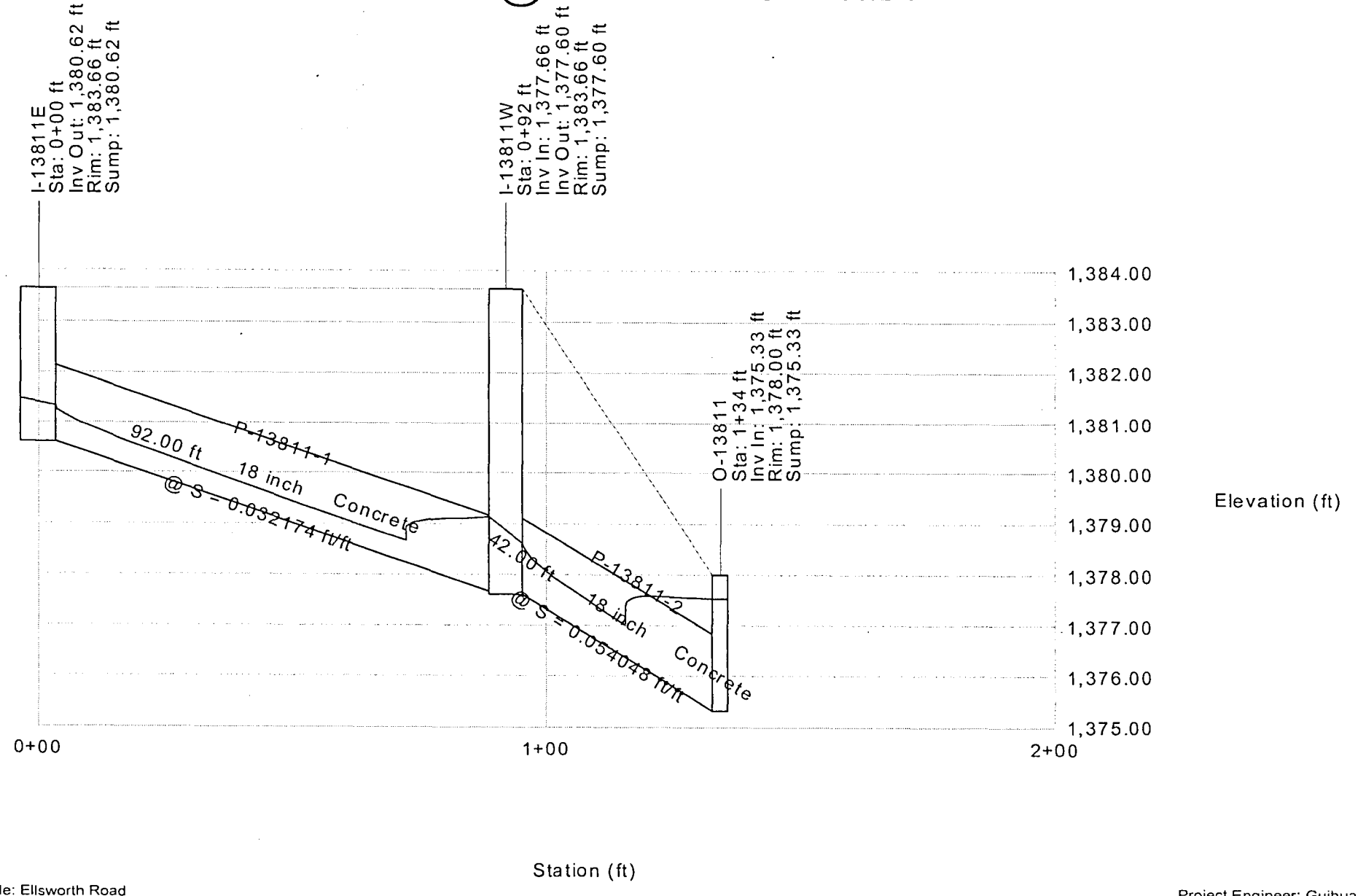
Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_13811.stm
05/23/05 07:49:24 AM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Profile
Scenario: Base

Storm drains @ Station 138+11.24



Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_13811.stm
05/23/05 07:49:40 AM

© Haestad Methods, Inc.

AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudinal Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-13811W	On Grad	5.80	5.80	5.80	5.42	2.91	1.85	4.76	2.14	54.9	3.55	1.31	1.60	0.83	2.61		0.059	Grate Inl	0.002671	1.60	1.10	5.50	1.42	0.38	15.99
I-13811E	On Grad	5.41	5.41	5.41	5.53	3.76	2.51	6.27	2.94	53.0	1.99	1.77	1.99	1.18	3.33		0.059	Grate Inl	0.002571	0.99	0.83	5.50	1.42	0.41	17.91

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-13811-	I-13811W	O-13811	0.65	0.82	0.53	0.65	5.42	8.09	42.00	0.054048	18 inch	0.013	24.42	1,377.60	1,375.33	1,383.66	1,378.00	4.56	1.17	1,378.70	1,377.53	
P-13811-	I-13811E	I-13811W	0.84	0.80	0.68	0.36	5.53	4.62	92.00	0.032174	18 inch	0.013	18.84	1,380.62	1,377.66	1,383.66	1,383.66	1.54	4.50	1,381.45	1,379.20	

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

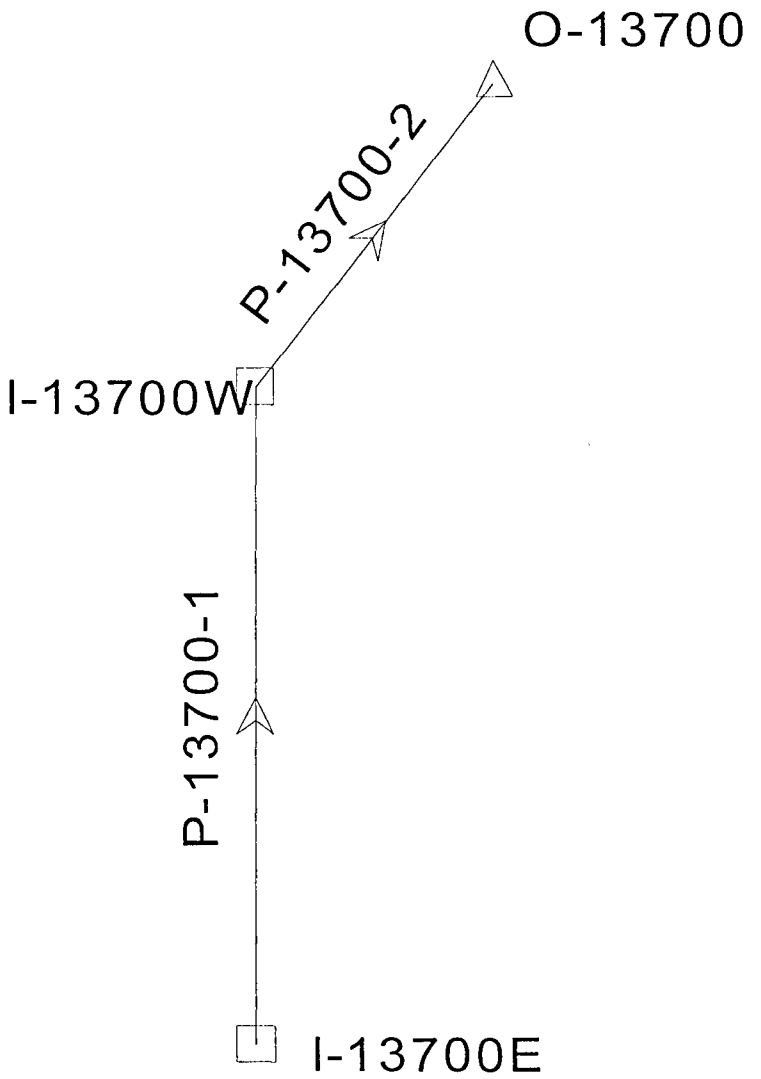
Q100

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-13811W	On Grade	5.80	5.80	5.80	8.21	4.41	1.85	6.26	3.03	51.6	5.06	2.13	2.28	0.89	3.23		0.059	Grate Inle	0.002671	1.69	1.19	5.50	1.42	0.41	17.76
I-13811E	On Grade	5.41	5.41	5.41	8.36	5.69	2.51	8.20	4.11	49.8	2.84	2.85	2.84	1.26	4.09		0.059	Grate Inle	0.002571	1.08	0.89	5.50	1.42	0.45	19.84

Scenario: Base

Storm Drains @ Station 137+00



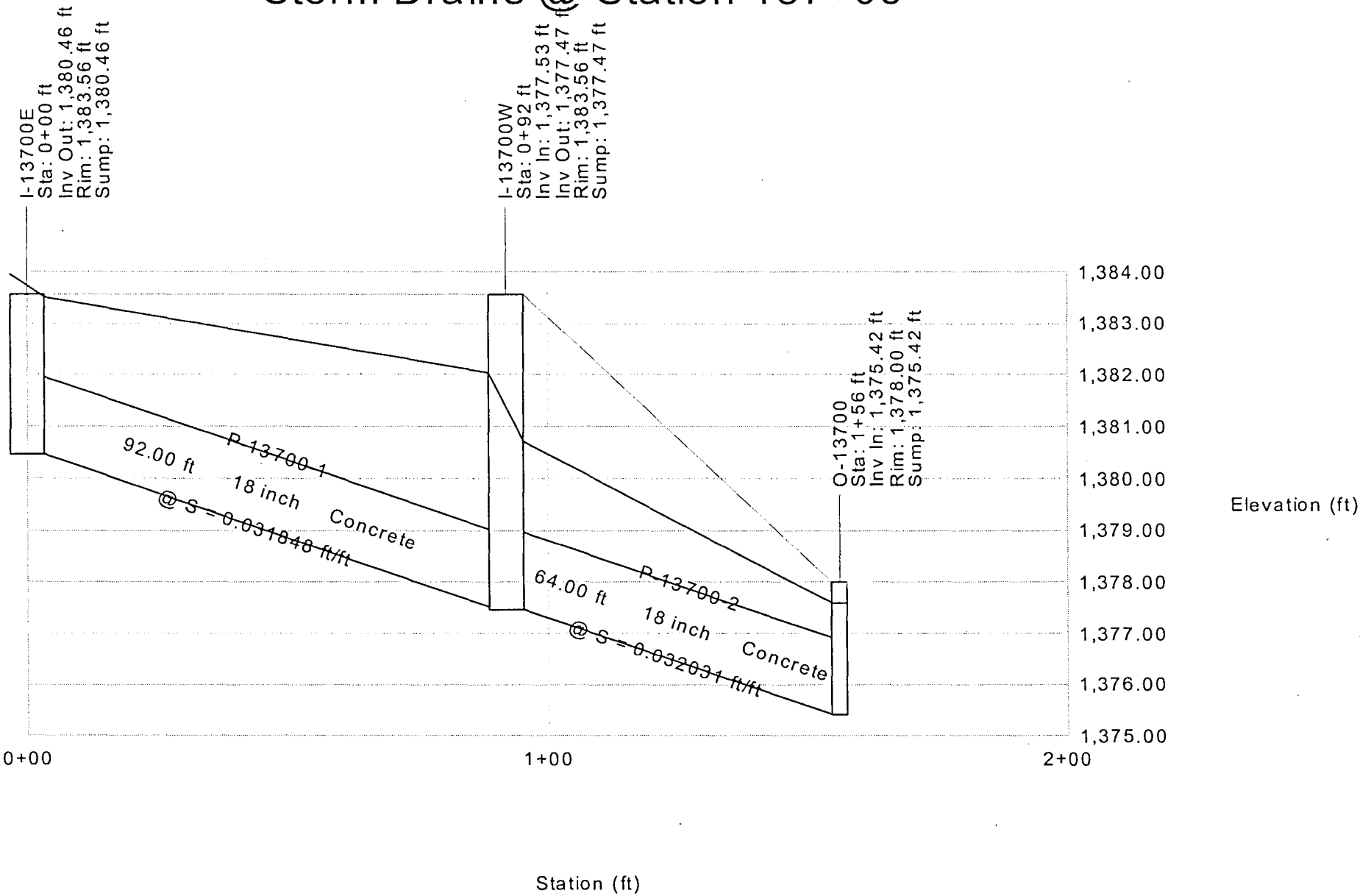
Title: Ellsworth Road
n:\...\storm cad\stormcad\rev-5-13-05\p_13700.stm
05/23/05 08:43:55 AM

AMEC Infrastructure Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]

Profile
Scenario: Base

Storm Drains @ Station 137+00



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-13700W	In Sag	6.94	6.94	0.00	5.10	5.52	2.80	8.32	0.00	100.0	12.59	0.00	5.52	0.00	8.32	6.00	0.059	Combination Ir		4.57	3.24	5.50	1.42	0.46	20.28
I-13700E	In Sag	6.48	6.48	0.00	5.23	7.24	4.79	12.03	0.00	100.0	7.24	0.00	7.24	0.00	12.03	6.00	0.059	Combination Ir		3.50	3.06	5.00	1.42	0.57	25.48

Scenario: Base

Pipe Report

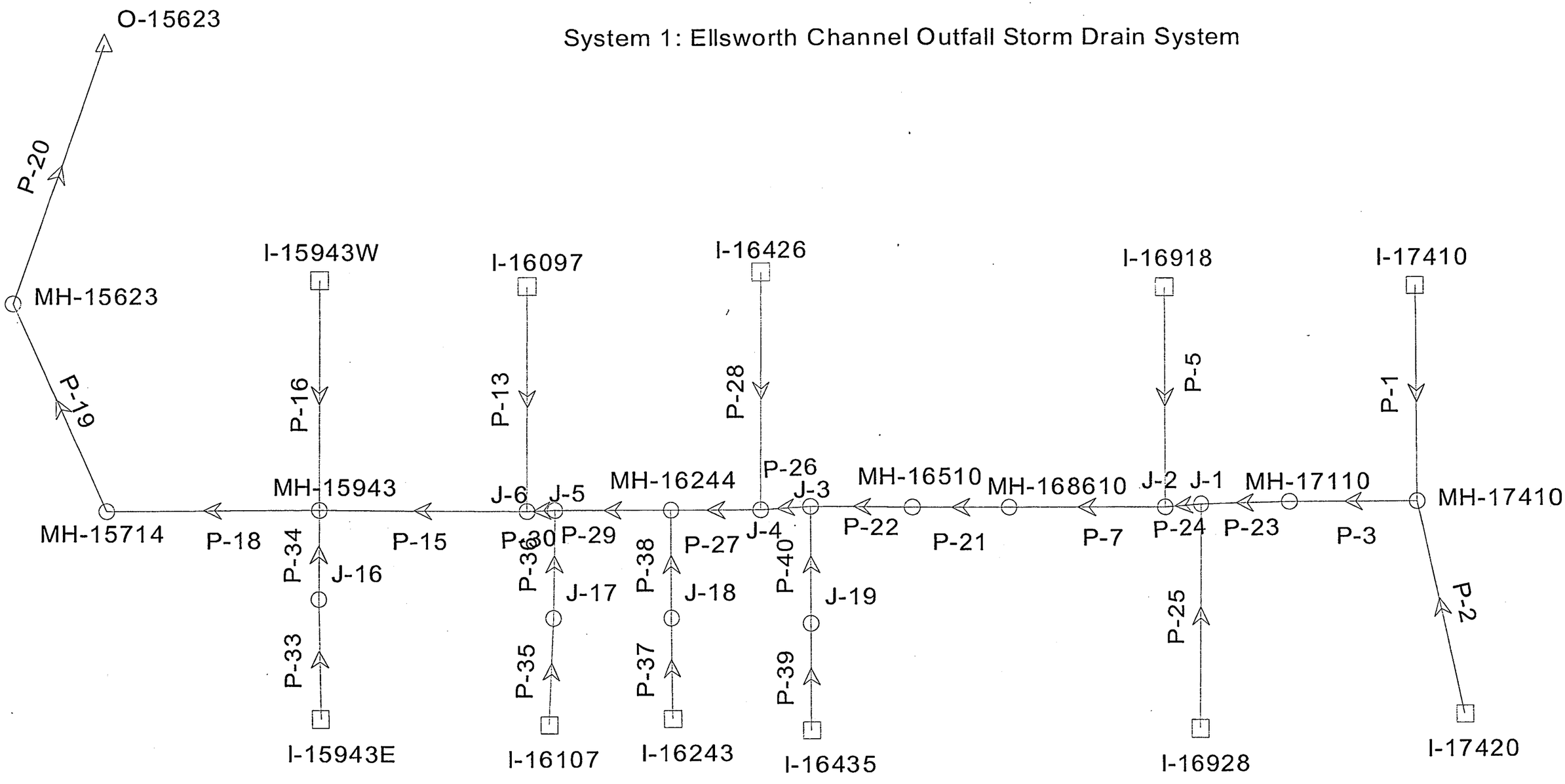
Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-13700-	I-13700W	O-13700	1.31	0.82	1.07	2.45	5.10	23.14	64.00	0.032031	18 inch	0.013	18.80	1,377.47	1,375.42	1,383.56	1,378.00	4.59	1.08	1,380.71	1,377.60	
P-13700-	I-13700E	I-13700W	1.71	0.80	1.37	1.37	5.23	13.32	92.00	0.031848	18 inch	0.013	18.74	1,380.46	1,377.53	1,383.56	1,383.56	1.60	4.53	1,383.52	1,382.04	

Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Bypassed Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Additional Carryover (cfs)	Total Flow To Inlet (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Bypassed Additional Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-13700W	In Sag	6.94	6.94	0.00	7.78	8.41	2.80	11.21	0.00	100.0	19.18	0.00	8.41	0.00	11.21	6.00	0.059	Combination Ir		7.46	5.26	5.50	1.42	0.54	24.30
I-13700E	In Sag	6.48	6.48	0.00	7.95	11.01	4.79	15.80	0.00	100.0	11.01	0.00	11.01	0.00	15.80	6.00	0.059	Combination Ir		3.83	3.10	5.00	1.42	0.65	29.96

System 1: Ellsworth Channel Outfall Storm Drain System



Scenario: Base

M-64

Label	Inlet Location	Time of Concentration (min)	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Type	Longitudina Slope (ft/ft)	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-16097	In Sag	4.65	4.65	5.64	2.00	6.30	0.00	100.0	6.30	0.00	6.30	6.30	6.40	0.059	Combination Ir		0.97	0.97	5.50	1.42	0.39	16.57
I-15943W	On Grad	6.78	6.78	5.15	2.76	2.76	6.78	58.7	1.62	1.14	1.62	1.62		0.059	Grate Inlet	0.002615	0.48	0.48	5.50	1.42	0.32	13.01
I-16918	On Grad	6.33	6.33	5.27	2.83	4.02	6.33	48.3	1.94	2.08	1.94	1.94		0.059	Grate Inlet	0.003072	0.53	0.53	5.50	1.42	0.35	14.59
I-17410	On Grad	6.34	6.34	5.27	2.78	2.78	6.34	57.3	1.60	1.19	1.60	1.60		0.059	Grate Inlet	0.003072	0.47	0.47	5.50	1.42	0.31	12.65
I-17420	On Grad	6.01	6.01	5.36	3.50	3.50	6.01	55.7	1.95	1.55	1.95	1.95		0.059	Grate Inlet	0.003072	0.53	0.53	5.50	1.42	0.33	13.82
I-16928	On Grad	5.97	5.97	5.37	3.55	5.10	5.97	47.0	2.40	2.70	2.40	2.40		0.059	Grate Inlet	0.003072	0.59	0.59	5.50	1.42	0.38	15.99
I-16426	On Grad	6.03	6.03	5.36	2.87	4.98	6.03	41.9	2.09	2.89	2.09	2.09		0.059	Grate Inlet	0.003072	0.55	0.55	5.50	1.42	0.37	15.85
I-15943E	On Grad	6.42	6.42	5.25	3.57	3.57	6.42	56.8	2.03	1.54	2.03	2.03		0.059	Grate Inlet	0.002615	0.54	0.54	5.50	1.42	0.34	14.37
I-16107	In Sag	2.26	2.26	5.64	1.24	6.55	0.00	100.0	6.55	0.00	6.55	6.55	6.40	0.059	Combination Ir		0.99	0.99	5.50	1.42	0.39	16.98
I-16243	On Grad	2.50	2.50	5.64	1.24	5.22	2.50	30.1	1.57	3.65	1.57	1.57		0.059	Grate Inlet	0.003072	0.47	0.47	5.50	1.42	0.38	16.13
I-16435	On Grad	6.08	6.08	5.34	3.53	6.22	6.08	39.4	2.45	3.77	2.45	2.45		0.059	Grate Inlet	0.003072	0.59	0.59	5.50	1.42	0.39	16.80

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
P-13	I-16097	J-6	0.43	0.82	0.35	1.11	5.64	6.30	31.00	0.085161	18 inch	0.013	30.65	1,382.77	1,380.13	1,386.56	1,387.00	2.29	5.37	1,383.74	1,382.33	
P-15	J-6	MH-15943	N/A	N/A	N/A	4.85	3.93	19.21	154.00	0.001818	30 inch	0.013	17.49	1,379.53	1,379.25	1,387.00	1,387.50	4.97	5.75	1,382.18	1,381.87	
P-16	I-15943W	MH-15943	0.65	0.82	0.53	0.31	5.15	1.62	30.00	0.130000	18 inch	0.013	37.87	1,383.46	1,379.56	1,386.66	1,387.50	1.70	6.44	1,383.94	1,381.87	
P-18	MH-15943	MH-15714	N/A	N/A	N/A	5.54	3.84	21.46	227.00	0.001806	30 inch	0.013	17.43	1,379.25	1,378.84	1,387.50	1,387.86	5.75	6.52	1,381.58	1,381.07	
P-19	MH-15714	MH-15623	N/A	N/A	N/A	5.54	3.72	20.79	119.00	0.001849	30 inch	0.013	17.64	1,378.84	1,378.62	1,387.86	1,388.59	6.52	7.47	1,380.87	1,380.51	
P-20	MH-15623	O-15623	N/A	N/A	N/A	5.54	3.66	20.43	120.00	0.041667	30 inch	0.013	83.72	1,378.62	1,373.62	1,388.59	1,377.20	7.47	1.08	1,380.13	1,375.50	
P-5	I-16918	J-2	0.65	0.82	0.53	0.37	5.27	1.94	31.00	0.059032	18 inch	0.013	25.52	1,384.77	1,382.94	1,388.56	1,389.40	2.29	4.96	1,385.30	1,383.83	
P-7	J-2	MH-16861(	N/A	N/A	N/A	1.47	4.62	6.85	107.90	0.005283	24 inch	0.013	16.44	1,382.65	1,382.08	1,389.40	1,389.00	4.75	4.92	1,383.58	1,383.20	
P-21	MH-16861	MH-16510	N/A	N/A	N/A	1.47	4.52	6.70	300.00	0.003967	24 inch	0.013	14.25	1,382.08	1,380.89	1,389.00	1,388.10	4.92	5.21	1,383.05	1,382.76	
P-22	MH-16510	J-3	N/A	N/A	N/A	1.47	4.24	6.28	74.40	0.002151	30 inch	0.013	19.02	1,380.39	1,380.23	1,388.10	1,387.80	5.21	5.07	1,382.75	1,382.73	
P-1	I-17410	MH-17410	0.64	0.82	0.52	0.30	5.27	1.60	34.00	0.032059	18 inch	0.013	18.81	1,385.69	1,384.60	1,390.26	1,390.71	3.07	4.61	1,386.16	1,385.41	
P-2	I-17420	MH-17410	0.83	0.78	0.65	0.36	5.36	1.95	57.00	0.011754	18 inch	0.013	11.39	1,385.26	1,384.59	1,390.26	1,390.71	3.50	4.62	1,385.79	1,385.41	
P-3	MH-17410	MH-17110	N/A	N/A	N/A	0.66	5.25	3.49	300.00	0.003000	24 inch	0.013	12.39	1,384.56	1,383.66	1,390.71	1,389.90	4.15	4.24	1,385.29	1,384.40	
P-23	MH-17110	J-1	N/A	N/A	N/A	0.66	4.84	3.22	182.30	0.005266	24 inch	0.013	16.42	1,383.66	1,382.70	1,389.90	1,389.40	4.24	4.70	1,384.29	1,383.92	
P-24	J-1	J-2	N/A	N/A	N/A	1.10	4.63	5.16	9.80	0.005102	24 inch	0.013	16.16	1,382.70	1,382.65	1,389.40	1,389.40	4.70	4.75	1,383.83	1,383.83	
P-25	I-16928	J-1	0.84	0.78	0.66	0.44	5.37	2.40	57.00	0.030351	18 inch	0.013	18.30	1,384.70	1,382.97	1,388.60	1,389.40	2.40	4.93	1,385.29	1,383.92	
P-26	J-3	J-4	N/A	N/A	N/A	1.92	4.19	8.13	9.80	0.002041	30 inch	0.013	18.53	1,380.23	1,380.21	1,387.80	1,387.80	5.07	5.09	1,382.70	1,382.70	
P-27	J-4	MH-16244	N/A	N/A	N/A	2.31	4.19	9.75	182.30	0.002249	30 inch	0.013	19.45	1,380.21	1,379.80	1,387.80	1,387.30	5.09	5.00	1,382.66	1,382.56	
P-28	I-16426	J-4	0.65	0.82	0.53	0.39	5.36	2.09	31.00	0.045806	18 inch	0.013	22.48	1,382.15	1,380.73	1,387.06	1,387.80	3.41	5.57	1,382.70	1,382.70	
P-29	MH-16244	J-5	N/A	N/A	N/A	2.59	4.08	10.65	136.00	0.001838	30 inch	0.013	17.58	1,379.80	1,379.55	1,387.30	1,387.30	5.00	5.25	1,382.52	1,382.43	
P-30	J-5	J-6	N/A	N/A	N/A	3.74	3.94	14.85	10.00	0.002000	30 inch	0.013	18.34	1,379.55	1,379.53	1,387.30	1,387.00	5.25	4.97	1,382.34	1,382.33	
P-33	I-15943E	J-16	0.84	0.80	0.68	0.38	5.25	2.03	22.75	0.032967	18 inch	0.013	19.07	1,383.54	1,382.79	1,386.66	1,387.16	1.62	2.87	1,384.08	1,383.13	
P-34	J-16	MH-15943	N/A	N/A	N/A	0.38	5.23	2.02	36.50	0.091507	18 inch	0.013	31.77	1,382.79	1,379.45	1,387.16	1,387.50	2.87	6.55	1,383.33	1,381.87	
P-35	I-16107	J-17	0.28	0.78	0.22	1.15	5.64	6.55	22.75	0.040000	18 inch	0.013	21.01	1,383.82	1,382.91	1,386.56	1,386.89	1.24	2.48	1,384.81	1,383.55	
P-36	J-17	J-5	N/A	N/A	N/A	1.15	5.64	6.55	35.25	0.079149	18 inch	0.013	29.55	1,382.91	1,380.12	1,386.89	1,387.30	2.48	5.68	1,383.90	1,382.43	
P-37	I-16243	J-18	0.28	0.78	0.22	0.28	5.64	1.57	22.75	0.039560	18 inch	0.013	20.89	1,384.06	1,383.16	1,387.06	1,387.27	1.50	2.61	1,384.53	1,383.45	
P-38	J-18	MH-16244	N/A	N/A	N/A	0.28	5.64	1.57	35.50	0.076901	18 inch	0.013	29.13	1,383.16	1,380.43	1,387.27	1,387.30	2.61	5.37	1,383.63	1,382.56	
P-39	I-16435	J-19	0.84	0.78	0.66	0.45	5.34	2.45	22.75	0.015824	18 inch	0.013	13.21	1,384.16	1,383.80	1,387.06	1,388.37	1.40	3.07	1,384.75	1,384.25	
P-40	J-19	J-3	N/A	N/A	N/A	0.45	5.32	2.44	35.25	0.085106	18 inch	0.013	30.64	1,383.80	1,380.80	1,388.37	1,387.80	3.07	5.50	1,384.39	1,382.73	

Scenario: Base

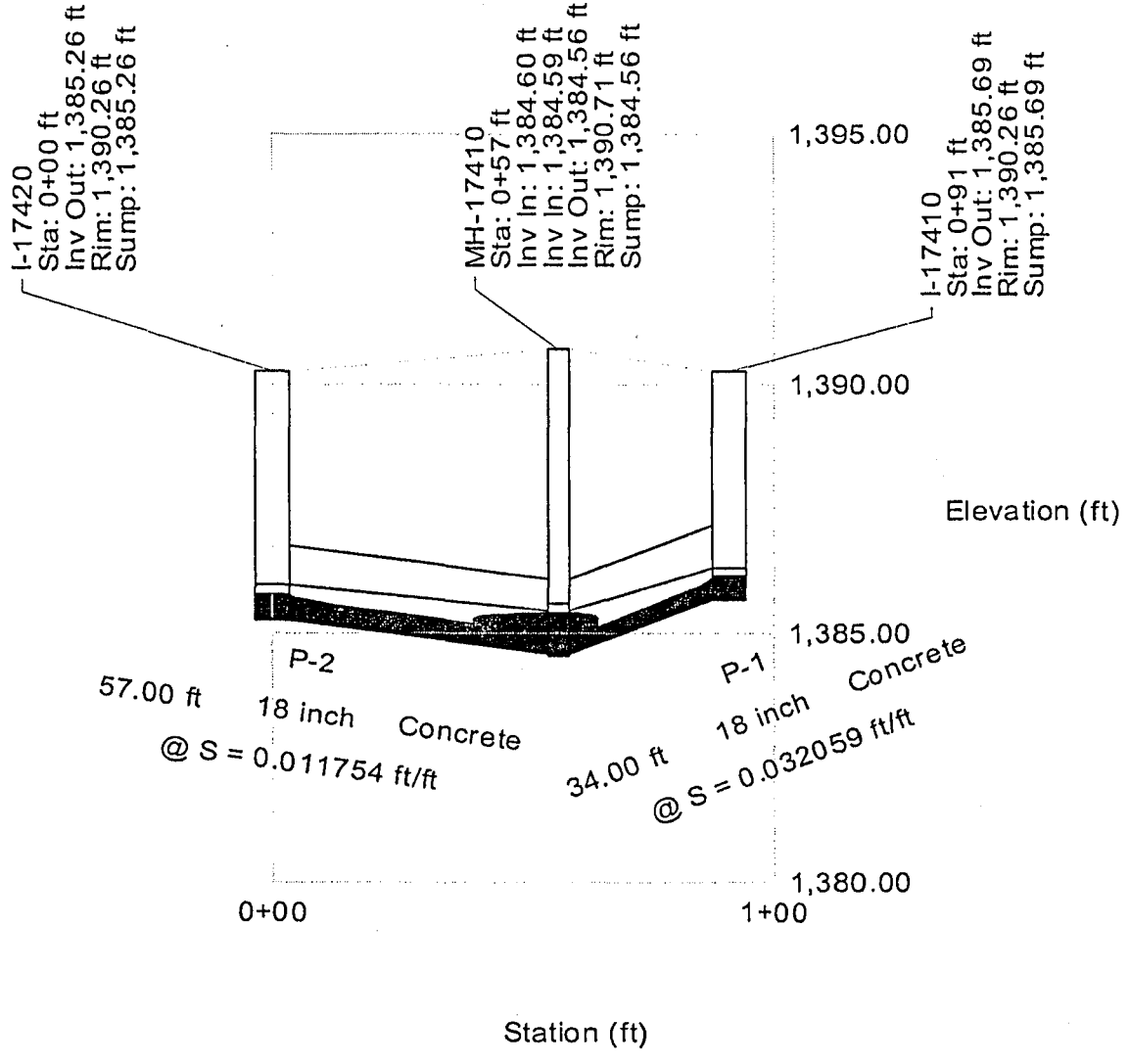
M-64

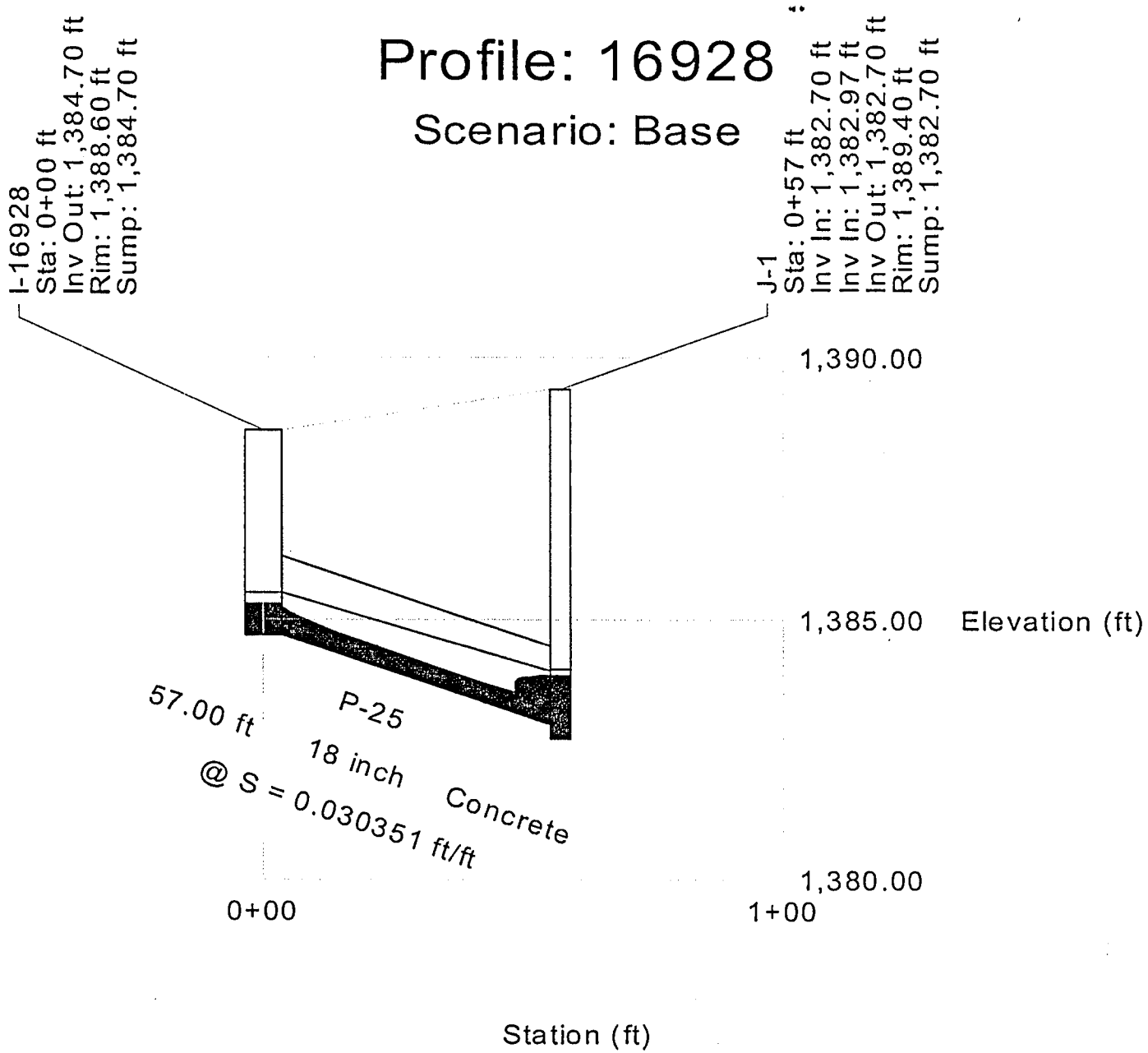
100-YR

Label	Inlet Location	Local Rational Flow (cfs)	Total Flow To Inlet (cfs)	Bypassed Tc (min)	Capture Efficiency (%)	Clogging Factor (%)	Carryover Known Flow (cfs)	System Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Intercepted Rational Flow (cfs)	Carryover Rational Flow (cfs)	Carryover Tc (min)	Total Intercepted Flow (cfs)	Curb Opening Length (ft)	Gutter Cross Slope (ft/ft)	Inlet Section Properties	Inlet Type	Longitudina Slope (ft/ft)	Max Depth In Sag (ft)	Depressed Gutter?	Depth In (ft)	Depth Out (ft)	Grate Length (ft)	Gutter Width (ft)	Gutter Ditch Depth (ft)	Gutter Ditch Spread (ft)
I-16097	In Sag	3.03	10.49	0.00	100.0	0.0	0.00	10.49	0.00	10.49	7.46	4.65	10.49	6.00	0.059	Gutter Sectic	Combination Ir		0.50	true	2.45	2.45	5.50	1.42	0.52	23.33
I-15943W	On Grad	4.21	4.21	6.78	53.6	35.6	0.00	2.26	1.95	2.26	0.00	0.00	2.26		0.059	Gutter Sectic	Grate Inlet	0.002615	0.50	true	0.57	0.57	5.50	1.42	0.36	15.31
I-16918	On Grad	4.30	6.32	6.33	42.9	40.3	0.00	2.71	3.61	2.71	2.02	6.33	2.71		0.059	Gutter Sectic	Grate Inlet	0.003072	0.50	true	1.62	1.62	5.50	1.42	0.40	17.36
I-17410	On Grad	4.23	4.23	6.34	52.2	34.5	0.00	2.21	2.02	2.21	0.00	0.00	2.21		0.059	Gutter Sectic	Grate Inlet	0.003072	0.50	true	0.95	0.95	5.50	1.42	0.35	14.87
I-17420	On Grad	5.30	5.30	6.01	50.7	32.9	0.00	2.69	2.61	2.69	0.00	0.00	2.69		0.059	Gutter Sectic	Grate Inlet	0.003072	0.50	true	1.43	1.43	5.50	1.42	0.38	16.23
I-16928	On Grad	5.38	8.00	5.97	41.7	38.3	0.00	3.34	4.66	3.34	2.62	5.97	3.34		0.059	Gutter Sectic	Grate Inlet	0.003072	0.50	true	1.78	1.78	5.50	1.42	0.44	19.00
I-16426	On Grad	4.36	8.02	6.03	36.5	45.0	0.00	2.93	5.09	2.93	3.66	6.03	2.93		0.059	Gutter Sectic	Grate Inlet	0.003072	0.50	true	3.46	3.46	5.50	1.42	0.44	19.01
I-15943E	On Grad	5.43	5.43	6.42	51.8	34.0	0.00	2.81	2.62	2.81	0.00	0.00	2.81		0.059	Gutter Sectic	Grate Inlet	0.002615	0.50	true	0.64	0.64	5.50	1.42	0.39	16.89
I-16107	In Sag	1.88	11.12	0.00	100.0	0.0	0.00	11.12	0.00	11.12	9.24	2.26	11.12	6.00	0.059	Gutter Sectic	Combination Ir		0.50	true	1.96	1.96	5.50	1.42	0.54	24.17
I-16243	On Grad	1.88	8.64	2.50	25.4	58.8	0.00	2.19	6.44	2.19	6.76	2.50	2.19		0.059	Gutter Sectic	Grate Inlet	0.003072	0.50	true	1.32	1.32	5.50	1.42	0.45	19.56
I-16435	On Grad	5.36	10.00	6.08	35.7	43.0	0.00	3.56	6.43	3.56	4.64	6.08	3.56		0.059	Gutter Sectic	Grate Inlet	0.003072	0.50	true	1.55	1.55	5.50	1.42	0.47	20.68

Profile: 17420

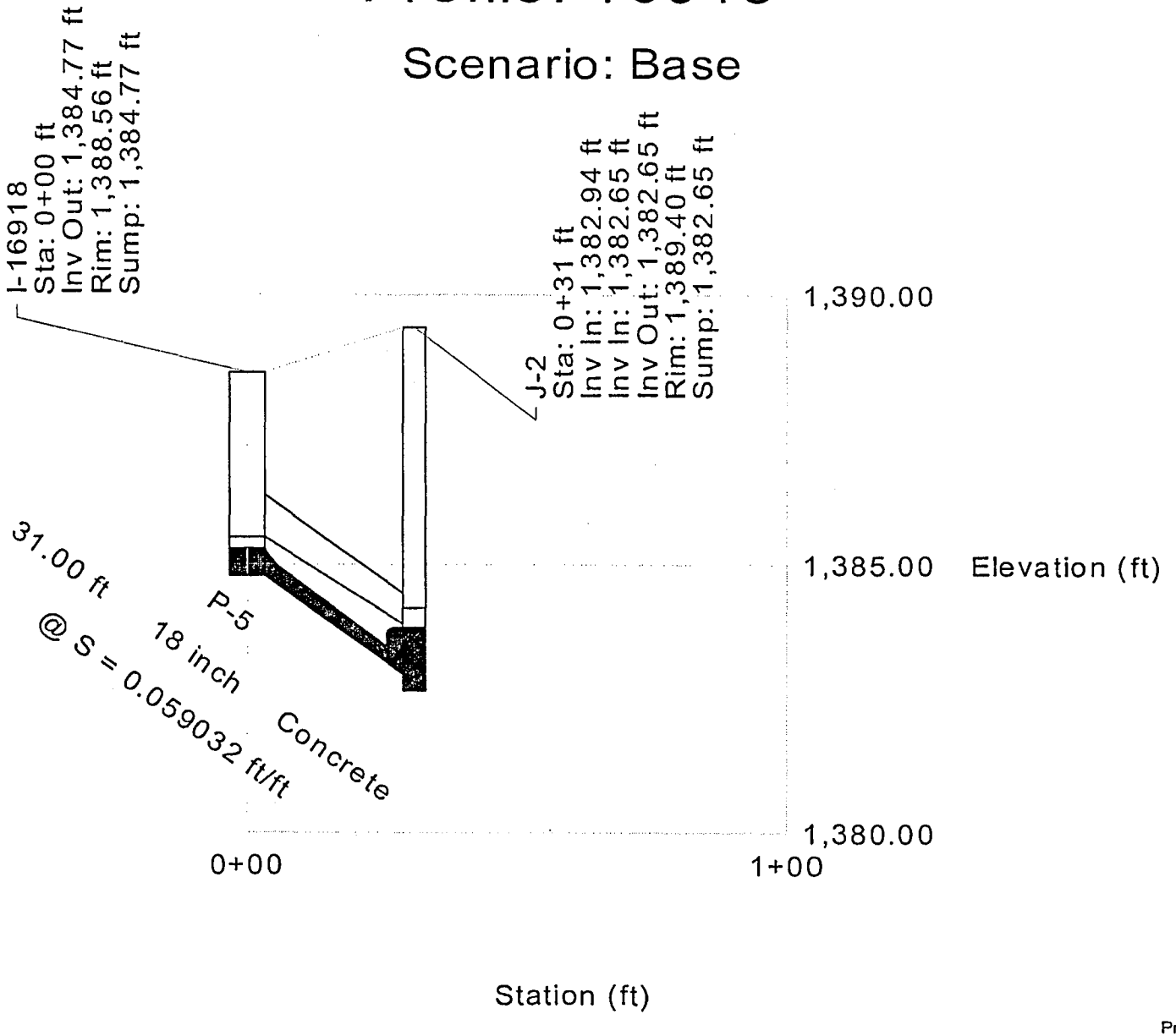
Scenario: Base

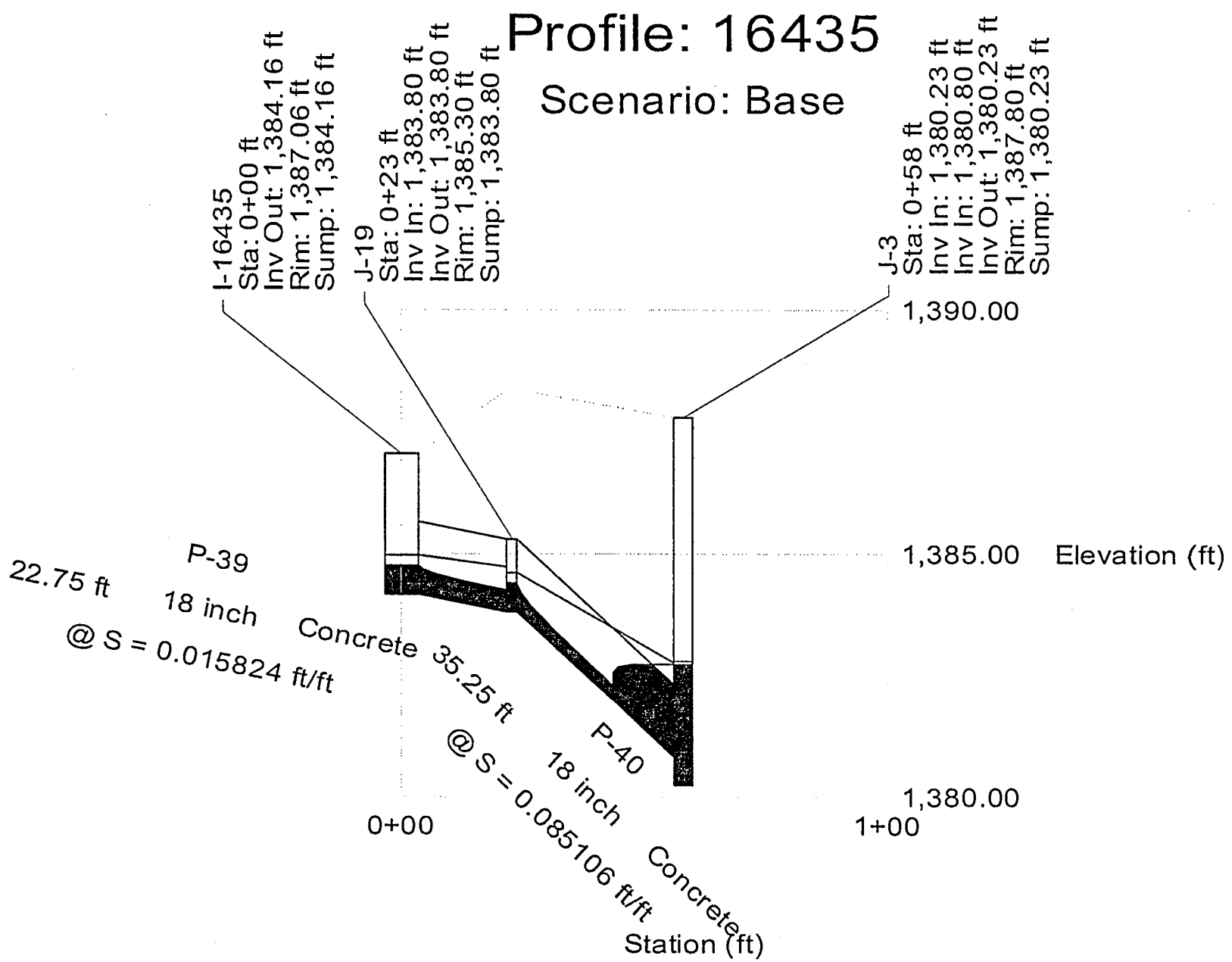



Profile: 16928
Scenario: Base
I-16928
Sta: 0+00 ft
Inv Out: 1,384.70 ft
Rim: 1,388.60 ft
Sump: 1,384.70 ft
J-1
Sta: 0+57 ft
Inv In: 1,382.70 ft
Inv In: 1,382.97 ft
Inv Out: 1,382.70 ft
Rim: 1,389.40 ft
Sump: 1,382.70 ft
1,390.00
1,385.00
Elevation (ft)
1,380.00
57.00 ft
P-25
18 inch
Concrete
@ S = 0.030351 ft/ft
0+00
1+00
Station (ft)

Profile: 16918

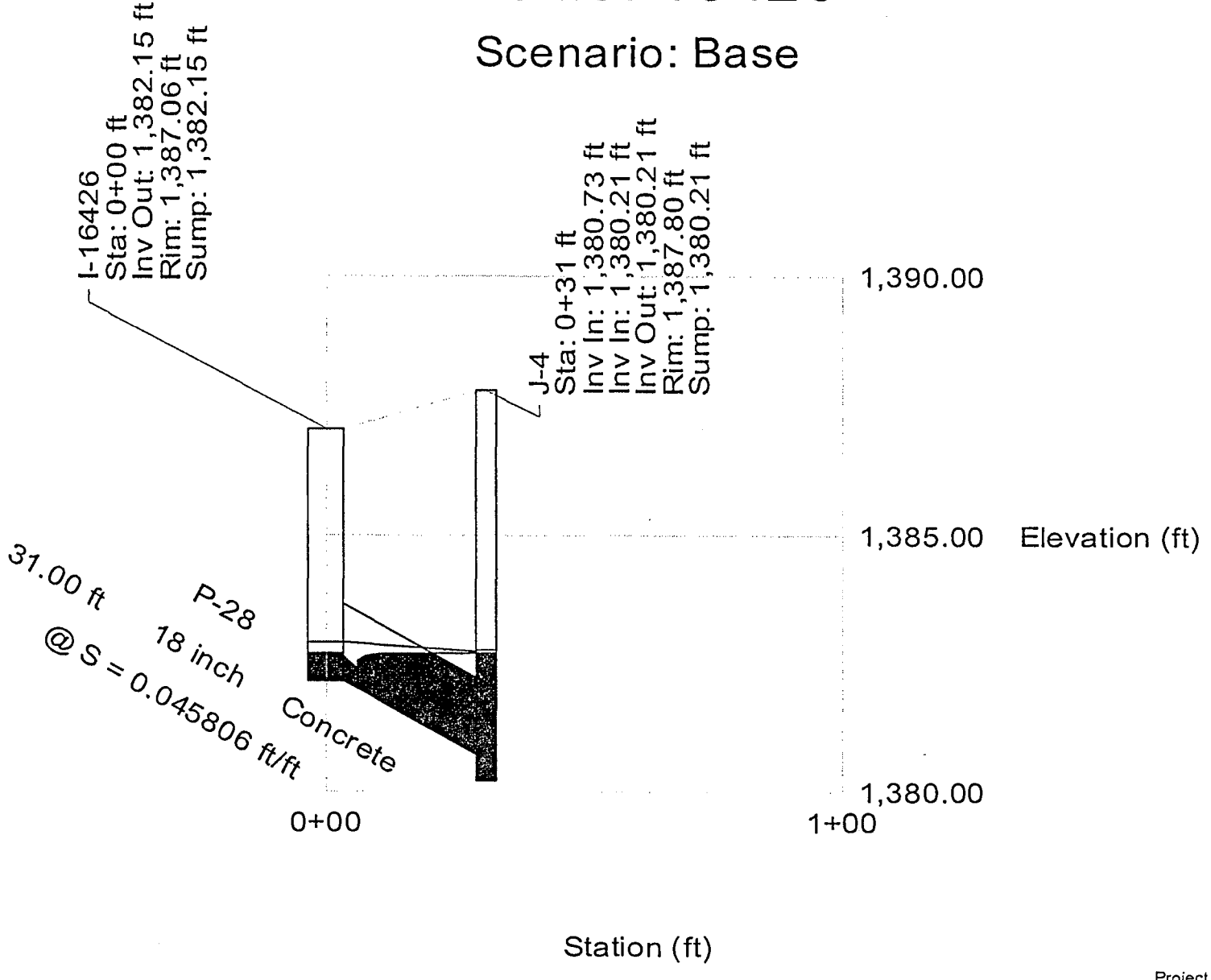
Scenario: Base



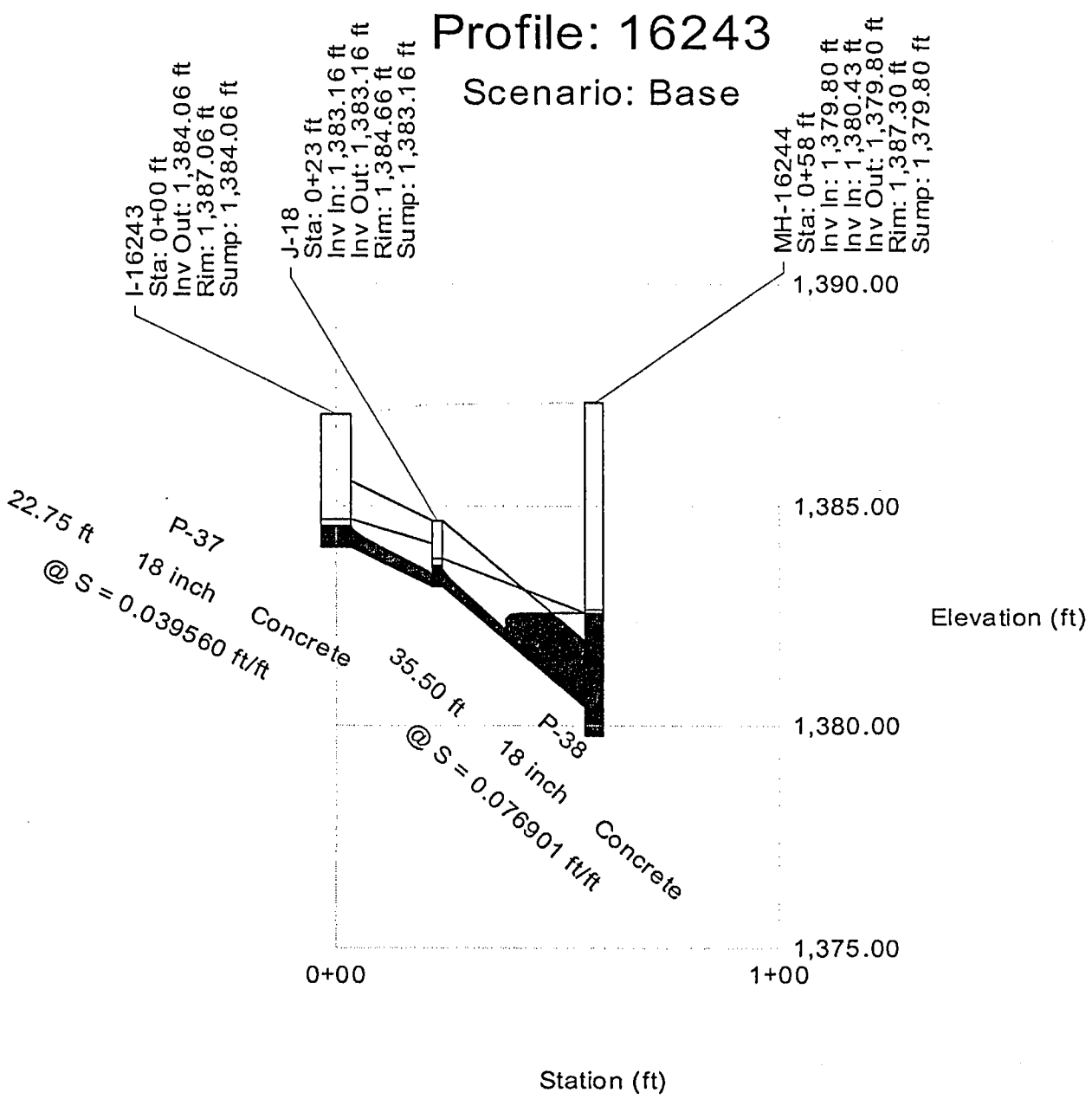

Profile: 16435
Scenario: Base
I-16435
Sta: 0+00 ft
Inv Out: 1,384.16 ft
Rim: 1,387.06 ft
Sump: 1,384.16 ft
J-19
Sta: 0+23 ft
Inv In: 1,383.80 ft
Inv Out: 1,383.80 ft
Rim: 1,385.30 ft
Sump: 1,383.80 ft
J-3
Sta: 0+58 ft
Inv In: 1,380.23 ft
Inv In: 1,380.80 ft
Inv Out: 1,380.23 ft
Rim: 1,387.80 ft
Sump: 1,380.23 ft
1,390.00
1,385.00
1,380.00
Elevation (ft)
P-39
22.75 ft
18 inch
Concrete
@ S = 0.015824 ft/ft
35.25 ft
P-40
18 inch
Concrete
@ S = 0.085106 ft/ft
0+00
1+00
Station (ft)

Profile: 16426

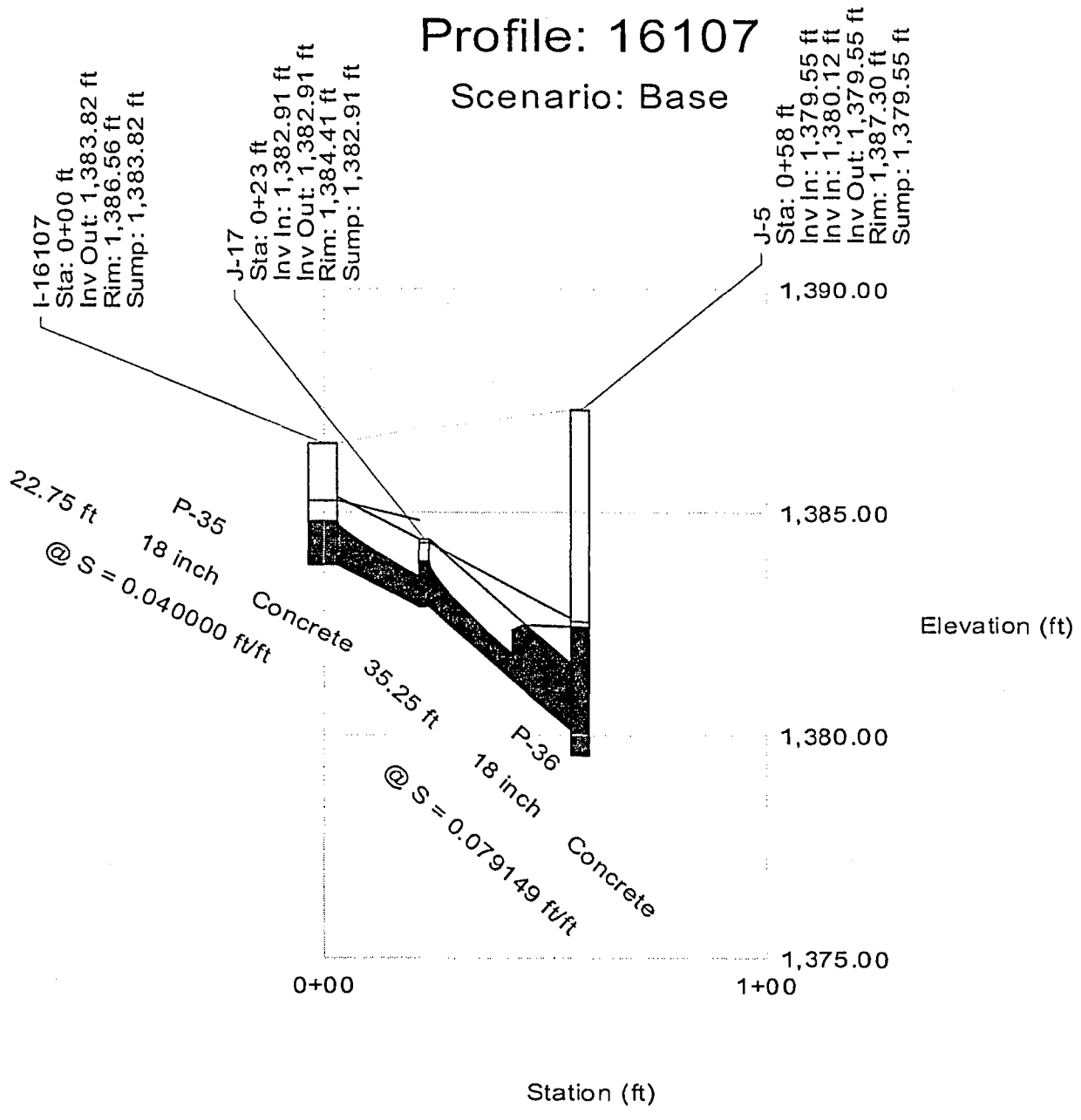
Scenario: Base



Profile
Scenario: Base

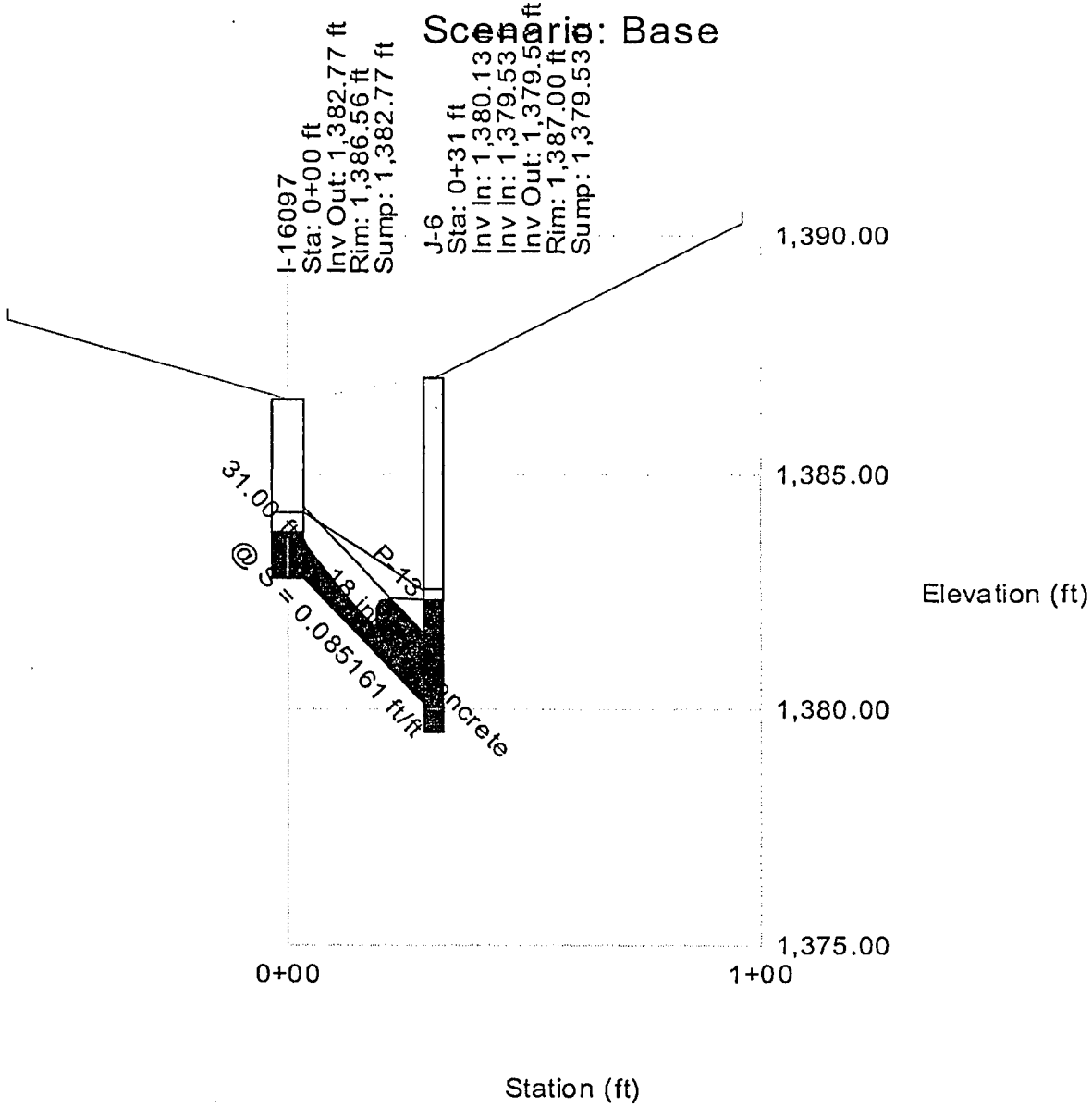


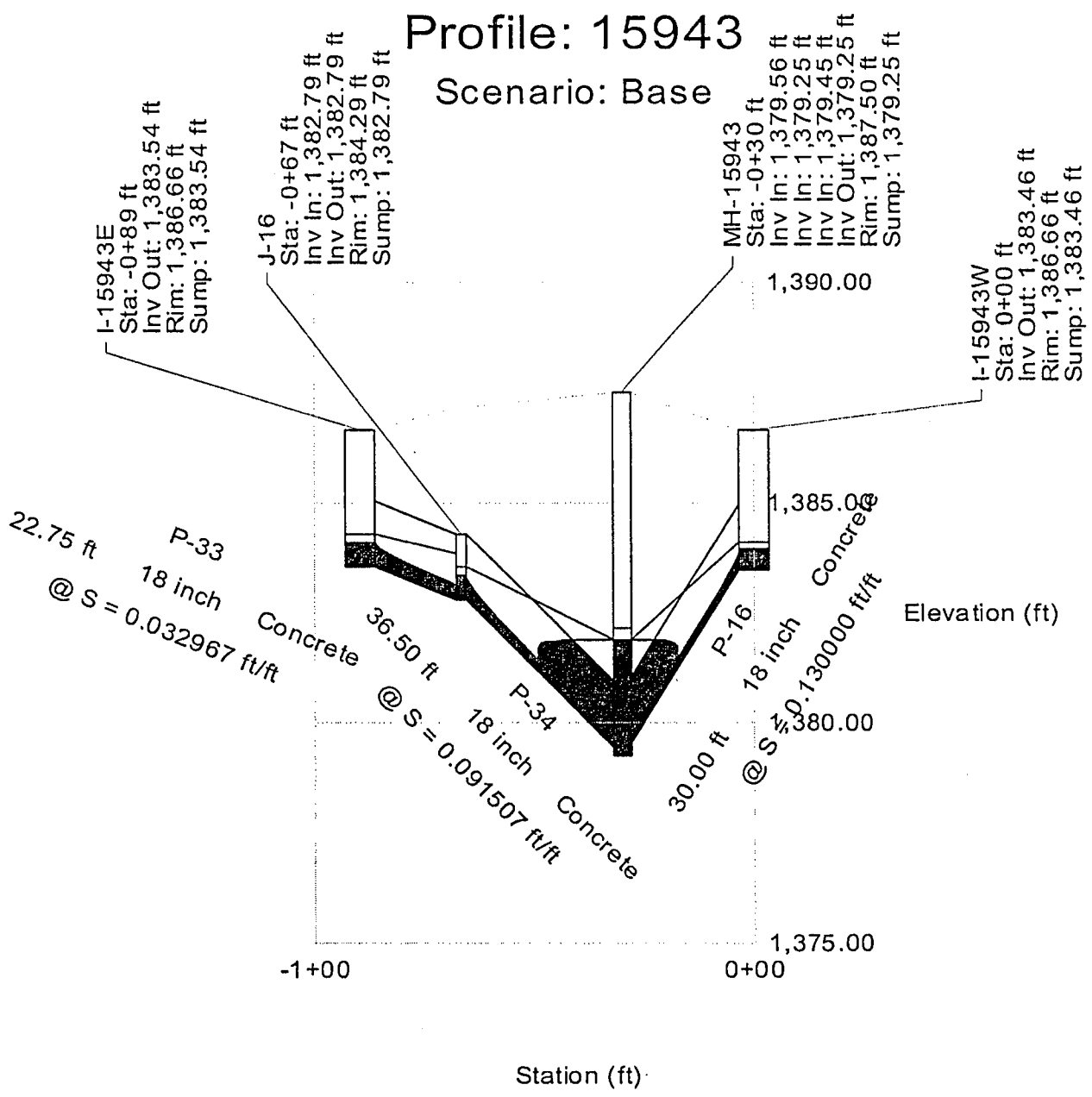
© Haestad Methods, Inc.


Profile: 16107
Scenario: Base
I-16107
Sta: 0+00 ft
Inv Out: 1,383.82 ft
Rim: 1,386.56 ft
Sump: 1,383.82 ft
J-17
Sta: 0+23 ft
Inv In: 1,382.91 ft
Inv Out: 1,382.91 ft
Rim: 1,384.41 ft
Sump: 1,382.91 ft
J-5
Sta: 0+58 ft
Inv In: 1,379.55 ft
Inv In: 1,380.12 ft
Inv Out: 1,379.55 ft
Rim: 1,387.30 ft
Sump: 1,379.55 ft
22.75 ft
P-35
18 inch
Concrete
@ S = 0.040000 ft/ft
35.25 ft
P-36
18 inch
Concrete
@ S = 0.079149 ft/ft
1,390.00
1,385.00
1,380.00
1,375.00
Elevation (ft)
0+00
1+00
Station (ft)

Profile: 16097

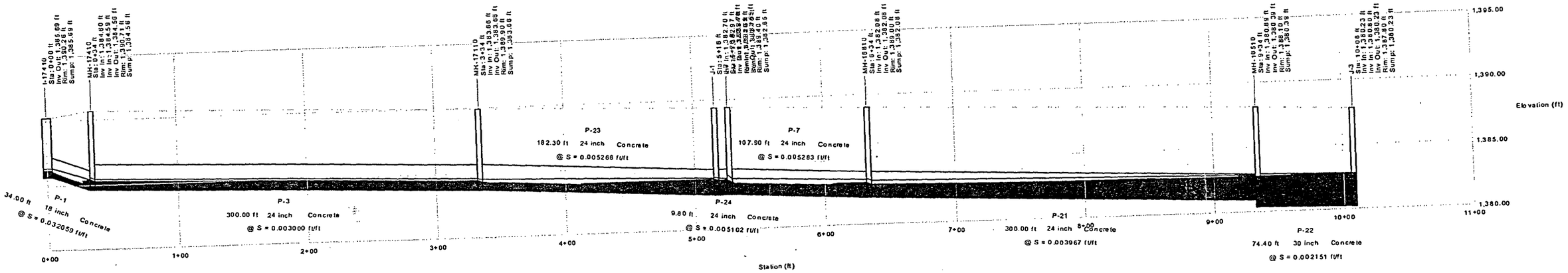
Scenario: Base




Profile: 15943
Scenario: Base
I-15943E
Sta: -0+89 ft
Inv Out: 1,383.54 ft
Rim: 1,386.66 ft
Sump: 1,383.54 ft
J-16
Sta: -0+67 ft
Inv In: 1,382.79 ft
Inv Out: 1,382.79 ft
Rim: 1,384.29 ft
Sump: 1,382.79 ft
MH-15943
Sta: -0+30 ft
Inv In: 1,379.56 ft
Inv In: 1,379.25 ft
Inv In: 1,379.45 ft
Inv Out: 1,379.25 ft
Rim: 1,387.50 ft
Sump: 1,379.25 ft
I-15943W
Sta: 0+00 ft
Inv Out: 1,383.46 ft
Rim: 1,386.66 ft
Sump: 1,383.46 ft
1,390.00
1,385.00
1,380.00
1,375.00
Elevation (ft)
22.75 ft
P-33
18 inch
Concrete
@ S = 0.032967 ft/ft
36.50 ft
P-34
18 inch
Concrete
@ S = 0.091507 ft/ft
30.00 ft
P-16
18 inch
Concrete
@ S = 0.130000 ft/ft
-1+00
0+00
Station (ft)

Profile
Scenario: Base

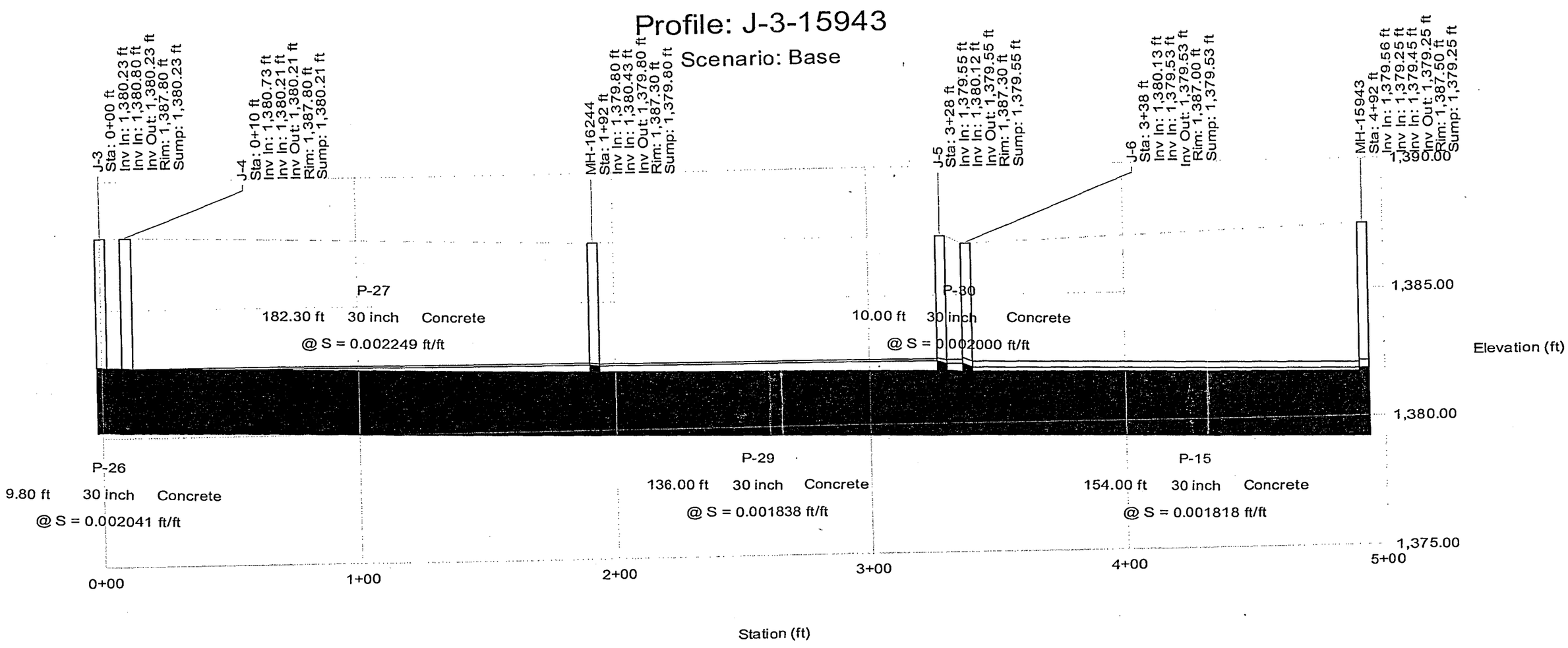
Profile: 17410-J-3
Scenario: Base

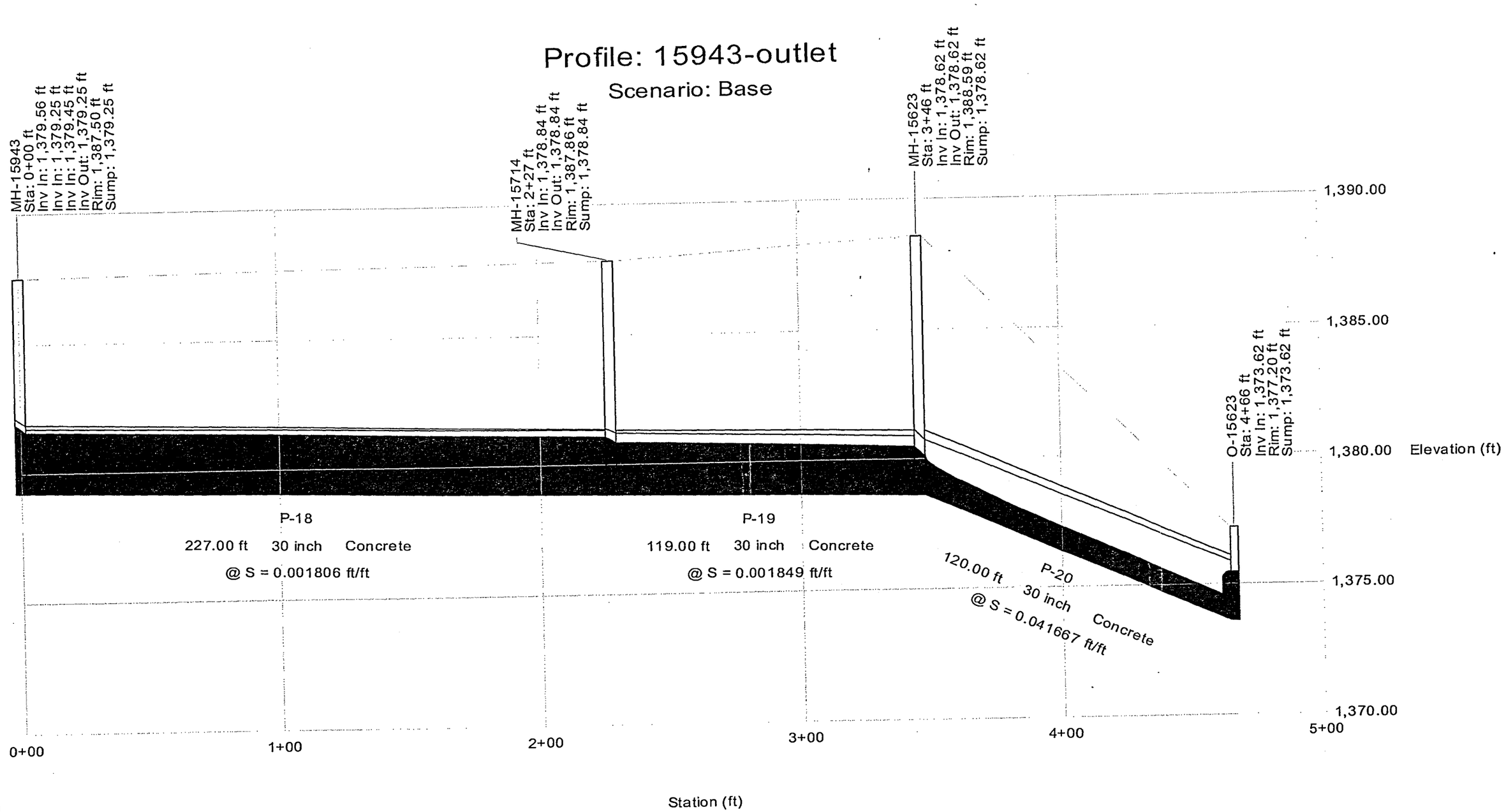


Project Engineer: Guihua Li
StormCAD v5.5 [5.5003]
Page 1 of 1

Title: Ellsworth Road
c:\scadd\system1-rev-5-13-05-cf75-grateonly.stm
05/18/05 03:23:39 PM

© Haestad Methods, Inc.
AMEC Infrastructure Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666


Profile: J-3-15943
Scenario: Base
J-3
Sta: 0+00 ft
Inv In: 1,380.23 ft
Inv In: 1,380.80 ft
Inv Out: 1,380.23 ft
Rim: 1,387.80 ft
Sump: 1,380.23 ft
J-4
Sta: 0+10 ft
Inv In: 1,380.73 ft
Inv In: 1,380.21 ft
Inv Out: 1,380.21 ft
Rim: 1,387.80 ft
Sump: 1,380.21 ft
MH-16244
Sta: 1+92 ft
Inv In: 1,379.80 ft
Inv In: 1,380.43 ft
Inv Out: 1,379.80 ft
Rim: 1,387.30 ft
Sump: 1,379.80 ft
J-5
Sta: 3+28 ft
Inv In: 1,379.55 ft
Inv In: 1,380.12 ft
Inv Out: 1,379.55 ft
Rim: 1,387.30 ft
Sump: 1,379.55 ft
J-6
Sta: 3+38 ft
Inv In: 1,380.13 ft
Inv In: 1,379.53 ft
Inv Out: 1,379.53 ft
Rim: 1,387.00 ft
Sump: 1,379.53 ft
MH-15943
Sta: 4+92 ft
Inv In: 1,379.56 ft
Inv In: 1,379.25 ft
Inv In: 1,379.45 ft
Inv Out: 1,379.25 ft
Rim: 1,387.50 ft
Sump: 1,379.25 ft
P-27
182.30 ft 30 inch Concrete
@ S = 0.002249 ft/ft
P-30
10.00 ft 30 inch Concrete
@ S = 0.002000 ft/ft
P-26
9.80 ft 30 inch Concrete
@ S = 0.002041 ft/ft
P-29
136.00 ft 30 inch Concrete
@ S = 0.001838 ft/ft
P-15
154.00 ft 30 inch Concrete
@ S = 0.001818 ft/ft
1,385.00
1,380.00
1,375.00
Elevation (ft)
0+00
1+00
2+00
3+00
4+00
5+00
Station (ft)


Profile: 15943-outlet
Scenario: Base
MH-15943
Sta: 0+00 ft
Inv In: 1,379.56 ft
Inv In: 1,379.25 ft
Inv In: 1,379.45 ft
Inv Out: 1,379.25 ft
Rim: 1,387.50 ft
Sump: 1,379.25 ft
MH-15714
Sta: 2+27 ft
Inv In: 1,378.84 ft
Inv Out: 1,378.84 ft
Rim: 1,387.86 ft
Sump: 1,378.84 ft
MH-15623
Sta: 3+46 ft
Inv In: 1,378.62 ft
Inv Out: 1,378.62 ft
Rim: 1,388.59 ft
Sump: 1,378.62 ft
O-15623
Sta: 4+66 ft
Inv In: 1,373.62 ft
Rim: 1,377.20 ft
Sump: 1,373.62 ft
1,390.00
1,385.00
1,380.00
1,375.00
1,370.00
Elevation (ft)
P-18
227.00 ft 30 inch Concrete
@ S = 0.001806 ft/ft
P-19
119.00 ft 30 inch Concrete
@ S = 0.001849 ft/ft
P-20
120.00 ft 30 inch Concrete
@ S = 0.041667 ft/ft
0+00
1+00
2+00
3+00
4+00
5+00
Station (ft)

Project Ellsworth Road from Germann to Ray Road
Subject: Road Side Ditch Calculations

The discharges in swale was calculated using the rational method. The rational method calculates the discharge using the following equation:

$Q = CiA$

Where
Q = Discharge (cfs)
C = Runoff Coefficient
i = Rainfall Intensity (in/hr)
A = Drainage Area (acres)

The cummulative drainage area is calculated on an incremental basis by station. At each station, the cummulative area is used to compute a new discharge in the swale based on the total area contributing to the swale at that point.

Based on this discharge, the depth of flow in the swale is computed using equation (6).

The velocity is then computed as Q/A = Q/equation (2).

Based on the velocity calculated for each segment of the swale, a cummulative travel time can be calculated where the travel time for each segment = L/V/60.

The time of concentration at any point along the swale is considered to be equal to the total travel time. The rainfall intensity, i, is chosen such that its duration is equal to the time of concentration. For travel times <5 min or > 60 min, the time of concentration is set equal to 5 or 60 respectively.

For travel times between 5 and 60 min, an iterative procedure is used compute the swale hydraulics. As an initial guess, Q is calculated using the rainfall intesity based on the travel time from the previous segment of swale. Based on this discharge, the hydraulics of the swale are determined and a new travel time is calculated. A new value of i is interpolated from the Intesity Duration curve using the new travel time, and a new discharge is calculated. This procedure is repeated until the results from 2 successive iterations are within 0.1 min.

Project:	Ellsworth Road		
Subject	Pavement Drainage for Interim condition (road side ditch calculations)		
		Filename:	PavementDrainage.xls
Computed By:	GL / AFC	Checked By:	Date: 05/20/2005

South Bound Road Side Ditch Calculations (Station 3+41 to Station 7+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Tc	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
7+00	17.27	35.00	17.73	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00028	0.00	0.00
6+50	16.54	42.00	25.46	0.85	0.35	0.03	0.03	0.15	0.31	2.73	2.73	5.64	4	4	4	8.25	2.47	0.025	0.00028	0.35	2.79
6+00	15.97	42.00	26.03	0.85	0.35	0.03	0.05	0.30	0.36	2.30	5.03	5.64	4	4	4	8.25	2.47	0.025	0.00028	0.45	3.61
5+50	15.40	42.00	26.60	0.85	0.35	0.03	0.08	0.40	0.39	2.14	7.17	5.09	4	4	4	8.25	2.47	0.025	0.00028	0.50	4.04
5+00	14.82	42.00	27.18	0.85	0.35	0.03	0.10	0.47	0.41	2.05	9.21	4.54	4	4	4	8.25	2.47	0.025	0.00028	0.54	4.30
4+50	14.25	42.00	27.75	0.85	0.35	0.03	0.13	0.53	0.42	1.99	11.20	4.13	4	4	4	8.25	2.47	0.025	0.00028	0.56	4.50
4+00	13.68	42.00	28.32	0.85	0.35	0.02	0.15	0.59	0.43	1.93	13.13	3.86	4	4	4	8.25	2.47	0.025	0.00028	0.59	4.69
3+41	13.00	42.00	29.00	0.85	0.35	0.03	0.18	0.66	0.44	2.22	15.36	3.60	4	4	4	8.25	2.47	0.025	0.00028	0.61	4.87

South Bound Road Side Ditch Calculations (Station 7+00 to Station 19+50)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
7+00	17.27	35.00	17.73	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00096	0.00	0.00
7+50	18.28	40.00	21.72	0.85	0.35	0.03	0.03	0.15	0.46	1.81	1.81	5.64	4	6	5	10.21	3.11	0.025	0.00096	0.25	2.55
8+00	19.29	38.00	18.71	0.85	0.35	0.03	0.05	0.30	0.55	1.52	3.33	5.64	4	6	5	10.21	3.11	0.025	0.00096	0.33	3.30
8+50	20.30	35.00	14.70	0.85	0.35	0.03	0.08	0.44	0.61	1.38	4.70	5.64	4	6	5	10.21	3.11	0.025	0.00096	0.38	3.83
9+00	21.31	37.00	15.69	0.85	0.35	0.03	0.11	0.57	0.64	1.30	6.00	5.36	4	6	5	10.21	3.11	0.025	0.00096	0.42	4.20
9+50	22.32	38.00	15.68	0.85	0.35	0.03	0.13	0.68	0.67	1.24	7.24	5.09	4	6	5	10.21	3.11	0.025	0.00096	0.45	4.50
10+00	23.33	39.00	15.67	0.85	0.35	0.03	0.16	0.78	0.70	1.19	8.43	4.81	4	6	5	10.21	3.11	0.025	0.00096	0.47	4.74
10+50	24.34	39.00	14.66	0.85	0.35	0.03	0.19	0.87	0.72	1.16	9.59	4.54	4	6	5	10.21	3.11	0.025	0.00096	0.49	4.94
11+00	25.35	40.00	14.65	0.85	0.35	0.03	0.22	0.95	0.73	1.14	10.73	4.26	4	6	5	10.21	3.11	0.025	0.00096	0.51	5.10
11+50	26.36	41.00	14.64	0.85	0.35	0.03	0.25	1.05	0.75	1.11	11.84	4.13	4	6	5	10.21	3.11	0.025	0.00096	0.53	5.29
12+00	27.37	42.00	14.63	0.85	0.35	0.03	0.29	1.15	0.77	1.09	12.93	4.00	4	6	5	10.21	3.11	0.025	0.00096	0.55	5.47
12+50	28.38	45.00	16.62	0.85	0.35	0.03	0.32	1.20	0.78	1.07	14.00	3.73	4	6	5	10.21	3.11	0.025	0.00096	0.56	5.56
13+00	29.39	47.00	17.61	0.85	0.35	0.04	0.36	1.29	0.79	1.06	15.06	3.60	4	6	5	10.21	3.11	0.025	0.00096	0.57	5.71
13+50	30.40	49.00	18.60	0.85	0.35	0.04	0.39	1.39	0.80	1.04	16.09	3.52	4	6	5	10.21	3.11	0.025	0.00096	0.59	5.87
14+00	31.41	48.00	16.59	0.85	0.35	0.04	0.43	1.49	0.82	1.02	17.11	3.44	4	6	5	10.21	3.11	0.025	0.00096	0.60	6.02
14+50	32.42	49.00	16.58	0.85	0.35	0.04	0.47	1.58	0.83	1.00	18.11	3.36	4	6	5	10.21	3.11	0.025	0.00096	0.62	6.16
15+00	33.43	50.00	16.57	0.85	0.35	0.04	0.51	1.67	0.84	0.99	19.10	3.28	4	6	5	10.21	3.11	0.025	0.00096	0.63	6.30
15+50	34.44	51.00	16.56	0.85	0.35	0.04	0.55	1.76	0.85	0.98	20.08	3.20	4	6	5	10.21	3.11	0.025	0.00096	0.64	6.42
16+00	35.45	51.00	15.55	0.85	0.35	0.04	0.59	1.84	0.86	0.96	21.04	3.12	4	6	5	10.21	3.11	0.025	0.00096	0.65	6.53
16+50	36.46	55.00	18.54	0.85	0.35	0.04	0.63	1.93	0.87	0.95	22.00	3.04	4	6	5	10.21	3.11	0.025	0.00096	0.66	6.64
17+00	37.47	53.00	15.53	0.85	0.35	0.04	0.68	2.00	0.88	0.94	22.94	2.96	4	6	5	10.21	3.11	0.025	0.00096	0.67	6.74
17+50	38.48	57.00	18.52	0.85	0.35	0.04	0.72	2.14	0.90	0.93	23.87	2.96	4	6	5	10.21	3.11	0.025	0.00096	0.69	6.90
18+00	39.49	57.00	17.51	0.85	0.35	0.05	0.77	2.21	0.90	0.92	24.79	2.88	4	6	5	10.21	3.11	0.025	0.00096	0.70	6.99
18+50	40.02	57.00	16.98	0.85	0.35	0.05	0.81	2.28	0.91	0.92	25.71	2.80	4	6	5	10.21	3.11	0.025	0.00096	0.71	7.07
19+00	40.01	59.00	18.99	0.85	0.35	0.05	0.86	2.34	0.92	0.91	26.62	2.72	4	6	5	10.21	3.11	0.025	0.00096	0.71	7.14
19+50	41.43	64.00	22.57	0.85	0.35	0.05	0.91	2.40	0.92	0.90	27.52	2.64	4	6	5	10.21	3.11	0.025	0.00096	0.72	7.21

North Bound Road Side Ditch Calculations (Station 9+00 to Station 19+50)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
9+00	13.00	36.00	23.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	6	4	5	10.21	3.11	0.025	0.00019	0.00	0.00
9+50	13.00	30.00	17.00	0.85	0.35	0.02	0.02	0.11	0.23	3.58	3.58	5.64	6	4	5	10.21	3.11	0.025	0.00019	0.31	3.08
10+00	13.00	37.00	24.00	0.85	0.35	0.02	0.04	0.22	0.28	3.00	6.58	5.36	6	4	5	10.21	3.11	0.025	0.00019	0.40	4.02
10+50	13.89	37.00	23.11	0.85	0.35	0.02	0.06	0.29	0.30	2.80	9.38	4.54	6	4	5	10.21	3.11	0.025	0.00019	0.44	4.44
11+00	14.78	37.00	22.22	0.85	0.35	0.02	0.09	0.35	0.31	2.68	12.06	4.00	6	4	5	10.21	3.11	0.025	0.00019	0.48	4.76
11+50	15.67	37.00	21.33	0.85	0.35	0.02	0.11	0.42	0.32	2.57	14.63	3.73	6	4	5	10.21	3.11	0.025	0.00019	0.51	5.07
12+00	16.55	36.00	19.45	0.85	0.35	0.02	0.14	0.47	0.33	2.50	17.12	3.44	6	4	5	10.21	3.11	0.025	0.00019	0.53	5.29
12+50	17.44	38.00	20.56	0.85	0.35	0.03	0.16	0.53	0.34	2.42	19.54	3.28	6	4	5	10.21	3.11	0.025	0.00019	0.55	5.54
13+00	18.33	39.00	20.67	0.85	0.35	0.03	0.19	0.58	0.35	2.36	21.90	3.12	6	4	5	10.21	3.11	0.025	0.00019	0.58	5.75
13+50	19.22	39.00	19.78	0.85	0.35	0.03	0.21	0.62	0.36	2.33	24.23	2.88	6	4	5	10.21	3.11	0.025	0.00019	0.59	5.87
14+00	20.11	38.00	17.89	0.85	0.35	0.03	0.24	0.66	0.36	2.29	26.53	2.72	6	4	5	10.21	3.11	0.025	0.00019	0.60	6.00
14+50	21.00	49.00	28.00	0.85	0.35	0.03	0.27	0.70	0.37	2.26	28.78	2.56	6	4	5	10.21	3.11	0.025	0.00019	0.61	6.15
15+00	24.80	49.00	24.20	0.85	0.35	0.03	0.31	0.73	0.37	2.24	31.02	2.37	6	4	5	10.21	3.11	0.025	0.00019	0.62	6.24
15+50	28.60	48.00	19.40	0.85	0.35	0.04	0.34	0.79	0.38	2.19	33.21	2.31	6	4	5	10.21	3.11	0.025	0.00019	0.64	6.44
16+00	32.40	51.00	18.60	0.85	0.35	0.04	0.38	0.86	0.39	2.14	35.35	2.25	6	4	5	10.21	3.11	0.025	0.00019	0.66	6.64
16+50	36.20	57.00	20.80	0.85	0.35	0.04	0.42	0.93	0.40	2.10	37.45	2.19	6	4	5	10.21	3.11	0.025	0.00019	0.68	6.84
17+00	40.00	61.00	21.00	0.85	0.35	0.05	0.47	1.00	0.40	2.06	39.51	2.12	6	4	5	10.21	3.11	0.025	0.00019	0.70	7.05
17+50	40.00	60.00	20.00	0.85	0.35	0.05	0.52	1.07	0.41	2.03	41.54	2.06	6	4	5	10.21	3.11	0.025	0.00019	0.72	7.22
18+00	40.00	60.00	20.00	0.85	0.35	0.05	0.57	1.13	0.42	2.00	43.54	2.00	6	4	5	10.21	3.11	0.025	0.00019	0.74	7.38
18+50	40.00	58.00	18.00	0.85	0.35	0.05	0.61	1.19	0.42	1.98	45.52	1.94	6	4	5	10.21	3.11	0.025	0.00019	0.75	7.51
19+00	40.00	55.00	15.00	0.85	0.35	0.05	0.66	1.24	0.43	1.96	47.47	1.88	6	4	5	10.21	3.11	0.025	0.00019	0.76	7.62
19+50	40.00	56.00	16.00	0.85	0.35	0.05	0.70	1.28	0.43	1.94	49.41	1.82	6	4	5	10.21	3.11	0.025	0.00019	0.77	7.71

South Bound Road Side Ditch Calculations (Station 20+50 to Station 25+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
20+50	47.97	61.00	13.03	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	6	5	10.21	3.11	0.025	0.00187	0.00	0.00
21+00	49.00	64.00	15.00	0.85	0.35	0.05	0.05	0.30	0.71	1.18	1.18	5.64	4	6	5	10.21	3.11	0.025	0.00187	0.29	2.93
21+50	49.00	63.00	14.00	0.85	0.35	0.05	0.11	0.60	0.84	0.99	2.17	5.64	4	6	5	10.21	3.11	0.025	0.00187	0.38	3.80
22+00	49.00	64.00	15.00	0.85	0.35	0.05	0.16	0.91	0.93	0.90	3.07	5.64	4	6	5	10.21	3.11	0.025	0.00187	0.44	4.42
22+50	49.00	64.00	15.00	0.85	0.35	0.05	0.21	1.21	1.00	0.83	3.90	5.64	4	6	5	10.21	3.11	0.025	0.00187	0.49	4.93
23+00	49.00	61.00	12.00	0.85	0.35	0.05	0.27	1.51	1.06	0.79	4.69	5.64	4	6	5	10.21	3.11	0.025	0.00187	0.53	5.35
23+50	47.92	62.00	14.08	0.85	0.35	0.05	0.32	1.80	1.10	0.76	5.45	5.64	4	6	5	10.21	3.11	0.025	0.00187	0.57	5.72
24+00	45.75	61.00	15.25	0.85	0.35	0.05	0.37	1.99	1.13	0.74	6.18	5.36	4	6	5	10.21	3.11	0.025	0.00187	0.59	5.93
24+50	43.58	59.00	15.42	0.85	0.35	0.05	0.42	2.25	1.17	0.71	6.90	5.36	4	6	5	10.21	3.11	0.025	0.00187	0.62	6.21
25+00	41.42	59.00	17.58	0.85	0.35	0.05	0.47	2.38	1.18	0.70	7.60	5.09	4	6	5	10.21	3.11	0.025	0.00187	0.63	6.34
25+50	39.25	59.00	19.75	0.85	0.35	0.05	0.51	2.47	1.19	0.70	8.30	4.81	4	6	5	10.21	3.11	0.025	0.00187	0.64	6.43
26+00	37.08	58.00	20.92	0.85	0.35	0.04	0.56	2.53	1.20	0.69	9.00	4.54	4	6	5	10.21	3.11	0.025	0.00187	0.65	6.49
26+50	36.00	58.00	22.00	0.85	0.35	0.04	0.60	2.73	1.22	0.68	9.68	4.54	4	6	5	10.21	3.11	0.025	0.00187	0.67	6.68
27+00	36.00	60.00	24.00	0.85	0.35	0.04	0.65	2.75	1.23	0.68	10.36	4.26	4	6	5	10.21	3.11	0.025	0.00187	0.67	6.70
27+50	36.00	63.00	27.00	0.85	0.35	0.05	0.69	2.86	1.24	0.67	11.03	4.13	4	6	5	10.21	3.11	0.025	0.00187	0.68	6.80
28+00	36.00	60.00	24.00	0.85	0.35	0.04	0.74	3.04	1.26	0.66	11.69	4.13	4	6	5	10.21	3.11	0.025	0.00187	0.70	6.96
28+50	36.00	61.00	25.00	0.85	0.35	0.05	0.78	3.13	1.27	0.66	12.35	4.00	4	6	5	10.21	3.11	0.025	0.00187	0.70	7.03
29+00	36.00	61.00	25.00	0.85	0.35	0.05	0.83	3.20	1.27	0.65	13.00	3.86	4	6	5	10.21	3.11	0.025	0.00187	0.71	7.09
29+50	36.00	61.00	25.00	0.85	0.35	0.05	0.87	3.37	1.29	0.65	13.65	3.86	4	6	5	10.21	3.11	0.025	0.00187	0.72	7.23
30+00	36.00	61.00	25.00	0.85	0.35	0.05	0.92	3.43	1.30	0.64	14.29	3.73	4	6	5	10.21	3.11	0.025	0.00187	0.73	7.27
30+50	36.00	61.00	25.00	0.85	0.35	0.05	0.96	3.59	1.31	0.64	14.93	3.73	4	6	5	10.21	3.11	0.025	0.00187	0.74	7.40
31+00	36.00	61.00	25.00	0.85	0.35	0.05	1.01	3.63	1.31	0.63	15.56	3.60	4	6	5	10.21	3.11	0.025	0.00187	0.74	7.43
31+50	36.00	61.00	25.00	0.85	0.35	0.05	1.05	3.71	1.32	0.63	16.19	3.52	4	6	5	10.21	3.11	0.025	0.00187	0.75	7.49
32+00	36.00	60.00	24.00	0.85	0.35	0.04	1.10	3.87	1.34	0.62	16.82	3.52	4	6	5	10.21	3.11	0.025	0.00187	0.76	7.61
32+50	36.00	62.00	26.00	0.85	0.35	0.05	1.14	3.93	1.34	0.62	17.44	3.44	4	6	5	10.21	3.11	0.025	0.00187	0.77	7.66
33+00	36.00	65.00	29.00	0.85	0.35	0.05	1.19	4.00	1.35	0.62	18.06	3.36	4	6	5	10.21	3.11	0.025	0.00187	0.77	7.71
33+50	36.00	64.00	28.00	0.85	0.35	0.05	1.24	4.16	1.36	0.61	18.67	3.36	4	6	5	10.21	3.11	0.025	0.00187	0.78	7.82
34+00	36.00	63.00	27.00	0.85	0.35	0.05	1.28	4.21	1.36	0.61	19.28	3.28	4	6	5	10.21	3.11	0.025	0.00187	0.79	7.86
34+50	36.00	63.00	27.00	0.85	0.35	0.05	1.33	4.36	1.38	0.61	19.89	3.28	4	6	5	10.21	3.11	0.025	0.00187	0.80	7.96
35+00	36.00	63.00	27.00	0.85	0.35	0.05	1.37	4.40	1.38	0.60	20.49	3.20	4	6	5	10.21	3.11	0.025	0.00187	0.80	7.99
35+50	36.00	63.00	27.00	0.85	0.35	0.05	1.42	4.43	1.38	0.60	21.10	3.12	4	6	5	10.21	3.11	0.025	0.00187	0.80	8.01
36+00	36.00	62.00	26.00	0.85	0.35	0.05	1.47	4.57	1.39	0.60	21.69	3.12	4	6	5	10.21	3.11	0.025	0.00187	0.81	8.11
36+50	36.00	58.00	22.00	0.85	0.35	0.04	1.51	4.59	1.39	0.60	22.29	3.04	4	6	5	10.21	3.11	0.025	0.00187	0.81	8.12
37+00	36.00	58.00	22.00	0.85	0.35	0.04	1.55	4.72	1.40	0.59	22.89	3.04	4	6	5	10.21	3.11	0.025	0.00187	0.82	8.20
37+50	36.00	58.00	22.00	0.85	0.35	0.04	1.60	4.73	1.40	0.59	23.48	2.96	4	6	5	10.21	3.11	0.025	0.00187	0.82	8.21
38+00	36.00	58.00	22.00	0.85	0.35	0.04	1.64	4.73	1.40	0.59	24.07	2.88	4	6	5	10.21	3.11	0.025	0.00187	0.82	8.21
38+50	36.00	58.00	22.00	0.85	0.35	0.04	1.69	4.86	1.41	0.59	24.66	2.88	4	6	5	10.21	3.11	0.025	0.00187	0.83	8.29

North Bound Road Side Ditch Calculations (Station 20+50 to Station 25+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
20+50	40.00	60.00	20.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.00	0.00
21+00	40.00	59.00	19.00	0.85	0.35	0.05	0.05	0.26	0.75	1.11	1.11	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.27	2.65
21+50	40.00	59.00	19.00	0.85	0.35	0.05	0.09	0.53	0.89	0.94	2.05	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.34	3.44
22+00	40.00	59.00	19.00	0.85	0.35	0.05	0.14	0.79	0.98	0.85	2.90	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.40	4.01
22+50	40.00	59.00	19.00	0.85	0.35	0.05	0.19	1.05	1.06	0.79	3.69	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.45	4.46
23+00	40.00	59.00	19.00	0.85	0.35	0.05	0.23	1.32	1.12	0.75	4.43	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.49	4.85
23+50	39.67	59.00	19.33	0.85	0.35	0.05	0.28	1.58	1.17	0.71	5.14	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.52	5.19
24+00	39.00	59.00	20.00	0.85	0.35	0.05	0.33	1.84	1.22	0.69	5.83	5.64	6	4	5	10.21	3.11	0.025	0.00239	0.55	5.50
24+50	38.33	59.00	20.67	0.85	0.35	0.05	0.37	1.99	1.24	0.67	6.50	5.36	6	4	5	10.21	3.11	0.025	0.00239	0.57	5.67
25+00	37.67	59.00	21.33	0.85	0.35	0.05	0.42	2.12	1.26	0.66	7.16	5.09	6	4	5	10.21	3.11	0.025	0.00239	0.58	5.80
25+50	37.00	59.00	22.00	0.85	0.35	0.04	0.46	2.35	1.29	0.64	7.81	5.09	6	4	5	10.21	3.11	0.025	0.00239	0.60	6.03
26+00	36.33	60.00	23.67	0.85	0.35	0.04	0.51	2.44	1.30	0.64	8.45	4.81	6	4	5	10.21	3.11	0.025	0.00239	0.61	6.11
26+50	36.00	60.00	24.00	0.85	0.35	0.04	0.55	2.50	1.31	0.63	9.08	4.54	6	4	5	10.21	3.11	0.025	0.00239	0.62	6.17
27+00	36.00	62.00	26.00	0.85	0.35	0.05	0.60	2.71	1.34	0.62	9.70	4.54	6	4	5	10.21	3.11	0.025	0.00239	0.64	6.36
27+50	36.00	63.00	27.00	0.85	0.35	0.05	0.64	2.74	1.34	0.62	10.32	4.26	6	4	5	10.21	3.11	0.025	0.00239	0.64	6.39
28+00	36.00	63.00	27.00	0.85	0.35	0.05	0.69	2.94	1.37	0.61	10.93	4.26	6	4	5	10.21	3.11	0.025	0.00239	0.66	6.55
28+50	36.00	63.00	27.00	0.85	0.35	0.05	0.74	3.03	1.38	0.60	11.54	4.13	6	4	5	10.21	3.11	0.025	0.00239	0.66	6.64
29+00	36.00	63.00	27.00	0.85	0.35	0.05	0.78	3.12	1.39	0.60	12.14	4.00	6	4	5	10.21	3.11	0.025	0.00239	0.67	6.71
29+50	36.00	63.00	27.00	0.85	0.35	0.05	0.83	3.30	1.41	0.59	12.73	4.00	6	4	5	10.21	3.11	0.025	0.00239	0.69	6.85
30+00	36.00	63.00	27.00	0.85	0.35	0.05	0.87	3.37	1.41	0.59	13.32	3.86	6	4	5	10.21	3.11	0.025	0.00239	0.69	6.91
30+50	36.00	63.00	27.00	0.85	0.35	0.05	0.92	3.55	1.43	0.58	13.90	3.86	6	4	5	10.21	3.11	0.025	0.00239	0.70	7.04
31+00	36.00	63.00	27.00	0.85	0.35	0.05	0.96	3.60	1.44	0.58	14.48	3.73	6	4	5	10.21	3.11	0.025	0.00239	0.71	7.08
31+50	36.00	63.00	27.00	0.85	0.35	0.05	1.01	3.64	1.44	0.58	15.06	3.60	6	4	5	10.21	3.11	0.025	0.00239	0.71	7.10
32+00	36.00	63.00	27.00	0.85	0.35	0.05	1.06	3.80	1.46	0.57	15.63	3.60	6	4	5	10.21	3.11	0.025	0.00239	0.72	7.22
32+50	36.00	62.00	26.00	0.85	0.35	0.05	1.10	3.88	1.47	0.57	16.20	3.52	6	4	5	10.21	3.11	0.025	0.00239	0.73	7.28
33+00	36.00	64.00	28.00	0.85	0.35	0.05	1.15	4.04	1.48	0.56	16.76	3.52	6	4	5	10.21	3.11	0.025	0.00239	0.74	7.39
33+50	36.00	62.00	26.00	0.85	0.35	0.05	1.19	4.11	1.49	0.56	17.32	3.44	6	4	5	10.21	3.11	0.025	0.00239	0.74	7.44
34+00	36.00	60.00	24.00	0.85	0.35	0.04	1.24	4.26	1.50	0.56	17.88	3.44	6	4	5	10.21	3.11	0.025	0.00239	0.75	7.54
34+50	36.00	59.00	23.00	0.85	0.35	0.04	1.28	4.31	1.50	0.55	18.43	3.36	6	4	5	10.21	3.11	0.025	0.00239	0.76	7.57
35+00	36.00	59.00	23.00	0.85	0.35	0.04	1.33	4.36	1.51	0.55	18.99	3.28	6	4	5	10.21	3.11	0.025	0.00239	0.76	7.60
35+50	36.00	59.00	23.00	0.85	0.35	0.04	1.37	4.50	1.52	0.55	19.53	3.28	6	4	5	10.21	3.11	0.025	0.00239	0.77	7.69
36+00	36.00	59.00	23.00	0.85	0.35	0.04	1.42	4.53	1.52	0.55	20.08	3.20	6	4	5	10.21	3.11	0.025	0.00239	0.77	7.71
36+50	36.00	59.00	23.00	0.85	0.35	0.04	1.46	4.67	1.53	0.54	20.62	3.20	6	4	5	10.21	3.11	0.025	0.00239	0.78	7.80
37+00	36.00	58.00	22.00	0.85	0.35	0.04	1.50	4.70	1.54	0.54	21.17	3.12	6	4	5	10.21	3.11	0.025	0.00239	0.78	7.82
37+50	36.00	58.00	22.00	0.85	0.35	0.04	1.55	4.83	1.55	0.54	21.71	3.12	6	4	5	10.21	3.11	0.025	0.00239	0.79	7.90
38+00	36.00	59.00	23.00	0.85	0.35	0.04	1.59	4.84	1.55	0.54	22.24	3.04	6	4	5	10.21	3.11	0.025	0.00239	0.79	7.91
38+50	36.00	59.00	23.00	0.85	0.35	0.04	1.64	4.98	1.56	0.53	22.78	3.04	6	4	5	10.21	3.11	0.025	0.00239	0.80	7.99

South Bound Road Side Ditch Calculations (Station 44+50 to Station 39+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
46+00	40.00	54.00	14.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	6	5	10.21	3.11	0.025	0.00156	0.00	0.00
45+50	40.00	54.00	14.00	0.85	0.35	0.04	0.04	0.25	0.63	1.32	1.32	5.64	4	6	5	10.21	3.11	0.025	0.00156	0.28	2.83
45+00	40.00	54.00	14.00	0.85	0.35	0.04	0.09	0.50	0.75	1.11	2.43	5.64	4	6	5	10.21	3.11	0.025	0.00156	0.37	3.67
44+50	40.00	55.00	15.00	0.85	0.35	0.05	0.13	0.76	0.83	1.00	3.44	5.64	4	6	5	10.21	3.11	0.025	0.00156	0.43	4.27
44+00	40.00	55.00	15.00	0.85	0.35	0.05	0.18	1.01	0.89	0.93	4.37	5.64	4	6	5	10.21	3.11	0.025	0.00156	0.48	4.76
43+50	40.00	57.00	17.00	0.85	0.35	0.05	0.23	1.27	0.94	0.88	5.25	5.64	4	6	5	10.21	3.11	0.025	0.00156	0.52	5.19
43+00	39.47	57.00	17.53	0.85	0.35	0.05	0.27	1.45	0.98	0.85	6.11	5.36	4	6	5	10.21	3.11	0.025	0.00156	0.55	5.45
42+50	38.80	57.00	18.20	0.85	0.35	0.05	0.32	1.69	1.01	0.82	6.93	5.36	4	6	5	10.21	3.11	0.025	0.00156	0.58	5.78
42+00	38.13	57.00	18.87	0.85	0.35	0.04	0.36	1.84	1.04	0.80	7.73	5.09	4	6	5	10.21	3.11	0.025	0.00156	0.60	5.95
41+50	37.47	57.00	19.53	0.85	0.35	0.04	0.41	1.95	1.05	0.79	8.53	4.81	4	6	5	10.21	3.11	0.025	0.00156	0.61	6.09
41+00	36.80	61.00	24.20	0.85	0.35	0.05	0.45	2.04	1.06	0.78	9.31	4.54	4	6	5	10.21	3.11	0.025	0.00156	0.62	6.20
40+50	36.13	61.00	24.87	0.85	0.35	0.05	0.50	2.11	1.07	0.78	10.09	4.26	4	6	5	10.21	3.11	0.025	0.00156	0.63	6.28
40+00	36.00	61.00	25.00	0.85	0.35	0.05	0.54	2.31	1.10	0.76	10.85	4.26	4	6	5	10.21	3.11	0.025	0.00156	0.65	6.49
39+50	36.00	57.00	21.00	0.85	0.35	0.04	0.58	2.41	1.11	0.75	11.60	4.13	4	6	5	10.21	3.11	0.025	0.00156	0.66	6.60
39+00	36.00	56.00	20.00	0.85	0.35	0.04	0.63	2.51	1.12	0.74	12.34	4.00	4	6	5	10.21	3.11	0.025	0.00156	0.67	6.70

North Bound Road Side Ditch Calculations (Station 39+00 to Station 46+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
39+00	36.00	61.00	25.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	6	5	10.21	3.11	0.025	0.00153	0.00	0.00
39+50	36.00	62.00	26.00	0.85	0.35	0.05	0.05	0.26	0.63	1.33	1.33	5.64	4	6	5	10.21	3.11	0.025	0.00153	0.29	2.86
40+00	36.00	62.00	26.00	0.85	0.35	0.05	0.09	0.51	0.75	1.11	2.44	5.64	4	6	5	10.21	3.11	0.025	0.00153	0.37	3.71
40+50	36.12	64.00	27.88	0.85	0.35	0.05	0.14	0.78	0.83	1.01	3.45	5.64	4	6	5	10.21	3.11	0.025	0.00153	0.43	4.33
41+00	36.80	66.00	29.20	0.85	0.35	0.05	0.19	1.04	0.89	0.93	4.38	5.64	4	6	5	10.21	3.11	0.025	0.00153	0.48	4.84
41+50	37.47	68.00	30.53	0.85	0.35	0.05	0.23	1.32	0.95	0.88	5.26	5.64	4	6	5	10.21	3.11	0.025	0.00153	0.53	5.28
42+00	38.13	70.00	31.87	0.85	0.35	0.05	0.28	1.52	0.98	0.85	6.11	5.36	4	6	5	10.21	3.11	0.025	0.00153	0.56	5.57
42+50	38.80	71.00	32.20	0.85	0.35	0.05	0.33	1.80	1.02	0.82	6.92	5.36	4	6	5	10.21	3.11	0.025	0.00153	0.59	5.93
43+00	39.47	73.00	33.53	0.85	0.35	0.05	0.39	1.97	1.05	0.80	7.72	5.09	4	6	5	10.21	3.11	0.025	0.00153	0.61	6.13
43+50	40.00	74.00	34.00	0.85	0.35	0.05	0.44	2.11	1.06	0.78	8.50	4.81	4	6	5	10.21	3.11	0.025	0.00153	0.63	6.30
44+00	40.00	75.00	35.00	0.85	0.35	0.05	0.49	2.23	1.08	0.77	9.27	4.54	4	6	5	10.21	3.11	0.025	0.00153	0.64	6.43
44+50	40.00	76.00	36.00	0.85	0.35	0.05	0.55	2.33	1.09	0.76	10.04	4.26	4	6	5	10.21	3.11	0.025	0.00153	0.65	6.53
45+00	40.00	76.00	36.00	0.85	0.35	0.05	0.60	2.55	1.12	0.75	10.78	4.26	4	6	5	10.21	3.11	0.025	0.00153	0.68	6.76
45+50	40.00	75.00	35.00	0.85	0.35	0.05	0.65	2.69	1.13	0.74	11.52	4.13	4	6	5	10.21	3.11	0.025	0.00153	0.69	6.90
46+00	40.00	57.00	17.00	0.85	0.35	0.05	0.70	2.79	1.14	0.73	12.25	4.00	4	6	5	10.21	3.11	0.025	0.00153	0.70	6.99

South Bound Road Side Ditch Calculations (Station 47+00 to Station 52+45)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
47+00	49.00	112.00	63.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	20	4	12	24.15	7.53	0.025	0.00229	0.00	0.00
47+50	49.00	113.00	64.00	0.85	0.35	0.07	0.07	0.41	0.55	1.53	1.53	5.64	50	4	27	54.13	16.98	0.025	0.00229	0.17	9.06
48+00	49.00	110.00	61.00	0.85	0.35	0.07	0.15	0.82	1.03	0.81	2.34	5.64	4	4	4	8.25	2.47	0.025	0.00229	0.45	3.58
48+50	49.00	68.00	19.00	0.85	0.35	0.06	0.20	1.14	1.12	0.75	3.08	5.64	4	4	4	8.25	2.47	0.025	0.00229	0.50	4.03
49+00	49.00	61.00	12.00	0.85	0.35	0.05	0.25	1.43	1.18	0.70	3.79	5.64	4	4	4	8.25	2.47	0.025	0.00229	0.55	4.40
49+50	49.00	62.00	13.00	0.85	0.35	0.05	0.31	1.73	1.24	0.67	4.46	5.64	4	4	4	8.25	2.47	0.025	0.00229	0.59	4.73
50+00	49.00	63.00	14.00	0.85	0.35	0.05	0.36	2.03	1.29	0.65	5.11	5.64	4	4	4	8.25	2.47	0.025	0.00229	0.63	5.02
50+50	46.83	61.00	14.17	0.85	0.35	0.05	0.41	2.32	1.33	0.62	5.73	5.64	4	4	4	8.25	2.47	0.025	0.00229	0.66	5.28
51+00	44.67	59.00	14.33	0.85	0.35	0.05	0.46	2.47	1.36	0.61	6.35	5.36	4	4	4	8.25	2.47	0.025	0.00229	0.68	5.40
51+50	42.50	57.00	14.50	0.85	0.35	0.05	0.51	2.59	1.37	0.61	6.95	5.09	4	4	4	8.25	2.47	0.025	0.00229	0.69	5.49
52+00	40.33	56.00	15.67	0.85	0.35	0.05	0.55	2.82	1.40	0.60	7.55	5.09	4	4	4	8.25	2.47	0.025	0.00229	0.71	5.67
52+45	38.17	53.00	14.83	0.85	0.35	0.04	0.59	2.85	1.40	0.53	8.08	4.81	4	4	4	8.25	2.47	0.025	0.00229	0.71	5.70

North Bound Road Side Ditch Calculations (Station 47+00 to Station 52+45)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
47+00	40.00	59.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.00	0.00
47+50	40.00	58.00	18.00	0.85	0.35	0.05	0.05	0.26	0.83	1.01	1.01	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.25	2.51
48+00	40.00	58.00	18.00	0.85	0.35	0.05	0.09	0.52	0.98	0.85	1.86	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.33	3.26
48+50	40.00	59.00	19.00	0.85	0.35	0.05	0.14	0.78	1.09	0.77	2.62	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.38	3.80
49+00	40.00	59.00	19.00	0.85	0.35	0.05	0.19	1.05	1.17	0.71	3.34	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.42	4.24
49+50	40.00	60.00	20.00	0.85	0.35	0.05	0.23	1.31	1.24	0.67	4.01	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.46	4.61
50+00	40.00	61.00	21.00	0.85	0.35	0.05	0.28	1.58	1.30	0.64	4.66	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.49	4.94
50+50	39.33	60.00	20.67	0.85	0.35	0.05	0.33	1.84	1.35	0.62	5.27	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.52	5.24
51+00	38.67	59.00	20.33	0.85	0.35	0.05	0.37	2.10	1.39	0.60	5.87	5.64	6	4	5	10.21	3.11	0.025	0.00313	0.55	5.50
51+50	38.00	60.00	22.00	0.85	0.35	0.05	0.42	2.25	1.41	0.59	6.46	5.36	6	4	5	10.21	3.11	0.025	0.00313	0.56	5.64
52+00	37.33	59.00	21.67	0.85	0.35	0.05	0.46	2.36	1.43	0.58	7.05	5.09	6	4	5	10.21	3.11	0.025	0.00313	0.57	5.74
52+45	36.67	59.00	22.33	0.85	0.35	0.04	0.50	2.57	1.46	0.51	7.56	5.09	6	4	5	10.21	3.11	0.025	0.00313	0.59	5.92

South Bound Road Side Ditch Calculations (Station 54+45 to Station 60+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
60+00	36.00	48.00	12.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00106	0.00	0.00
59+50	36.00	47.00	11.00	0.85	0.35	0.04	0.04	0.22	0.56	1.50	1.50	5.64	4	4	4	8.25	2.47	0.025	0.00106	0.32	2.53
59+00	36.00	47.00	11.00	0.85	0.35	0.04	0.08	0.45	0.66	1.26	2.76	5.64	4	4	4	8.25	2.47	0.025	0.00106	0.41	3.28
58+50	36.00	46.00	10.00	0.85	0.35	0.04	0.12	0.67	0.73	1.14	3.90	5.64	4	4	4	8.25	2.47	0.025	0.00106	0.48	3.82
58+00	36.00	46.00	10.00	0.85	0.35	0.04	0.16	0.89	0.79	1.06	4.96	5.64	4	4	4	8.25	2.47	0.025	0.00106	0.53	4.25
57+50	36.00	46.00	10.00	0.85	0.35	0.04	0.20	1.05	0.82	1.02	5.97	5.36	4	4	4	8.25	2.47	0.025	0.00106	0.57	4.53
57+00	36.00	47.00	11.00	0.85	0.35	0.04	0.24	1.27	0.86	0.97	6.94	5.36	4	4	4	8.25	2.47	0.025	0.00106	0.61	4.86
56+50	36.00	47.00	11.00	0.85	0.35	0.04	0.28	1.40	0.88	0.95	7.89	5.09	4	4	4	8.25	2.47	0.025	0.00106	0.63	5.05
56+00	36.00	47.00	11.00	0.85	0.35	0.04	0.32	1.52	0.90	0.93	8.82	4.81	4	4	4	8.25	2.47	0.025	0.00106	0.65	5.20
55+50	36.00	47.00	11.00	0.85	0.35	0.04	0.35	1.61	0.91	0.91	9.73	4.54	4	4	4	8.25	2.47	0.025	0.00106	0.66	5.31
55+00	36.00	47.00	11.00	0.85	0.35	0.04	0.39	1.68	0.92	0.90	10.63	4.26	4	4	4	8.25	2.47	0.025	0.00106	0.67	5.40
54+45	36.00	47.00	11.00	0.85	0.35	0.04	0.44	1.81	0.94	0.98	11.61	4.13	4	4	4	8.25	2.47	0.025	0.00106	0.69	5.55

North Bound Road Side Ditch Calculations (Station 54+45 to Station 59+50)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
59+50	36.00	48.00	12.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.00	0.00
59+00	36.00	48.00	12.00	0.85	0.35	0.04	0.04	0.23	0.74	1.13	1.13	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.25	2.47
58+50	36.00	52.00	16.00	0.85	0.35	0.04	0.08	0.46	0.88	0.95	2.08	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.32	3.23
58+00	36.00	53.00	17.00	0.85	0.35	0.04	0.12	0.70	0.98	0.85	2.93	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.38	3.78
57+50	36.00	53.00	17.00	0.85	0.35	0.04	0.17	0.93	1.05	0.79	3.73	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.42	4.22
57+00	36.00	54.00	18.00	0.85	0.35	0.04	0.21	1.17	1.11	0.75	4.48	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.46	4.59
56+50	36.00	55.00	19.00	0.85	0.35	0.04	0.25	1.41	1.16	0.72	5.19	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.49	4.93
56+00	36.00	56.00	20.00	0.85	0.35	0.04	0.29	1.66	1.21	0.69	5.88	5.64	6	4	5	10.21	3.11	0.025	0.00254	0.52	5.23
55+50	36.00	57.00	21.00	0.85	0.35	0.04	0.34	1.81	1.24	0.67	6.55	5.36	6	4	5	10.21	3.11	0.025	0.00254	0.54	5.40
55+00	36.00	57.00	21.00	0.85	0.35	0.04	0.38	1.94	1.26	0.66	7.22	5.09	6	4	5	10.21	3.11	0.025	0.00254	0.55	5.55
54+50	36.00	57.00	21.00	0.85	0.35	0.04	0.42	2.16	1.29	0.64	7.86	5.09	6	4	5	10.21	3.11	0.025	0.00254	0.58	5.78

South Bound Road Side Ditch Calculations (Station 63+50 to Station 69+21)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
63+00	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	50	4	27	54.13	16.98	0.025	0.00085	0.00	0.00
63+50	36.00	55.00	19.00	0.85	0.35	0.04	0.04	0.24	0.33	2.54	2.54	5.64	50	4	27	54.13	16.98	0.025	0.00085	0.16	8.90
64+00	36.00	55.00	19.00	0.85	0.35	0.04	0.09	0.48	0.39	2.13	4.67	5.64	50	4	27	54.13	16.98	0.025	0.00085	0.21	11.55
64+50	36.00	55.00	19.00	0.85	0.35	0.04	0.13	0.69	0.43	1.95	6.62	5.36	50	4	27	54.13	16.98	0.025	0.00085	0.24	13.19
65+00	36.00	55.00	19.00	0.85	0.35	0.04	0.17	0.82	0.45	1.87	8.49	4.81	50	4	27	54.13	16.98	0.025	0.00085	0.26	14.11
65+50	36.00	55.00	19.00	0.85	0.35	0.04	0.21	0.91	0.46	1.82	10.31	4.26	50	4	27	54.13	16.98	0.025	0.00085	0.27	14.65
66+00	36.00	55.00	19.00	0.85	0.35	0.04	0.26	1.03	0.47	1.77	12.07	4.00	50	4	27	54.13	16.98	0.025	0.00085	0.28	15.32
66+50	36.00	55.00	19.00	0.85	0.35	0.04	0.30	1.16	0.49	1.71	13.79	3.86	50	4	27	54.13	16.98	0.025	0.00085	0.30	16.03
67+00	36.00	55.00	19.00	0.85	0.35	0.04	0.34	1.23	0.49	1.69	15.47	3.60	50	4	27	54.13	16.98	0.025	0.00085	0.30	16.41
67+50	36.00	55.00	19.00	0.85	0.35	0.04	0.38	1.32	0.50	1.66	17.13	3.44	50	4	27	54.13	16.98	0.025	0.00085	0.31	16.86
68+00	36.00	55.00	19.00	0.85	0.35	0.04	0.43	1.44	0.51	1.62	18.75	3.36	50	4	27	54.13	16.98	0.025	0.00085	0.32	17.39
68+50	36.00	55.00	19.00	0.85	0.35	0.04	0.47	1.51	0.52	1.60	20.36	3.20	50	4	27	54.13	16.98	0.025	0.00085	0.33	17.69
69+21	36.00	55.00	19.00	0.85	0.35	0.06	0.53	1.61	0.53	2.24	22.60	3.04	50	4	27	54.13	16.98	0.025	0.00085	0.34	18.16

North Bound Road Side Ditch Calculations (Station 60+50 to Station 69+21)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttrave	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
60+50	36.00	50.00	14.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	10	7	14.17	4.37	0.025	0.00231	0.00	0.00
61+00	36.00	52.00	16.00	0.85	0.35	0.04	0.04	0.23	0.66	1.26	1.26	5.64	4	10	7	14.17	4.37	0.025	0.00231	0.22	3.15
61+50	36.00	52.00	16.00	0.85	0.35	0.04	0.08	0.47	0.79	1.06	2.32	5.64	4	10	7	14.17	4.37	0.025	0.00231	0.29	4.08
62+00	36.00	55.00	19.00	0.85	0.35	0.04	0.13	0.71	0.77	1.09	3.41	5.64	4	20	12	24.15	7.53	0.025	0.00231	0.28	6.67
62+50	36.00	55.00	19.00	0.85	0.35	0.04	0.17	0.95	1.02	0.82	4.23	5.64	6	4	5	10.21	3.11	0.025	0.00231	0.43	4.32
63+00	36.00	43.00	7.00	0.85	0.35	0.04	0.21	1.16	0.87	0.96	5.19	5.64	20	4	12	24.15	7.53	0.025	0.00231	0.33	8.03
63+50	36.00	50.00	14.00	0.85	0.35	0.04	0.25	1.33	0.89	0.93	6.12	5.36	20	4	12	24.15	7.53	0.025	0.00231	0.35	8.43
64+00	36.00	53.00	17.00	0.85	0.35	0.04	0.29	1.55	1.21	0.69	6.81	5.36	4	4	4	8.25	2.47	0.025	0.00231	0.57	4.53
64+50	36.00	53.00	17.00	0.85	0.35	0.04	0.33	1.69	1.24	0.67	7.48	5.09	4	4	4	8.25	2.47	0.025	0.00231	0.58	4.67
65+00	36.00	54.00	18.00	0.85	0.35	0.04	0.37	1.80	1.26	0.66	8.14	4.81	4	4	4	8.25	2.47	0.025	0.00231	0.60	4.79
65+50	36.00	54.00	18.00	0.85	0.35	0.04	0.42	2.00	1.29	0.65	8.79	4.81	4	4	4	8.25	2.47	0.025	0.00231	0.62	4.98
66+00	36.00	48.00	12.00	0.85	0.35	0.04	0.46	2.07	1.30	0.64	9.43	4.54	4	4	4	8.25	2.47	0.025	0.00231	0.63	5.04
66+50	36.00	50.00	14.00	0.85	0.35	0.04	0.50	2.12	1.31	0.64	10.07	4.26	4	4	4	8.25	2.47	0.025	0.00231	0.64	5.09
67+00	36.00	55.00	19.00	0.85	0.35	0.04	0.54	2.30	1.03	0.81	10.88	4.26	4	20	12	24.15	7.53	0.025	0.00231	0.43	10.36
67+50	36.00	55.00	19.00	0.85	0.35	0.04	0.58	2.40	1.35	0.62	11.50	4.13	4	4	4	8.25	2.47	0.025	0.00231	0.67	5.34
68+00	36.00	55.00	19.00	0.85	0.35	0.04	0.62	2.50	1.36	0.61	12.11	4.00	4	4	4	8.25	2.47	0.025	0.00231	0.68	5.41
68+50	36.00	55.00	19.00	0.85	0.35	0.04	0.67	2.67	1.39	0.60	12.71	4.00	4	4	4	8.25	2.47	0.025	0.00231	0.69	5.55
69+21	36.00	56.00	20.00	0.85	0.35	0.06	0.73	2.82	1.34	0.89	13.60	3.86	6	4	5	10.21	3.11	0.025	0.00231	0.65	6.50

South Bound Road Side Ditch Calculations (Station 69+21 to Station 72+17)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttrave	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
69+21	36.00	50.00	14.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	10	4	7	14.17	4.37	0.025	0.00243	0.00	0.00
70+00	36.00	53.00	17.00	0.85	0.35	0.07	0.07	0.37	0.82	1.60	1.60	5.64	4	6	5	10.21	3.11	0.025	0.00243	0.30	3.02
70+50	36.00	50.00	14.00	0.85	0.35	0.04	0.11	0.60	0.93	0.90	2.50	5.64	4	6	5	10.21	3.11	0.025	0.00243	0.36	3.61
71+00	36.00	52.00	16.00	0.85	0.35	0.04	0.15	0.84	0.93	0.90	3.40	5.64	10	4	7	14.17	4.37	0.025	0.00243	0.36	5.03
71+50	36.00	53.00	17.00	0.85	0.35	0.04	0.19	1.07	1.07	0.78	4.18	5.64	4	6	5	10.21	3.11	0.025	0.00243	0.45	4.48
72+00	36.00	53.00	17.00	0.85	0.35	0.04	0.23	1.31	1.04	0.80	4.98	5.64	10	4	7	14.17	4.37	0.025	0.00243	0.42	5.95
72+17	36.00	52.00	16.00	0.85	0.35	0.01	0.25	1.39	1.05	0.27	5.25	5.64	10	4	7	14.17	4.37	0.025	0.00243	0.43	6.08

North Bound Road Side Ditch Calculations (Station 69+21 to Station 72+17)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttrave	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
69+21	36.00	57.00	21.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	6	4	5	10.21	3.11	0.025	0.00183	0.00	0.00
70+00	36.00	58.00	22.00	0.85	0.35	0.07	0.07	0.39	0.75	1.76	1.76	5.64	6	4	5	10.21	3.11	0.025	0.00183	0.32	3.24
70+50	36.00	59.00	23.00	0.85	0.35	0.04	0.11	0.64	0.85	0.99	2.75	5.64	6	4	5	10.21	3.11	0.025	0.00183	0.39	3.90
71+00	36.00	61.00	25.00	0.85	0.35	0.05	0.16	0.90	0.92	0.91	3.65	5.64	6	4	5	10.21	3.11	0.025	0.00183	0.44	4.42
71+50	36.00	59.00	23.00	0.85	0.35	0.04	0.20	1.15	0.98	0.85	4.51	5.64	6	4	5	10.21	3.11	0.025	0.00183	0.48	4.84
72+00	36.00	59.00	23.00	0.85	0.35	0.04	0.25	1.40	1.03	0.81	5.32	5.64	6	4	5	10.21	3.11	0.025	0.00183	0.52	5.22
72+17	36.00	63.00	27.00	0.85	0.35	0.02	0.26	1.49	1.10	0.26	5.58	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.58	4.65

South Bound Road Side Ditch Calculations (Station 72+17 to Station 77+65)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
72+17	36.00	52.00	16.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	10	4	7	14.17	4.37	0.025	0.00242	0.00	0.00
73+00	36.00	58.00	22.00	0.85	0.35	0.07	0.07	0.41	0.78	1.78	1.78	5.64	10	4	7	14.17	4.37	0.025	0.00242	0.28	3.86
73+50	36.00	55.00	19.00	0.85	0.35	0.04	0.12	0.65	0.99	0.84	2.62	5.64	4	4	4	8.25	2.47	0.025	0.00242	0.41	3.24
74+00	36.00	55.00	19.00	0.85	0.35	0.04	0.16	0.89	1.07	0.78	3.40	5.64	4	4	4	8.25	2.47	0.025	0.00242	0.46	3.65
74+50	36.00	56.00	20.00	0.85	0.35	0.04	0.20	1.14	1.11	0.75	4.15	5.64	5	4	4.5	9.22	2.79	0.025	0.00242	0.48	4.30
75+00	36.00	53.00	17.00	0.85	0.35	0.04	0.24	1.37	1.05	0.80	4.95	5.64	10	4	7	14.17	4.37	0.025	0.00242	0.43	6.06
75+50	36.00	53.00	17.00	0.85	0.35	0.04	0.29	1.61	1.09	0.76	5.71	5.64	10	4	7	14.17	4.37	0.025	0.00242	0.46	6.43
76+00	36.00	53.00	17.00	0.85	0.35	0.04	0.33	1.76	1.11	0.75	6.46	5.36	10	4	7	14.17	4.37	0.025	0.00242	0.47	6.64
76+50	36.00	53.00	17.00	0.85	0.35	0.04	0.37	1.88	1.29	0.64	7.10	5.09	4	4	4	8.25	2.47	0.025	0.00242	0.60	4.82
77+00	36.00	54.00	18.00	0.85	0.35	0.04	0.41	2.10	1.33	0.63	7.73	5.09	4	4	4	8.25	2.47	0.025	0.00242	0.63	5.03
77+65	36.00	54.00	18.00	0.85	0.35	0.06	0.47	2.25	1.35	0.80	8.53	4.81	4	4	4	8.25	2.47	0.025	0.00242	0.64	5.16

North Bound Road Side Ditch Calculations (Station 72+17 to Station 77+65)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
72+17	36.00	63.00	27.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00258	0.00	0.00
73+00	36.00	90.00	54.00	0.85	0.35	0.09	0.09	0.53	0.61	2.28	2.28	5.64	4	50	27	54.13	16.98	0.025	0.00258	0.18	9.73
73+50	36.00	55.00	19.00	0.85	0.35	0.04	0.14	0.77	1.01	0.83	3.11	5.64	6	4	5	10.21	3.11	0.025	0.00258	0.39	3.92
74+00	36.00	55.00	19.00	0.85	0.35	0.04	0.18	1.01	1.08	0.77	3.88	5.64	4	6	5	10.21	3.11	0.025	0.00258	0.43	4.34
74+50	36.00	55.00	19.00	0.85	0.35	0.04	0.22	1.26	1.14	0.73	4.61	5.64	6	4	5	10.21	3.11	0.025	0.00258	0.47	4.70
75+00	36.00	55.00	19.00	0.85	0.35	0.04	0.27	1.50	1.19	0.70	5.31	5.64	6	4	5	10.21	3.11	0.025	0.00258	0.50	5.02
75+50	36.00	55.00	19.00	0.85	0.35	0.04	0.31	1.65	1.22	0.68	6.00	5.36	6	4	5	10.21	3.11	0.025	0.00258	0.52	5.21
76+00	36.00	55.00	19.00	0.85	0.35	0.04	0.35	1.88	1.32	0.63	6.63	5.36	4	4	4	8.25	2.47	0.025	0.00258	0.60	4.77
76+50	36.00	55.00	19.00	0.85	0.35	0.04	0.39	2.00	1.34	0.62	7.25	5.09	4	4	4	8.25	2.47	0.025	0.00258	0.61	4.88
77+00	36.00	55.00	19.00	0.85	0.35	0.04	0.44	2.22	1.38	0.60	7.85	5.09	4	4	4	8.25	2.47	0.025	0.00258	0.63	5.07
77+65	36.00	55.00	19.00	0.85	0.35	0.06	0.49	2.37	1.33	0.81	8.66	4.81	6	4	5	10.21	3.11	0.025	0.00258	0.60	5.96

South Bound Road Side Ditch Calculations (Station 79+00 to Station 85+50)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
85+50	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00142	0.00	0.00
85+00	36.00	55.00	19.00	0.85	0.35	0.04	0.04	0.24	0.63	1.32	1.32	5.64	4	4	4	8.25	2.47	0.025	0.00142	0.31	2.47
84+50	36.00	56.00	20.00	0.85	0.35	0.04	0.09	0.48	0.75	1.11	2.42	5.64	4	4	4	8.25	2.47	0.025	0.00142	0.40	3.21
84+00	36.00	56.00	20.00	0.85	0.35	0.04	0.13	0.73	0.83	1.00	3.42	5.64	4	4	4	8.25	2.47	0.025	0.00142	0.47	3.74
83+50	36.00	56.00	20.00	0.85	0.35	0.04	0.17	0.97	0.90	0.93	4.35	5.64	4	4	4	8.25	2.47	0.025	0.00142	0.52	4.16
83+00	36.00	56.00	20.00	0.85	0.35	0.04	0.22	1.21	0.95	0.88	5.23	5.64	4	4	4	8.25	2.47	0.025	0.00142	0.57	4.53
82+50	36.00	56.00	20.00	0.85	0.35	0.04	0.26	1.39	0.75	1.11	6.33	5.36	4	20	12	24.15	7.53	0.025	0.00142	0.39	9.40
82+00	36.00	56.00	20.00	0.85	0.35	0.04	0.30	1.54	0.77	1.08	7.41	5.09	4	20	12	24.15	7.53	0.025	0.00142	0.41	9.76
81+50	36.00	55.00	19.00	0.85	0.35	0.04	0.34	1.66	0.79	1.06	8.47	4.81	4	20	12	24.15	7.53	0.025	0.00142	0.42	10.05
81+00	36.00	55.00	19.00	0.85	0.35	0.04	0.39	1.76	0.80	1.04	9.51	4.54	4	20	12	24.15	7.53	0.025	0.00142	0.43	10.27
80+50	36.00	55.00	19.00	0.85	0.35	0.04	0.43	1.83	0.81	1.03	10.54	4.26	4	20	12	24.15	7.53	0.025	0.00142	0.43	10.43
80+00	36.00	56.00	20.00	0.85	0.35	0.04	0.47	1.95	0.82	1.01	11.55	4.13	4	20	12	24.15	7.53	0.025	0.00142	0.45	10.68
79+50	36.00	54.00	18.00	0.85	0.35	0.04	0.52	2.06	1.03	0.81	12.36	4.00	4	6	5	10.21	3.11	0.025	0.00142	0.63	6.33
79+00	36.00	53.00	17.00	0.85	0.35	0.04	0.56	2.15	1.04	0.80	13.17	3.86	4	6	5	10.21	3.11	0.025	0.00142	0.64	6.44

North Bound Road Side Ditch Calculations (Station 79+00 to Station 85+50)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
85+50	36.00	54.00	18.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00082	0.00	0.00
85+00	36.00	54.00	18.00	0.85	0.35	0.04	0.04	0.24	0.51	1.62	1.62	5.64	4	4	4	8.25	2.47	0.025	0.00082	0.34	2.73
84+50	36.00	54.00	18.00	0.85	0.35	0.04	0.08	0.48	0.61	1.37	2.99	5.64	4	4	4	8.25	2.47	0.025	0.00082	0.44	3.54
84+00	36.00	54.00	18.00	0.85	0.35	0.04	0.13	0.72	0.68	1.23	4.23	5.64	4	4	4	8.25	2.47	0.025	0.00082	0.52	4.12
83+50	36.00	54.00	18.00	0.85	0.35	0.04	0.17	0.96	0.73	1.15	5.37	5.64	4	4	4	8.25	2.47	0.025	0.00082	0.57	4.59
83+00	36.00	54.00	18.00	0.85	0.35	0.04	0.21	1.14	0.76	1.10	6.47	5.36	4	4	4	8.25	2.47	0.025	0.00082	0.61	4.90
82+50	36.00	53.00	17.00	0.85	0.35	0.04	0.25	1.29	0.74	1.12	7.60	5.09	6	4	5	10.21	3.11	0.025	0.00082	0.59	5.89
82+00	36.00	53.00	17.00	0.85	0.35	0.04	0.30	1.42	0.76	1.09	8.69	4.81	6	4	5	10.21	3.11	0.025	0.00082	0.61	6.11
81+50	36.00	53.00	17.00	0.85	0.35	0.04	0.34	1.53	0.78	1.07	9.76	4.54	6	4	5	10.21	3.11	0.025	0.00082	0.63	6.28
81+00	36.00	53.00	17.00	0.85	0.35	0.04	0.38	1.62	0.79	1.06	10.82	4.26	6	4	5	10.21	3.11	0.025	0.00082	0.64	6.41
80+50	36.00	52.00	16.00	0.85	0.35	0.04	0.42	1.74	0.80	1.04	11.86	4.13	6	4	5	10.21	3.11	0.025	0.00082	0.66	6.59
80+00	36.00	56.00	20.00	0.85	0.35	0.04	0.46	1.86	0.81	1.02	12.89	4.00	6	4	5	10.21	3.11	0.025	0.00082	0.68	6.75
79+50	36.00	56.00	20.00	0.85	0.35	0.04	0.51	1.96	0.83	1.01	13.90	3.86	6	4	5	10.21	3.11	0.025	0.00082	0.69	6.89
79+00	36.00	56.00	20.00	0.85	0.35	0.04	0.55	2.05	0.83	1.00	14.90	3.73	6	4	5	10.21	3.11	0.025	0.00082	0.70	7.02

South Bound Road Side Ditch Calculations (Station 85+50 to Station 89+98)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
85+50	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.00	0.00
86+00	36.00	54.00	18.00	0.85	0.35	0.04	0.04	0.24	1.01	0.83	0.83	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.24	1.95
86+50	36.00	54.00	18.00	0.85	0.35	0.04	0.08	0.48	1.20	0.70	1.52	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.32	2.53
87+00	36.00	53.00	17.00	0.85	0.35	0.04	0.13	0.71	1.33	0.63	2.15	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.37	2.94
87+50	36.00	53.00	17.00	0.85	0.35	0.04	0.17	0.95	1.42	0.59	2.74	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.41	3.27
88+00	36.00	54.00	18.00	0.85	0.35	0.04	0.21	1.19	1.51	0.55	3.29	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.44	3.56
88+50	36.00	54.00	18.00	0.85	0.35	0.04	0.25	1.43	1.58	0.53	3.82	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.48	3.81
89+00	36.00	55.00	19.00	0.85	0.35	0.04	0.30	1.67	1.64	0.51	4.33	5.64	4	4	4	8.25	2.47	0.025	0.00493	0.50	4.04
89+50	36.00	55.00	19.00	0.85	0.35	0.04	0.34	1.91	1.61	0.52	4.85	5.64	4	6	5	10.21	3.11	0.025	0.00493	0.49	4.87
89+98	36.00	54.00	18.00	0.85	0.35	0.04	0.38	2.14	1.66	0.48	5.33	5.64	4	6	5	10.21	3.11	0.025	0.00493	0.51	5.08

North Bound Road Side Ditch Calculations (Station 85+50 to Station 89+98)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
85+50	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00440	0.00	0.00
86+00	36.00	55.00	19.00	0.85	0.35	0.04	0.04	0.24	0.97	0.86	0.86	5.64	4	4	4	8.25	2.47	0.025	0.00440	0.25	2.00
86+50	36.00	55.00	19.00	0.85	0.35	0.04	0.09	0.48	1.15	0.72	1.59	5.64	4	4	4	8.25	2.47	0.025	0.00440	0.32	2.59
87+00	36.00	55.00	19.00	0.85	0.35	0.04	0.13	0.72	1.27	0.65	2.24	5.64	4	4	4	8.25	2.47	0.025	0.00440	0.38	3.01
87+50	36.00	55.00	19.00	0.85	0.35	0.04	0.17	0.96	1.37	0.61	2.85	5.64	4	4	4	8.25	2.47	0.025	0.00440	0.42	3.36
88+00	36.00	49.00	13.00	0.85	0.35	0.04	0.21	1.19	1.37	0.61	3.46	5.64	6	4	5	10.21	3.11	0.025	0.00440	0.42	4.17
88+50	36.00	48.00	12.00	0.85	0.35	0.04	0.25	1.42	1.43	0.58	4.04	5.64	6	4	5	10.21	3.11	0.025	0.00440	0.44	4.45
89+00	36.00	51.00	15.00	0.85	0.35	0.04	0.29	1.65	1.49	0.56	4.60	5.64	6	4	5	10.21	3.11	0.025	0.00440	0.47	4.71
89+50	36.00	52.00	16.00	0.85	0.35	0.04	0.33	1.88	1.54	0.54	5.14	5.64	6	4	5	10.21	3.11	0.025	0.00440	0.50	4.95
89+98	36.00	53.00	17.00	0.85	0.35	0.04	0.37	2.11	1.58	0.51	5.65	5.64	6	4	5	10.21	3.11	0.025	0.00440	0.52	5.17

South Bound Road Side Ditch Calculations (Station 95+64 to Station 99+50)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
105+00	50.58	61.56	10.98	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.00	0.00
104+50	50.58	60.62	10.04	0.85	0.35	0.05	0.05	0.30	0.77	1.08	1.08	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.12	6.25
104+00	50.58	57.27	6.69	0.85	0.35	0.05	0.11	0.59	0.92	0.91	1.99	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.16	8.07
103+50	50.58	59.95	9.37	0.85	0.35	0.05	0.16	0.89	1.01	0.82	2.81	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.19	9.40
103+00	50.58	63.20	12.62	0.85	0.35	0.05	0.21	1.20	1.09	0.76	3.58	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.21	10.50
102+50	50.58	59.56	8.98	0.85	0.35	0.05	0.27	1.50	1.15	0.72	4.30	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.23	11.42
102+00	50.58	56.55	5.97	0.85	0.35	0.05	0.32	1.79	1.21	0.69	4.99	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.24	12.20
101+50	50.58	59.85	9.27	0.85	0.35	0.05	0.37	2.09	1.25	0.67	5.66	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.26	12.93
101+00	50.58	63.51	12.93	0.85	0.35	0.05	0.43	2.28	1.28	0.65	6.31	5.36	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.27	13.36
100+50	50.58	61.78	11.20	0.85	0.35	0.05	0.48	2.57	1.32	0.63	6.94	5.36	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.28	13.97
100+00	50.58	57.24	6.66	0.85	0.35	0.05	0.53	2.70	1.34	0.62	7.56	5.09	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.28	14.24
99+50	50.58	58.08	7.50	0.85	0.35	0.05	0.58	2.81	1.35	0.62	8.18	4.81	0.1	50	25.1	51.01	15.59	0.015	0.00250	0.29	14.44
99+00	36.00	80.00	44.00	0.85	0.35	0.05	0.64	3.06	1.29	0.65	8.83	4.81	4	4	4	8.25	2.47	0.025	0.00174	0.77	6.16
98+50	36.00	55.00	19.00	0.85	0.35	0.04	0.68	3.08	0.99	0.84	9.66	4.54	4	20	12	24.15	7.53	0.025	0.00174	0.51	12.20
98+00	36.00	55.00	19.00	0.85	0.35	0.04	0.72	3.07	0.99	0.84	10.50	4.26	4	20	12	24.15	7.53	0.025	0.00174	0.51	12.19
97+50	36.00	55.00	19.00	0.85	0.35	0.04	0.76	3.16	1.24	0.67	11.18	4.13	4	6	5	10.21	3.11	0.025	0.00174	0.71	7.15
97+00	36.00	55.00	19.00	0.85	0.35	0.04	0.81	3.33	1.25	0.67	11.84	4.13	4	6	5	10.21	3.11	0.025	0.00174	0.73	7.30
96+50	36.00	55.00	19.00	0.85	0.35	0.04	0.85	3.40	1.26	0.66	12.51	4.00	4	6	5	10.21	3.11	0.025	0.00174	0.73	7.35
96+00	36.00	55.00	19.00	0.85	0.35	0.04	0.89	3.45	1.26	0.66	13.17	3.86	4	6	5	10.21	3.11	0.025	0.00174	0.74	7.39
95+64	36.00	55.00	19.00	0.85	0.35	0.03	0.92	3.57	1.27	0.47	13.64	3.86	4	6	5	10.21	3.11	0.025	0.00174	0.75	7.49

North Bound Road Side Ditch Calculations (Station 95+64 to Station 105+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
105+00	36.00	53.00	17.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00056	0.00	0.00
104+50	36.00	53.00	17.00	0.85	0.35	0.04	0.04	0.24	0.44	1.87	1.87	5.64	4	4	4	8.25	2.47	0.025	0.00056	0.36	2.92
104+00	36.00	55.00	19.00	0.85	0.35	0.04	0.08	0.48	0.53	1.57	3.45	5.64	4	4	4	8.25	2.47	0.025	0.00056	0.47	3.80
103+50	36.00	52.00	16.00	0.85	0.35	0.04	0.13	0.71	0.59	1.42	4.87	5.64	4	4	4	8.25	2.47	0.025	0.00056	0.55	4.41
103+00	36.00	75.00	39.00	0.85	0.35	0.05	0.18	0.95	0.63	1.32	6.19	5.36	4	4	4	8.25	2.47	0.025	0.00056	0.61	4.91
102+50	36.00	75.00	39.00	0.85	0.35	0.05	0.23	1.16	0.66	1.26	7.45	5.09	4	4	4	8.25	2.47	0.025	0.00056	0.66	5.30
102+00	36.00	55.00	19.00	0.85	0.35	0.04	0.27	1.30	0.68	1.22	8.68	4.81	4	4	4	8.25	2.47	0.025	0.00056	0.69	5.53
101+50	36.00	55.00	19.00	0.85	0.35	0.04	0.31	1.42	0.70	1.20	9.88	4.54	4	4	4	8.25	2.47	0.025	0.00056	0.71	5.72
101+00	36.00	55.00	19.00	0.85	0.35	0.04	0.36	1.47	0.70	1.19	11.06	4.13	4	4	4	8.25	2.47	0.025	0.00056	0.72	5.79
100+50	36.00	55.00	19.00	0.85	0.35	0.04	0.40	1.59	0.72	1.16	12.23	4.00	4	4	4	8.25	2.47	0.025	0.00056	0.75	5.97
100+00	36.00	55.00	19.00	0.85	0.35	0.04	0.44	1.71	0.56	1.49	13.71	3.86	4	20	12	24.15	7.53	0.025	0.00056	0.50	12.09
99+50	36.00	55.00	19.00	0.85	0.35	0.04	0.48	1.74	0.56	1.48	15.19	3.60	4	20	12	24.15	7.53	0.025	0.00056	0.51	12.19
99+00	36.00	55.00	19.00	0.85	0.35	0.04	0.53	1.86	0.57	1.46	16.65	3.52	4	20	12	24.15	7.53	0.025	0.00056	0.52	12.48
98+50	36.00	55.00	19.00	0.85	0.35	0.04	0.57	1.91	0.58	1.45	18.10	3.36	4	20	12	24.15	7.53	0.025	0.00056	0.53	12.63
98+00	36.00	55.00	19.00	0.85	0.35	0.04	0.61	2.01	0.58	1.43	19.52	3.28	4	20	12	24.15	7.53	0.025	0.00056	0.54	12.86
97+50	36.00	55.00	19.00	0.85	0.35	0.04	0.66	2.04	0.59	1.42	20.95	3.12	4	20	12	24.15	7.53	0.025	0.00056	0.54	12.94
97+00	36.00	55.00	19.00	0.85	0.35	0.04	0.70	2.12	0.59	1.41	22.35	3.04	4	20	12	24.15	7.53	0.025	0.00056	0.55	13.12
96+50	36.00	55.00	19.00	0.85	0.35	0.04	0.74	2.19	0.60	1.40	23.75	2.96	4	20	12	24.15	7.53	0.025	0.00056	0.55	13.28
96+00	36.00	55.00	19.00	0.85	0.35	0.04	0.78	2.19	0.60	1.40	25.15	2.80	4	20	12	24.15	7.53	0.025	0.00056	0.55	13.29
95+64	36.00	55.00	19.00	0.85	0.35	0.03	0.81	2.22	0.60	1.00	26.15	2.72	4	20	12	24.15	7.53	0.025	0.00056	0.56	13.33

North Bound Road Side Ditch Calculations (Station 105+00 to Station 111+58)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttrave	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
105+00	36.00	53.00	17.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.00	0.00
105+50	36.00	53.00	17.00	0.85	0.35	0.04	0.04	0.24	0.84	0.99	0.99	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.27	2.12
106+00	36.00	53.00	17.00	0.85	0.35	0.04	0.08	0.47	1.00	0.83	1.82	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.34	2.75
106+50	36.00	54.00	18.00	0.85	0.35	0.04	0.13	0.71	1.11	0.75	2.58	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.40	3.21
107+00	36.00	54.00	18.00	0.85	0.35	0.04	0.17	0.95	1.19	0.70	3.27	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.45	3.57
107+50	36.00	54.00	18.00	0.85	0.35	0.04	0.21	1.19	1.26	0.66	3.94	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.49	3.89
108+00	36.00	54.00	18.00	0.85	0.35	0.04	0.25	1.43	1.32	0.63	4.57	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.52	4.16
108+50	36.00	54.00	18.00	0.85	0.35	0.04	0.30	1.67	1.37	0.61	5.18	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.55	4.41
109+00	36.00	55.00	19.00	0.85	0.35	0.04	0.34	1.91	1.42	0.59	5.76	5.64	4	4	4	8.25	2.47	0.025	0.00307	0.58	4.64
109+50	36.00	55.00	19.00	0.85	0.35	0.04	0.38	2.04	1.44	0.58	6.34	5.36	4	4	4	8.25	2.47	0.025	0.00307	0.60	4.76
110+00	36.00	55.00	19.00	0.85	0.35	0.04	0.42	2.27	1.48	0.56	6.90	5.36	4	4	4	8.25	2.47	0.025	0.00307	0.62	4.96
110+50	36.00	55.00	19.00	0.85	0.35	0.04	0.47	2.37	1.50	0.56	7.46	5.09	4	4	4	8.25	2.47	0.025	0.00307	0.63	5.04
111+00	36.00	55.00	19.00	0.85	0.35	0.04	0.51	2.45	0.95	0.88	8.34	4.81	4	50	27	54.13	16.98	0.025	0.00307	0.31	16.70
111+58	36.00	48.00	12.00	0.85	0.35	0.05	0.56	2.67	1.54	0.63	8.96	4.81	4	4	4	8.25	2.47	0.025	0.00307	0.66	5.27

North Bound Road Side Ditch Calculations (Station 111+58 to Station 115+15)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttrave	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
111+58	36.00	48.00	12.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.00	0.00
112+00	36.00	55.00	19.00	0.85	0.35	0.04	0.04	0.20	0.67	1.05	1.05	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.28	2.20
112+50	36.00	55.00	19.00	0.85	0.35	0.04	0.08	0.44	0.81	1.03	2.08	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.37	2.96
113+00	36.00	55.00	19.00	0.85	0.35	0.04	0.12	0.68	0.90	0.92	3.00	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.44	3.48
113+50	36.00	55.00	19.00	0.85	0.35	0.04	0.16	0.93	0.97	0.85	3.85	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.49	3.90
114+00	36.00	55.00	19.00	0.85	0.35	0.04	0.21	1.17	1.03	0.81	4.66	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.53	4.25
114+50	36.00	55.00	19.00	0.85	0.35	0.04	0.25	1.41	1.08	0.77	5.43	5.64	4	4	4	8.25	2.47	0.025	0.00183	0.57	4.56
115+15	36.00	55.00	19.00	0.85	0.35	0.06	0.31	1.64	1.12	0.96	6.39	5.36	4	4	4	8.25	2.47	0.025	0.00183	0.60	4.83

North Bound Road Side Ditch Calculations (Station 118+50 to Station 122+36)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttrave	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
122+36	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00110	0.00	0.00
122+00	36.00	55.00	19.00	0.85	0.35	0.03	0.03	0.17	0.53	1.13	1.13	5.64	4	4	4	8.25	2.47	0.025	0.00110	0.29	2.29
121+50	36.00	55.00	19.00	0.85	0.35	0.04	0.07	0.41	0.63	1.33	2.46	5.64	6	4	5	10.21	3.11	0.025	0.00110	0.36	3.64
121+00	36.00	55.00	19.00	0.85	0.35	0.04	0.12	0.66	0.70	1.19	3.65	5.64	6	4	5	10.21	3.11	0.025	0.00110	0.43	4.32
120+50	36.00	52.00	16.00	0.85	0.35	0.04	0.16	0.89	0.76	1.10	4.75	5.64	6	4	5	10.21	3.11	0.025	0.00110	0.48	4.85
120+00	36.00	57.00	21.00	0.85	0.35	0.04	0.20	1.14	0.81	1.03	5.78	5.64	6	4	5	10.21	3.11	0.025	0.00110	0.53	5.31
119+50	36.00	57.00	21.00	0.85	0.35	0.04	0.24	1.31	0.84	1.00	6.78	5.36	6	4	5	10.21	3.11	0.025	0.00110	0.56	5.61
119+00	36.00	83.00	47.00	0.85	0.35	0.05	0.30	1.52	0.87	0.96	7.74	5.09	6	4	5	10.21	3.11	0.025	0.00110	0.59	5.93

118+50	36.00	49.00	13.00	0.85	0.35	0.04	0.34	1.63	0.88	0.94	8.69	4.81	6	4	5	10.21	3.11	0.025	0.00110	0.61	6.08

North Bound Road Side Ditch Calculations (Station 122+36 to Station 126+63)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
126+63	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00028	0.00	0.00
126+00	36.00	53.00	17.00	0.85	0.35	0.05	0.05	0.30	0.36	2.89	2.89	5.64	4	4	4	8.25	2.47	0.025	0.00028	0.45	3.62
125+50	36.00	52.00	16.00	0.85	0.35	0.04	0.09	0.51	0.26	3.19	6.09	5.36	4	50	27	54.13	16.98	0.025	0.00028	0.27	14.48
125+00	36.00	55.00	19.00	0.85	0.35	0.04	0.14	0.62	0.27	3.03	9.12	4.54	4	50	27	54.13	16.98	0.025	0.00028	0.29	15.64
124+50	36.00	53.00	17.00	0.85	0.35	0.04	0.18	0.76	0.46	1.81	10.93	4.26	4	4	4	8.25	2.47	0.025	0.00028	0.64	5.16
124+00	36.00	53.00	17.00	0.85	0.35	0.04	0.22	0.88	0.48	1.75	12.68	4.00	4	4	4	8.25	2.47	0.025	0.00028	0.68	5.45
123+50	36.00	54.00	18.00	0.85	0.35	0.04	0.26	0.98	0.49	1.70	14.39	3.73	4	4	4	8.25	2.47	0.025	0.00028	0.71	5.67
123+00	36.00	54.00	18.00	0.85	0.35	0.04	0.31	1.08	0.50	1.66	16.05	3.52	4	4	4	8.25	2.47	0.025	0.00028	0.73	5.87
122+36	36.00	55.00	19.00	0.85	0.35	0.05	0.36	1.21	0.52	2.07	18.12	3.36	4	4	4	8.25	2.47	0.025	0.00028	0.77	6.13

North Bound Road Side Ditch Calculations (Station 111+58 to Station 115+15)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
128+50	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00073	0.00	0.00
129+00	36.00	55.00	19.00	0.85	0.35	0.04	0.04	0.24	0.49	1.69	1.69	5.64	4	4	4	8.25	2.47	0.025	0.00073	0.35	2.80
129+50	36.00	55.00	19.00	0.85	0.35	0.04	0.09	0.48	0.59	1.42	3.11	5.64	4	4	4	8.25	2.47	0.025	0.00073	0.45	3.63
130+00	36.00	55.00	19.00	0.85	0.35	0.04	0.13	0.72	0.65	1.28	4.39	5.64	4	4	4	8.25	2.47	0.025	0.00073	0.53	4.22
130+50	36.00	55.00	19.00	0.85	0.35	0.04	0.17	0.96	0.70	1.19	5.59	5.64	4	4	4	8.25	2.47	0.025	0.00073	0.59	4.70
131+00	36.00	55.00	19.00	0.85	0.35	0.04	0.21	1.15	0.73	1.14	6.73	5.36	4	4	4	8.25	2.47	0.025	0.00073	0.63	5.02
131+50	36.00	55.00	19.00	0.85	0.35	0.04	0.26	1.31	0.75	1.11	7.84	5.09	4	4	4	8.25	2.47	0.025	0.00073	0.66	5.27
132+00	36.00	55.00	19.00	0.85	0.35	0.04	0.30	1.44	0.77	1.08	8.92	4.81	4	4	4	8.25	2.47	0.025	0.00073	0.68	5.47
132+50	36.00	55.00	19.00	0.85	0.35	0.04	0.34	1.46	0.77	1.08	10.00	4.26	4	4	4	8.25	2.47	0.025	0.00073	0.69	5.49
133+00	36.00	55.00	19.00	0.85	0.35	0.04	0.38	1.59	0.79	1.05	11.05	4.13	4	4	4	8.25	2.47	0.025	0.00073	0.71	5.67

North Bound Road Side Ditch Calculations (Station 133+00 to Station 137+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
133+00	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.00	0.00
133+50	36.00	55.00	19.00	0.85	0.35	0.04	0.04	0.24	0.72	1.16	1.16	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.29	2.32
134+00	36.00	55.00	19.00	0.85	0.35	0.04	0.09	0.48	0.85	0.98	2.14	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.38	3.01
134+50	36.00	55.00	19.00	0.85	0.35	0.04	0.13	0.72	0.94	0.88	3.02	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.44	3.50
135+00	36.00	51.00	15.00	0.85	0.35	0.04	0.17	0.96	1.01	0.82	3.85	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.49	3.89
135+50	36.00	53.00	17.00	0.85	0.35	0.04	0.21	1.19	1.07	0.78	4.62	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.53	4.22
136+00	36.00	55.00	19.00	0.85	0.35	0.04	0.25	1.43	1.06	0.78	5.41	5.64	6	4	5	10.21	3.11	0.025	0.00198	0.52	5.19
136+50	36.00	55.00	19.00	0.85	0.35	0.04	0.30	1.59	1.09	0.76	6.17	5.36	6	4	5	10.21	3.11	0.025	0.00198	0.54	5.40
137+00	36.00	56.00	20.00	0.85	0.35	0.04	0.34	1.82	1.13	0.74	6.91	5.36	6	4	5	10.21	3.11	0.025	0.00198	0.57	5.68

North Bound Road Side Ditch Calculations (Station 138+11 to Station 143+03)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
143+03	36.00	52.00	16.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.00	0.00
142+50	36.00	53.00	17.00	0.85	0.35	0.04	0.04	0.25	0.76	1.17	1.17	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.26	2.57
142+00	36.00	55.00	19.00	0.85	0.35	0.04	0.09	0.49	0.90	0.93	2.09	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.33	3.31
141+50	36.00	54.00	18.00	0.85	0.35	0.04	0.13	0.73	0.99	0.84	2.94	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.38	3.84
141+00	36.00	53.00	17.00	0.85	0.35	0.04	0.17	0.97	1.06	0.78	3.72	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.43	4.27
140+50	36.00	54.00	18.00	0.85	0.35	0.04	0.21	1.21	1.12	0.74	4.46	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.46	4.64
140+00	36.00	55.00	19.00	0.85	0.35	0.04	0.26	1.45	1.17	0.71	5.17	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.50	4.96
139+50	36.00	55.00	19.00	0.85	0.35	0.04	0.30	1.69	1.22	0.68	5.85	5.64	6	4	5	10.21	3.11	0.025	0.00256	0.53	5.26
139+00	36.00	56.00	20.00	0.85	0.35	0.04	0.34	1.84	1.25	0.67	6.52	5.36	6	4	5	10.21	3.11	0.025	0.00256	0.54	5.43
138+50	36.00	55.00	19.00	0.85	0.35	0.04	0.39	1.96	1.27	0.66	7.18	5.09	6	4	5	10.21	3.11	0.025	0.00256	0.56	5.56
138+11	36.00	55.00	19.00	0.85	0.35	0.03	0.42	2.13	1.29	0.50	7.68	5.09	6	4	5	10.21	3.11	0.025	0.00256	0.57	5.74

North Bound Road Side Ditch Calculations (Station 143+03 to Station 147+96)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
147+96	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.00	0.00
147+50	36.00	55.00	19.00	0.85	0.35	0.04	0.04	0.22	0.80	0.96	0.96	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.26	2.11
147+00	36.00	55.00	19.00	0.85	0.35	0.04	0.08	0.46	0.96	0.87	1.84	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.35	2.78
146+50	36.00	55.00	19.00	0.85	0.35	0.04	0.12	0.70	1.06	0.78	2.62	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.41	3.26
146+00	36.00	55.00	19.00	0.85	0.35	0.04	0.17	0.95	1.14	0.73	3.35	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.45	3.64
145+50	36.00	55.00	19.00	0.85	0.35	0.04	0.21	1.19	1.21	0.69	4.04	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.50	3.96
145+00	36.00	55.00	19.00	0.85	0.35	0.04	0.25	1.43	1.27	0.66	4.70	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.53	4.25
144+50	36.00	55.00	19.00	0.85	0.35	0.04	0.30	1.67	1.32	0.63	5.33	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.56	4.50
144+00	36.00	55.00	19.00	0.85	0.35	0.04	0.34	1.91	1.36	0.61	5.94	5.64	4	4	4	8.25	2.47	0.025	0.00276	0.59	4.74
143+50	36.00	55.00	19.00	0.85	0.35	0.04	0.38	2.05	1.39	0.60	6.54	5.36	4	4	4	8.25	2.47	0.025	0.00276	0.61	4.86
143+03	36.00	52.00	16.00	0.85	0.35	0.04	0.42	2.14	1.33	0.59	7.13	5.09	6	4	5	10.21	3.11	0.025	0.00276	0.57	5.67

North Bound Road Side Ditch Calculations (Station 149+96 to Station 152+71)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
152+71	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	20	12	24.15	7.53	0.025	0.00133	0.00	0.00
152+00	36.00	55.00	19.00	0.85	0.35	0.06	0.06	0.34	0.52	2.28	2.28	5.64	4	20	12	24.15	7.53	0.025	0.00133	0.23	5.63
151+50	36.00	55.00	19.00	0.85	0.35	0.04	0.10	0.58	0.59	1.41	3.69	5.64	4	20	12	24.15	7.53	0.025	0.00133	0.29	6.88
151+00	36.00	55.00	19.00	0.85	0.35	0.04	0.15	0.82	0.65	1.29	4.98	5.64	4	20	12	24.15	7.53	0.025	0.00133	0.33	7.83
150+50	36.00	55.00	19.00	0.85	0.35	0.04	0.19	1.01	0.68	1.22	6.20	5.36	4	20	12	24.15	7.53	0.025	0.00133	0.35	8.46
150+00	36.00	55.00	19.00	0.85	0.35	0.04	0.23	1.18	0.71	1.18	7.38	5.09	4	20	12	24.15	7.53	0.025	0.00133	0.37	8.95
149+50	36.00	55.00	19.00	0.85	0.35	0.04	0.27	1.32	0.73	1.15	8.53	4.81	4	20	12	24.15	7.53	0.025	0.00133	0.39	9.34
149+00	36.00	55.00	19.00	0.85	0.35	0.04	0.32	1.44	0.74	1.12	9.65	4.54	4	20	12	24.15	7.53	0.025	0.00133	0.40	9.64
148+50	36.00	55.00	19.00	0.85	0.35	0.04	0.36	1.53	0.75	1.10	10.76	4.26	4	20	12	24.15	7.53	0.025	0.00133	0.41	9.88
147+96	36.00	55.00	19.00	0.85	0.35	0.05	0.41	1.68	0.77	1.17	11.92	4.13	4	20	12	24.15	7.53	0.025	0.00133	0.43	10.21

North Bound Road Side Ditch Calculations (Station 154+50 to Station 159+43)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
154+50	36.00	55.00	19.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	20	12	24.15	7.53	0.025	0.00128	0.00	0.00
155+00	36.00	85.00	49.00	0.85	0.35	0.05	0.05	0.31	0.50	1.67	1.67	5.64	4	20	12	24.15	7.53	0.025	0.00128	0.23	5.46
155+50	36.00	85.00	49.00	0.85	0.35	0.05	0.11	0.62	0.59	1.41	3.08	5.64	4	20	12	24.15	7.53	0.025	0.00128	0.29	7.08
156+00	36.00	85.00	49.00	0.85	0.35	0.05	0.16	0.93	0.66	1.27	4.35	5.64	4	20	12	24.15	7.53	0.025	0.00128	0.34	8.24
156+50	36.00	85.00	49.00	0.85	0.35	0.05	0.22	1.24	0.70	1.18	5.53	5.64	4	20	12	24.15	7.53	0.025	0.00128	0.38	9.18
157+00	36.00	85.00	49.00	0.85	0.35	0.05	0.27	1.47	0.91	0.92	6.45	5.36	6	4	5	10.21	3.11	0.025	0.00128	0.57	5.69
157+50	36.00	85.00	49.00	0.85	0.35	0.05	0.33	1.67	0.94	0.89	7.33	5.09	6	4	5	10.21	3.11	0.025	0.00128	0.60	5.97
158+00	36.00	85.00	49.00	0.85	0.35	0.05	0.38	1.85	0.96	0.87	8.20	4.81	6	4	5	10.21	3.11	0.025	0.00128	0.62	6.19
158+50	36.00	85.00	49.00	0.85	0.35	0.05	0.44	1.99	0.98	0.85	9.05	4.54	6	4	5	10.21	3.11	0.025	0.00128	0.64	6.37
159+00	36.00	85.00	49.00	0.85	0.35	0.05	0.49	2.24	1.01	0.82	9.87	4.54	6	4	5	10.21	3.11	0.025	0.00128	0.67	6.66
159+43	36.00	85.00	49.00	0.85	0.35	0.05	0.54	2.30	1.02	0.70	10.58	4.26	6	4	5	10.21	3.11	0.025	0.00128	0.67	6.73

South Bound Road Side Ditch Calculations (Station 154+50 to Station 159+43)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
154+50	50.58	56.42	5.84	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00262	0.00	0.00
155+00	50.58	56.87	6.29	0.85	0.35	0.05	0.05	0.29	0.78	1.07	1.07	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00262	0.12	6.13
155+50	50.58	62.32	11.74	0.85	0.35	0.05	0.11	0.60	0.93	0.89	1.96	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00262	0.16	8.02
156+00	50.58	63.14	12.56	0.85	0.35	0.05	0.16	0.90	1.03	0.81	2.77	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00262	0.19	9.36
156+50	50.58	58.03	7.45	0.85	0.35	0.05	0.21	1.20	1.11	0.75	3.52	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00262	0.21	10.41
157+00	50.58	56.00	5.42	0.85	0.35	0.05	0.26	1.49	1.17	0.71	4.23	5.64	0.1	50	25.1	51.01	15.59	0.015	0.00262	0.23	11.29
157+50	43.67	58.00	14.33	0.85	0.35	0.05	0.31	1.76	1.24	0.67	4.90	5.64	4	6	5	10.21	3.11	0.025	0.00262	0.53	5.32
158+00	40.33	55.00	14.67	0.85	0.35	0.05	0.36	2.02	1.29	0.65	5.55	5.64	4	6	5	10.21	3.11	0.025	0.00262	0.56	5.60
158+50	37.00	51.00	14.00	0.85	0.35	0.04	0.40	2.14	1.06	0.79	6.34	5.36	4	20	12	24.15	7.53	0.025	0.00262	0.41	9.86
159+00	36.00	51.00	15.00	0.85	0.35	0.04	0.44	2.24	1.07	0.78	7.12	5.09	4	20	12	24.15	7.53	0.025	0.00262	0.42	10.03
159+43	36.00	51.00	15.00	0.85	0.35	0.04	0.48	2.42	1.09	0.66	7.78	5.09	4	20	12	24.15	7.53	0.025	0.00262	0.43	10.33

South Bound Road Side Ditch Calculations (Station 160+98 to Station 164+26)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
164+26	36.00	51.00	15.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	20	12	24.15	7.53	0.025	0.00334	0.00	0.00
164+00	36.00	51.00	15.00	0.85	0.35	0.02	0.02	0.12	0.56	0.77	0.77	5.64	4	20	12	24.15	7.53	0.025	0.00334	0.13	3.20
163+50	36.00	51.00	15.00	0.85	0.35	0.04	0.06	0.35	0.74	1.13	1.90	5.64	4	20	12	24.15	7.53	0.025	0.00334	0.20	4.79
163+00	36.00	52.00	16.00	0.85	0.35	0.04	0.10	0.59	1.04	0.80	2.70	5.64	4	6	5	10.21	3.11	0.025	0.00334	0.34	3.37
162+50	36.00	50.00	14.00	0.85	0.35	0.04	0.14	0.82	0.91	0.92	3.62	5.64	4	20	12	24.15	7.53	0.025	0.00334	0.27	6.56
162+00	36.00	55.00	19.00	0.85	0.35	0.04	0.19	1.06	1.20	0.69	4.31	5.64	4	6	5	10.21	3.11	0.025	0.00334	0.42	4.20
161+50	36.00	53.00	17.00	0.85	0.35	0.04	0.23	1.29	1.26	0.66	4.97	5.64	4	6	5	10.21	3.11	0.025	0.00334	0.45	4.53
160+98	36.00	53.00	17.00	0.85	0.35	0.04	0.27	1.54	1.32	0.66	5.63	5.64	4	6	5	10.21	3.11	0.025	0.00334	0.48	4.83

South Bound Road Side Ditch Calculations (Station 164+26 to Station 169+18)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
169+18	36.00	50.00	14.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00180	0.00	0.00
168+50	36.00	51.00	15.00	0.85	0.35	0.06	0.06	0.32	0.74	1.53	1.53	5.64	4	4	4	8.25	2.47	0.025	0.00180	0.33	2.61
168+00	36.00	51.00	15.00	0.85	0.35	0.04	0.10	0.55	0.85	0.98	2.51	5.64	4	4	4	8.25	2.47	0.025	0.00180	0.40	3.21
167+50	36.00	52.00	16.00	0.85	0.35	0.04	0.14	0.78	0.93	0.90	3.41	5.64	4	4	4	8.25	2.47	0.025	0.00180	0.46	3.67
167+00	36.00	50.00	14.00	0.85	0.35	0.04	0.18	1.01	0.99	0.84	4.25	5.64	4	4	4	8.25	2.47	0.025	0.00180	0.51	4.04
166+50	36.00	55.00	19.00	0.85	0.35	0.04	0.22	1.25	1.04	0.80	5.05	5.64	4	4	4	8.25	2.47	0.025	0.00180	0.55	4.38
166+00	36.00	53.00	17.00	0.85	0.35	0.04	0.26	1.49	1.09	0.76	5.81	5.64	4	4	4	8.25	2.47	0.025	0.00180	0.58	4.67
165+50	36.00	51.00	15.00	0.85	0.35	0.04	0.31	1.64	0.86	0.97	6.78	5.36	4	20	12	24.15	7.53	0.025	0.00180	0.40	9.56
165+00	36.00	51.00	15.00	0.85	0.35	0.04	0.35	1.76	0.88	0.95	7.73	5.09	4	20	12	24.15	7.53	0.025	0.00180	0.41	9.83
164+26	36.00	51.00	15.00	0.85	0.35	0.06	0.41	1.85	0.89	1.39	9.13	4.54	4	20	12	24.15	7.53	0.025	0.00180	0.42	10.01

North Bound Road Side Ditch Calculations (Station 164+36 to Station 169+28)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
169+28	36.00	85.00	49.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	5	4.5	9.22	2.79	0.025	0.00344	0.00	0.00
168+50	36.00	85.00	49.00	0.85	0.35	0.09	0.09	0.48	1.02	1.27	1.27	5.64	4	5	4.5	9.22	2.79	0.025	0.00344	0.32	2.91
168+00	36.00	85.00	49.00	0.85	0.35	0.05	0.14	0.79	1.16	0.72	1.99	5.64	4	5	4.5	9.22	2.79	0.025	0.00344	0.39	3.51
167+50	36.00	85.00	49.00	0.85	0.35	0.05	0.20	1.10	1.26	0.66	2.66	5.64	4	5	4.5	9.22	2.79	0.025	0.00344	0.44	3.97
167+00	36.00	86.00	50.00	0.85	0.35	0.06	0.25	1.41	1.30	0.64	3.30	5.64	6	4	5	10.21	3.11	0.025	0.00344	0.47	4.65
166+50	36.00	85.00	49.00	0.85	0.35	0.05	0.31	1.72	1.37	0.61	3.90	5.64	6	4	5	10.21	3.11	0.025	0.00344	0.50	5.01
166+00	36.00	85.00	49.00	0.85	0.35	0.05	0.36	2.03	1.43	0.58	4.49	5.64	6	4	5	10.21	3.11	0.025	0.00344	0.53	5.33
165+50	36.00	85.00	49.00	0.85	0.35	0.05	0.41	2.34	1.48	0.56	5.05	5.64	6	4	5	10.21	3.11	0.025	0.00344	0.56	5.62
165+00	36.00	85.00	49.00	0.85	0.35	0.05	0.47	2.65	1.53	0.55	5.60	5.64	6	4	5	10.21	3.11	0.025	0.00344	0.59	5.89
164+36	36.00	85.00	49.00	0.85	0.35	0.07	0.54	2.90	1.56	0.68	6.28	5.36	6	4	5	10.21	3.11	0.025	0.00344	0.61	6.09

South Bound Road Side Ditch Calculations (Station 169+18 to Station 173+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
173+00	36.00	51.00	15.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.00	0.00
172+50	36.00	51.00	15.00	0.85	0.35	0.04	0.04	0.23	0.71	1.17	1.17	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.29	2.29
172+00	36.00	51.00	15.00	0.85	0.35	0.04	0.08	0.46	0.84	0.99	2.16	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.37	2.97
171+50	36.00	52.00	16.00	0.85	0.35	0.04	0.12	0.70	0.94	0.89	3.05	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.43	3.46
171+00	36.00	95.00	59.00	0.85	0.35	0.06	0.18	1.03	0.65	1.28	4.33	5.64	50	4	27	54.13	16.98	0.025	0.00198	0.24	13.10
170+50	36.00	51.00	15.00	0.85	0.35	0.04	0.22	1.26	1.08	0.77	5.10	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.54	4.31
170+00	36.00	51.00	15.00	0.85	0.35	0.04	0.26	1.49	1.13	0.74	5.84	5.64	4	4	4	8.25	2.47	0.025	0.00198	0.57	4.60
169+50	36.00	51.00	15.00	0.85	0.35	0.04	0.31	1.64	1.16	0.72	6.56	5.36	4	4	4	8.25	2.47	0.025	0.00198	0.60	4.76
169+18	36.00	50.00	14.00	0.85	0.35	0.03	0.33	1.69	1.17	0.46	7.02	5.09	4	4	4	8.25	2.47	0.025	0.00198	0.60	4.81

North Bound Road Side Ditch Calculations (Station 169+28 to Station 174+20)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
174+20	36.00	87.00	51.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	10	7	14.17	4.37	0.025	0.00058	0.00	0.00
173+50	36.00	87.00	51.00	0.85	0.35	0.08	0.08	0.44	0.50	2.33	2.33	5.64	4	6	5	10.21	3.11	0.025	0.00058	0.42	4.19
173+00	36.00	87.00	51.00	0.85	0.35	0.06	0.13	0.75	0.57	1.46	3.79	5.64	4	6	5	10.21	3.11	0.025	0.00058	0.51	5.13
172+50	36.00	87.00	51.00	0.85	0.35	0.06	0.19	1.07	0.66	1.27	5.06	5.64	4	4	4	8.25	2.47	0.025	0.00058	0.64	5.10
172+00	36.00	86.00	50.00	0.85	0.35	0.06	0.24	1.31	0.66	1.27	6.33	5.36	4	6	5	10.21	3.11	0.025	0.00058	0.63	6.32
171+50	36.00	87.00	51.00	0.85	0.35	0.06	0.30	1.53	0.68	1.22	7.55	5.09	4	6	5	10.21	3.11	0.025	0.00058	0.67	6.69
171+00	36.00	86.00	50.00	0.85	0.35	0.06	0.36	1.71	0.70	1.19	8.74	4.81	4	6	5	10.21	3.11	0.025	0.00058	0.70	6.98
170+50	36.00	85.00	49.00	0.85	0.35	0.05	0.41	1.86	0.72	1.16	9.90	4.54	4	6	5	10.21	3.11	0.025	0.00058	0.72	7.20
170+00	36.00	85.00	49.00	0.85	0.35	0.05	0.46	1.92	0.72	1.15	11.06	4.13	4	6	5	10.21	3.11	0.025	0.00058	0.73	7.29
169+28	36.00	86.00	50.00	0.85	0.35	0.08	0.54	2.17	0.69	1.74	12.80	4.00	4	10	7	14.17	4.37	0.025	0.00058	0.67	9.41

North Bound Road Side Ditch Calculations (Station 174+20 to Station 179+00)

Station	Pv_W		RW_W	C_Pv	C_RW	CA	total CA	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)		(ft)			(acre)	(acre)	(cfs)	(ft/s)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
179+00	36.00	105.00	69.00	0.85	0.35	0.00	0	0.00	0.00	0.00	0	5.64	4	50	27	54.13	16.98	0.025	0.00050	0.00	0.00
178+50	36.00	80.00	44.00	0.85	0.35	0.05	0.05	0.30	0.43	1.94	1.94	5.64	4	6	5	10.21	3.11	0.025	0.00050	0.37	3.73
178+00	36.00	85.00	49.00	0.85	0.35	0.05	0.11	0.61	0.54	1.55	3.49	5.64	4	4	4	8.25	2.47	0.025	0.00050	0.53	4.24
177+50	36.00	87.00	51.00	0.85	0.35	0.06	0.16	0.92	0.52	1.59	5.08	5.64	4	10	7	14.17	4.37	0.025	0.00050	0.50	7.01
177+00	36.00	87.00	51.00	0.85	0.35	0.06	0.22	1.17	0.56	1.49	6.57	5.36	4	10	7	14.17	4.37	0.025	0.00050	0.55	7.68
176+50	36.00	87.00	51.00	0.85	0.35	0.06	0.27	1.32	0.57	1.45	8.02	4.81	4	10	7	14.17	4.37	0.025	0.00050	0.57	8.02
176+00	36.00	87.00	51.00	0.85	0.35	0.06	0.33	1.50	0.59	1.41	9.43	4.54	4	10	7	14.17	4.37	0.025	0.00050	0.60	8.41
175+50	36.00	87.00	51.00	0.85	0.35	0.06	0.39	1.64	0.61	1.37	10.80	4.26	4	10	7	14.17	4.37	0.025	0.00050	0.62	8.71
175+00	36.00	87.00	51.00	0.85	0.35	0.06	0.44	1.76	0.62	1.35	12.15	4.00	4	10	7	14.17	4.37	0.025	0.00050	0.64	8.94
174+50	36.00	87.00	51.00	0.85	0.35	0.06	0.50	1.92	0.63	1.32	13.47	3.86	4	10	7	14.17	4.37	0.025	0.00050	0.66	9.23
174+20	36.00	87.00	51.00	0.85	0.35	0.03	0.53	1.98	0.64	0.79	14.26	3.73	4	10	7	14.17	4.37	0.025	0.00050	0.67	9.34

DESIGN MEMORANDUM

Client: MCDOT / FCD / CITY OF MESA Sheet 1 Of 2

Project: ELLSWORTH ROAD Date:

Data For: RIPRAP APRON DIMENSIONS & ROCK SIZE Work Order:

Prepared By: [illegible] Checked By: File No:

Note: This form must be used for project calculations and original filed in project files

amec

* FOR 18" PIPES USE:

$Q_{max} = 6\ cfs$
$TW = 1\ ft$, ASSUME ROAD RUNOFF IS PRIOR TO LARGE Q IN ELLSWORTH
$D = 1.5'$

APRON LENGTH:

$$L_a = \frac{3Q}{D^{3/2}} + 7D \text{, for } TW > D/2 \quad ; \text{ EQUN 5.22, DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY Vol. 2}$$

$$= \frac{3 \cdot 6}{1.5^{1.5}} + 7 \cdot 1.5$$

$$= \underline{20'}$$

STONE SIZE

$$d_{50} = \frac{0.02\,(Q)^{4/3}}{TW \cdot D} \Rightarrow d_{50} = \frac{0.02\,(6)^{4/3}}{1 \cdot 1.5} \Rightarrow d_{50} = 0.15\ ft^3 = 1.75\ in \therefore$$

* EQUATION 5.25

USE $d_{50} = 3in$, 6 in thick

* FOR 30" PIPE USE:

$Q_{max} = 22\ cfs$
$TW = 1\ ft$, ASSUME ROAD RUNOFF IS PRIOR TO LARGE Q IN ELLSWORTH
$D = 2.5\ ft$

APRON LENGTH

$$L_a = \frac{1.8Q}{D^{3/2}} + 7D \text{, for } TW < D/2 \quad ; \text{ EQUN 5.21}$$

$$= \frac{1.8 \cdot 22}{2.5^{(3/2)}} \cdot 7 \cdot 2.5 \Rightarrow 28' \Rightarrow \text{USE } 30'$$

STONE SIZE

$$d_{50} = \frac{0.02\,(Q)^{4/3}}{TW \cdot D} \Rightarrow d_{50} = \frac{0.02\,(22)^{4/3}}{1 \cdot 2.5} \Rightarrow 0.49\ ft \Rightarrow \text{USE } d_{50} = 6in$$

1 ft THICK

DESIGN MEMORANDUM

Client: _____ Sheet 2 Of 2

Project: _____ Date: _____

Data For: _____ Work Order: _____

Prepared By: _____ Checked By: _____ File No: _____

Note: This form must be used for project calculations and original filed in project files

* FOR 42" PIPES:

THESE PIPES CARRY AN OFFSITE FLOW OF 51 cfs EACH (SEE ATTACHED)

$\therefore$ $Q_{MAX} = 51$ cfs
$TW = 1$ ft
$D = 3.5$ ft

, ASSUME THAT RUNOFF FROM ADJACENT FIELDS OCCURS PRIOR TO LARGE Q IN ELLSWORTH CHANNEL

APRON LENGTH

$$L_a = \frac{1.8Q}{D^{3/2}} + 7D \; ; \text{ for } TW < D/2$$

$$= \frac{1.8(51)}{3.5^{(1.5)}} + 7 \cdot 3.5$$

$\Rightarrow 38.5'$ $\Rightarrow$ THIS APRON LENGTH IS IMPRACTICAL CONSIDERING THE BOTTOM WIDTH OF THE CHANNEL AT THIS LOCATION. USE OF TYPE B BANK PROTECTION ON BOTTOM & OPPOSITE SLOPE FOR A LENGTH OF 36' IS RECOMMENDED.

STONE SIZE

d_{50} $\Rightarrow$ USING GAGION BANK PROTECTION PER ABOVE

APPENDIX H

HEC-RAS For PLF

(Used to Determine Starting Water Surface Elevation for Ellsworth Channel)

Power Line Floodway HEC-RAS
(from Dibble & Associates)

HEC-RAS Plan: Improved River: PLF Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	0	isting (updated)	3994.00	1319.70	1326.37	1324.58	1327.40	0.002924	8.16	489.55	87.94	0.61
1	0	Future (N-3)	2685.00	1319.70	1324.96	1323.48	1325.78	0.002921	7.23	371.14	81.05	0.60
1	315	isting (updated)	3994.00	1319.70	1327.54		1328.40	0.003344	7.46	535.75	76.65	0.50
1	315	Future (N-3)	2685.00	1319.70	1326.11		1326.72	0.002971	6.27	428.51	73.62	0.46
1	336	isting (updated)	3994.00	1319.70	1327.85		1328.49	0.002457	6.39	624.69	95.07	0.44
1	336	Future (N-3)	2685.00	1319.70	1326.32		1326.79	0.002343	5.54	484.66	87.16	0.41
1	337	isting (updated)	3994.00	1319.70	1327.72		1328.54	0.000379	7.26	549.78	77.04	0.48
1	337	Future (N-3)	2685.00	1319.70	1326.24		1326.83	0.000341	6.13	437.90	73.89	0.44
1	438	isting (updated)	3994.00	1319.71	1327.62		1328.65	0.000531	8.17	488.97	73.80	0.56
1	438	Future (N-3)	2685.00	1319.71	1326.16		1326.92	0.000504	7.00	383.31	71.03	0.53
1	941.42		Bridge									
1	951	isting (updated)	3994.00	1319.76	1328.23	1325.37	1329.12	0.000421	7.59	526.48	73.82	0.50
1	951	Future (N-3)	2685.00	1319.76	1326.67	1324.24	1327.33	0.000395	6.49	413.96	71.08	0.47
1	1000		Bridge									
1	1057	isting (updated)	3994.00	1319.53	1328.53	1325.15	1329.30	0.000339	7.06	565.85	74.77	0.45
1	1057	Future (N-3)	2685.00	1319.53	1326.91	1324.00	1327.47	0.000312	6.00	447.25	71.91	0.42
1	1073	isting (updated)	3994.00	1319.77	1328.49		1329.32	0.000379	7.32	545.30	74.28	0.48
1	1073	Future (N-3)	2685.00	1319.77	1326.88		1327.49	0.000357	6.28	427.83	71.43	0.45
1	1074	isting (updated)	3994.00	1319.77	1328.56		1329.33	0.000948	7.05	566.57	78.37	0.46
1	1074	Future (N-3)	2685.00	1319.77	1326.92		1327.49	0.000816	6.09	441.07	74.67	0.44
1	1114	isting (updated)	3994.00	1319.77	1328.60		1329.37	0.000933	7.00	570.20	78.47	0.46
1	1114	Future (N-3)	2685.00	1319.77	1326.96		1327.53	0.000802	6.05	444.00	74.76	0.44
1	1115	isting (updated)	3994.00	1326.80	1331.71	1331.71	1333.92	0.015072	11.93	334.71	76.36	1.00
1	1115	Future (N-3)	2685.00	1326.80	1330.61	1330.61	1332.36	0.016174	10.63	252.53	72.69	1.01
1	1161	isting (updated)	3994.00	1326.80	1333.24	1331.71	1334.43	0.005949	8.77	455.37	81.46	0.65
1	1161	Future (N-3)	2685.00	1326.80	1331.97	1330.61	1332.86	0.005699	7.56	354.93	77.24	0.62
1	1162	isting (updated)	3994.00	1326.80	1333.25		1334.44	0.004054	8.76	456.12	81.49	0.65
1	1162	Future (N-3)	2685.00	1326.80	1331.98		1332.87	0.003777	7.55	355.58	77.27	0.62
1	3970	isting (updated)	3994.00	1332.18	1340.39		1341.02	0.001506	6.41	637.73	102.45	0.42
1	3970	Future (N-3)	2685.00	1332.18	1338.84		1339.31	0.001524	5.51	488.93	89.49	0.40
1	4070	isting (updated)	3994.00	1332.48	1340.52		1341.19	0.001629	6.57	620.85	101.07	0.43
1	4070	Future (N-3)	2685.00	1332.48	1338.98		1339.48	0.001674	5.67	474.77	88.15	0.42
1	4071	isting (updated)	3994.00	1332.48	1340.52		1341.19	0.001633	6.58	618.49	98.72	0.43
1	4071	Future (N-3)	2685.00	1332.48	1338.98		1339.48	0.001672	5.66	474.79	87.60	0.42
1	4090	isting (updated)	3994.00	1332.54	1340.54		1341.21	0.000841	6.63	615.23	99.74	0.44
1	4090	Future (N-3)	2685.00	1332.54	1339.00		1339.50	0.000862	5.71	471.08	87.59	0.43
1	4109	isting (updated)	3994.00	1332.60	1340.54		1341.23	0.000861	6.68	610.91	100.08	0.44
1	4109	Future (N-3)	2685.00	1332.60	1339.01		1339.52	0.000888	5.76	466.77	87.36	0.43
1	4110	isting (updated)	3994.00	1334.60	1339.65	1339.47	1341.63	0.004225	11.29	353.78	80.19	0.95
1	4110	Future (N-3)	2685.00	1334.60	1338.38	1338.38	1340.10	0.004462	10.51	255.58	75.13	1.00
1	4120	isting (updated)	3994.00	1334.63	1339.96	1339.49	1341.71	0.007499	10.61	376.31	81.30	0.87
1	4120	Future (N-3)	2685.00	1334.63	1338.67	1338.41	1340.20	0.007241	9.25	290.13	76.95	0.84
1	4121	isting (updated)	3994.00	1334.63	1339.97		1341.71	0.007443	10.59	377.29	81.35	0.87
1	4121	Future (N-3)	2685.00	1334.63	1338.88		1340.20	0.007176	9.23	291.02	76.99	0.84
1	5240	isting (updated)	3381.00	1336.18	1345.51		1345.84	0.000655	4.65	755.23	105.33	0.28
1	5240	Future (N-3)	2936.00	1336.18	1344.24		1344.59	0.000874	4.82	622.11	100.96	0.32
1	5340	isting (updated)	3381.00	1336.48	1345.56		1345.92	0.000727	4.80	729.21	105.33	0.30
1	5340	Future (N-3)	2936.00	1336.48	1344.31		1344.69	0.000976	4.98	599.57	99.10	0.33
1	5341	isting (updated)	3381.00	1336.48	1345.56		1345.92	0.000728	4.81	728.02	104.85	0.30
1	5341	Future (N-3)	2936.00	1336.48	1344.31		1344.70	0.000976	4.98	599.17	98.58	0.33
1	5360	isting (updated)	3381.00	1336.54	1345.57		1345.93	0.000380	4.88	717.84	101.92	0.30
1	5360	Future (N-3)	2936.00	1336.54	1344.32		1344.71	0.000505	5.03	592.67	96.72	0.34
1	5379	isting (updated)	3381.00	1336.60	1345.57		1345.94	0.000389	4.91	712.10	101.18	0.30
1	5379	Future (N-3)	2936.00	1336.60	1344.32		1344.72	0.000519	5.07	587.60	96.56	0.34

HEC-RAS Plan: Improved River: PLF Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5380	Isting (updated)	3381.00	1338.10	1345.41		1346.01	0.000848	6.22	549.34	92.39	0.43
1	5380	Future (N-3)	2936.00	1338.10	1344.10		1344.82	0.001366	6.79	432.15	84.02	0.53
1	5390	Isting (updated)	3381.00	1338.13	1345.42		1346.02	0.001701	6.24	548.03	92.63	0.43
1	5390	Future (N-3)	2936.00	1338.13	1344.12		1344.84	0.002740	6.81	431.08	83.96	0.53
1	5391	Isting (updated)	3381.00	1338.13	1345.42		1346.02	0.001697	6.23	549.35	94.33	0.43
1	5391	Future (N-3)	2936.00	1338.13	1344.12		1344.84	0.002735	6.81	431.35	83.97	0.53
1	6540	Isting (updated)	3381.00	1340.18	1347.40		1348.02	0.001769	6.31	540.07	93.19	0.44
1	6540	Future (N-3)	2936.00	1340.18	1346.83		1347.40	0.001826	6.03	488.52	88.93	0.44
1	6640	Isting (updated)	3381.00	1340.48	1347.56		1348.21	0.001903	6.45	527.44	92.16	0.46
1	6640	Future (N-3)	2936.00	1340.48	1347.01		1347.60	0.001968	6.17	477.13	87.96	0.46
1	6641	Isting (updated)	3381.00	1340.48	1347.57		1348.21	0.001902	6.45	527.25	91.48	0.46
1	6641	Future (N-3)	2936.00	1340.48	1347.01		1347.60	0.001966	6.16	477.24	87.63	0.46
1	6660	Isting (updated)	3381.00	1340.54	1347.58		1348.24	0.000977	6.50	523.81	91.87	0.46
1	6660	Future (N-3)	2936.00	1340.54	1347.03		1347.63	0.001011	6.21	473.82	87.67	0.46
1	6679	Isting (updated)	3381.00	1340.60	1347.60		1348.26	0.001004	6.55	519.40	91.59	0.47
1	6679	Future (N-3)	2936.00	1340.60	1347.04		1347.65	0.001040	6.26	469.65	87.35	0.47
1	6680	Isting (updated)	3381.00	1342.10	1347.00		1348.52	0.003298	9.88	342.26	79.61	0.84
1	6680	Future (N-3)	2936.00	1342.10	1346.38	1346.11	1347.94	0.003707	10.00	293.57	77.13	0.90
1	6690	Isting (updated)	3381.00	1342.13	1347.05		1348.56	0.007071	9.87	342.55	79.62	0.84
1	6690	Future (N-3)	2936.00	1342.13	1346.46		1347.98	0.008158	9.91	296.17	77.22	0.89
1	6691	Isting (updated)	3381.00	1342.13	1347.09		1348.57	0.006824	9.76	346.56	79.83	0.83
1	6691	Future (N-3)	2936.00	1342.13	1346.52		1347.99	0.007699	9.72	301.95	77.56	0.87
1	6980	Isting (updated)	3381.00	1343.00	1349.06		1349.99	0.003479	7.74	436.85	84.55	0.60
1	6980	Future (N-3)	2936.00	1343.00	1348.63		1349.46	0.003367	7.32	401.25	82.52	0.58
1	7840	Isting (updated)	3381.00	1344.34	1351.50		1352.13	0.001822	6.37	536.02	94.88	0.45
1	7840	Future (N-3)	2936.00	1344.34	1351.00		1351.57	0.001815	6.02	489.78	90.20	0.44
1	7940	Isting (updated)	3381.00	1344.64	1351.67		1352.33	0.001956	6.51	523.68	93.65	0.46
1	7940	Future (N-3)	2936.00	1344.64	1351.17		1351.76	0.001958	6.16	478.12	88.99	0.46
1	7941	Isting (updated)	3381.00	1344.64	1351.67		1352.33	0.001954	6.51	523.48	92.91	0.46
1	7941	Future (N-3)	2936.00	1344.64	1351.18		1351.76	0.001956	6.15	478.22	88.61	0.46
1	7960	Isting (updated)	3381.00	1344.72	1351.69		1352.36	0.001018	6.58	517.24	91.83	0.47
1	7960	Future (N-3)	2936.00	1344.72	1351.19		1351.79	0.001020	6.22	472.56	87.81	0.46
1	7979	Isting (updated)	3381.00	1344.80	1351.70		1352.39	0.001059	6.66	510.34	90.54	0.48
1	7979	Future (N-3)	2936.00	1344.80	1351.20		1351.82	0.001064	6.30	466.27	86.92	0.47
1	7980	Isting (updated)	3381.00	1346.80	1351.19	1351.19	1353.14	0.004571	11.20	301.87	77.56	1.00
1	7980	Future (N-3)	2936.00	1346.80	1350.80	1350.80	1352.61	0.004517	10.78	272.24	76.01	1.00
1	7990	Isting (updated)	3381.00	1346.84	1351.67	1351.23	1353.24	0.007451	10.05	336.26	79.31	0.86
1	7990	Future (N-3)	2936.00	1346.84	1351.27	1350.84	1352.71	0.007467	9.62	305.11	77.72	0.86
1	7991	Isting (updated)	3381.00	1346.84	1351.68		1353.24	0.007389	10.03	337.22	79.36	0.86
1	7991	Future (N-3)	2936.00	1346.84	1351.28		1352.71	0.007400	9.59	306.05	77.77	0.85
1	8815	Isting (updated)	3381.00	1348.15	1355.36		1355.98	0.001783	6.33	538.25	92.19	0.44
1	8815	Future (N-3)	2936.00	1348.15	1354.87		1355.42	0.001759	5.96	494.09	88.88	0.43
1	8915	Isting (updated)	3381.00	1348.54	1355.51		1356.18	0.002025	6.58	516.75	90.59	0.47
1	8915	Future (N-3)	2936.00	1348.54	1355.02		1355.62	0.002018	6.21	473.38	87.28	0.46
1	8916	Isting (updated)	3381.00	1348.54	1355.51		1356.18	0.002020	6.57	517.94	92.46	0.47
1	8916	Future (N-3)	2936.00	1348.54	1355.03		1355.62	0.002014	6.21	473.83	88.22	0.46
1	8935	Isting (updated)	3381.00	1348.62	1355.53		1356.22	0.001052	6.65	510.95	89.53	0.48
1	8935	Future (N-3)	2936.00	1348.62	1355.04		1355.66	0.001051	6.28	468.07	86.57	0.47
1	8955	Isting (updated)	3381.00	1348.70	1355.54		1356.24	0.001093	6.72	505.68	91.35	0.48
1	8955	Future (N-3)	2936.00	1348.70	1355.05		1355.68	0.001095	6.36	462.25	87.09	0.48
1	8956	Isting (updated)	3381.00	1350.70	1355.08	1355.08	1357.04	0.004603	11.23	301.06	77.51	1.00
1	8956	Future (N-3)	2936.00	1350.70	1354.70	1354.70	1356.51	0.004525	10.79	272.06	76.00	1.01
1	8966	Isting (updated)	3381.00	1350.74	1355.57	1355.12	1357.14	0.007417	10.04	336.79	79.34	0.86
1	8966	Future (N-3)	2936.00	1350.74	1355.17	1354.74	1356.61	0.007464	9.62	305.15	77.73	0.86

Starting Water Surface Elevation for Elsworth Channel

HEC-RAS Plan: Improved River: PLF Reach: 1 (Continued)

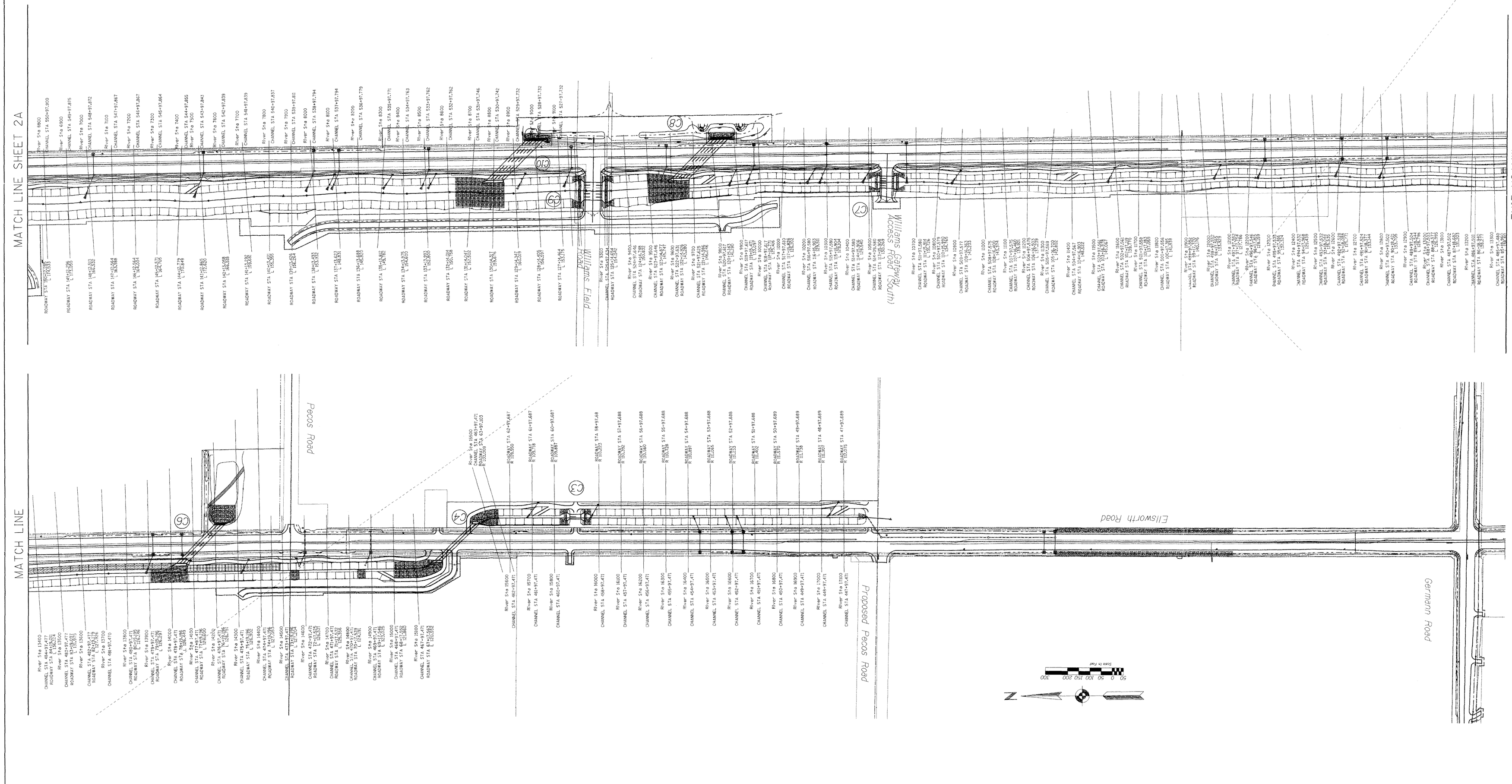
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	8967	isting (updated)	3381.00	1350.74	1355.59		1357.14	0.007356	10.01	337.75	79.39	0.86
1	8967	Future (N-3)	2936.00	1350.74	1355.18		1356.61	0.007397	9.59	306.09	77.77	0.85
1	9477	isting (updated)	3381.00	1352.61	1358.73		1359.64	0.003342	7.65	442.26	85.69	0.59
1	9477	Future (N-3)	2936.00	1352.61	1358.27		1359.09	0.003302	7.27	403.96	82.65	0.58
1	9540	isting (updated)	712.00	1353.00	1359.76		1359.79	0.000101	1.43	499.65	94.60	0.10
1	9540	Future (N-3)	615.00	1353.00	1359.21		1359.24	0.000105	1.37	449.78	86.91	0.10
1	9541	isting (updated)	712.00	1353.00	1359.69		1359.82	0.000547	2.94	241.77	36.32	0.20
1	9541	Future (N-3)	615.00	1353.00	1359.15		1359.26	0.000538	2.77	222.15	36.30	0.20
1	9559	isting (updated)	712.00	1347.00	1359.75		1359.83	0.000164	2.29	310.48	24.71	0.11
1	9559	Future (N-3)	615.00	1347.00	1359.21		1359.27	0.000140	2.07	297.11	24.68	0.11
1	9560.2	isting (updated)	712.00	1347.00	1359.73		1359.84	0.000061	2.66	267.31	21.00	0.13
1	9560.2	Future (N-3)	615.00	1347.00	1359.19		1359.28	0.000051	2.40	256.02	21.00	0.12
1	9575.5	isting (updated)	712.00	1347.00	1359.73		1359.84	0.000061	2.66	267.33	21.00	0.13
1	9575.5	Future (N-3)	615.00	1347.00	1359.19		1359.28	0.000051	2.40	256.04	21.00	0.12
1	9601	isting (updated)	712.00	1356.00	1359.93	1359.93	1361.92	0.003119	11.31	62.93	16.00	1.01
1	9601	Future (N-3)	615.00	1356.00	1359.57	1359.57	1361.37	0.003090	10.77	57.09	16.00	1.01
1	9621	isting (updated)	712.00	1356.00	1360.68	1360.68	1362.27	0.002289	10.14	70.19	22.03	1.00
1	9621	Future (N-3)	615.00	1356.00	1360.33	1360.33	1361.82	0.002325	9.81	62.66	20.98	1.00
1	9780	isting (updated)	712.00	1357.71	1362.39	1362.39	1363.98	0.002285	10.14	70.24	22.03	1.00
1	9780	Future (N-3)	615.00	1357.71	1362.04	1362.04	1363.53	0.002322	9.81	62.69	20.98	1.00
1	12183	isting (updated)	712.00	1368.26	1372.94	1372.94	1374.53	0.002283	10.13	70.25	22.03	1.00
1	12183	Future (N-3)	615.00	1368.26	1372.59	1372.59	1374.08	0.002319	9.81	62.72	20.98	1.00
1	12192		Bridge									
1	12201	isting (updated)	712.00	1368.34	1373.25	1373.02	1374.63	0.001881	9.44	75.45	22.73	0.91
1	12201	Future (N-3)	615.00	1368.34	1372.88	1372.67	1374.18	0.001916	9.14	67.28	21.63	0.91
1	13680	isting (updated)	712.00	1375.00	1379.66	1379.66	1381.27	0.002315	10.19	69.90	21.99	1.01
1	13680	Future (N-3)	615.00	1375.00	1379.31	1379.31	1380.82	0.002356	9.86	62.36	20.93	1.01
1	13681	isting (updated)	712.00	1375.00	1379.69	1379.66	1381.27	0.002252	10.08	70.61	22.08	0.99
1	13681	Future (N-3)	615.00	1375.00	1379.34	1379.31	1380.82	0.002292	9.76	63.00	21.02	0.99
1	14744	isting (updated)	712.00	1381.23	1386.08	1386.08	1387.78	0.002346	10.45	68.12	20.09	1.00
1	14744	Future (N-3)	615.00	1381.23	1385.71	1385.71	1387.30	0.002385	10.11	60.80	19.16	1.00
1	14776	isting (updated)	712.00	1381.44	1386.02	1385.74	1387.92	0.002778	11.06	64.39	14.10	0.91
1	14776	Future (N-3)	615.00	1381.44	1385.86		1387.38	0.002295	9.90	62.10	14.09	0.83
1	14813		Culvert									
1	14961	isting (updated)	712.00	1381.82	1388.81	1386.12	1389.63	0.000875	7.25	98.21	14.10	0.48
1	14961	Future (N-3)	615.00	1381.82	1388.16	1385.72	1388.90	0.000849	6.91	89.04	14.08	0.48
1	14993	isting (updated)	712.00	1382.50	1389.12		1389.68	0.000527	6.01	118.55	27.73	0.50
1	14993	Future (N-3)	615.00	1382.50	1388.32		1388.94	0.000704	6.32	97.37	25.46	0.57
1	15255	isting (updated)	712.00	1384.31	1388.97	1388.97	1390.58	0.002316	10.19	69.89	21.98	1.01
1	15255	Future (N-3)	615.00	1384.31	1388.63	1388.63	1390.13	0.002348	9.85	62.44	20.94	1.01

APPENDIX I

Ellsworth Channel Design Conditions HEC-RAS Output

(Future Condition with Full CIP)

- **HEC-RAS Cross Section, Channel Station, and Roadway Station Exhibit**
- **HEC-RAS Report**
- **Standard Tables 1 & 2**
- **Cross Section Plots**



MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

NO.	REVISION	BY	DATE
1			
2			
3			
4			

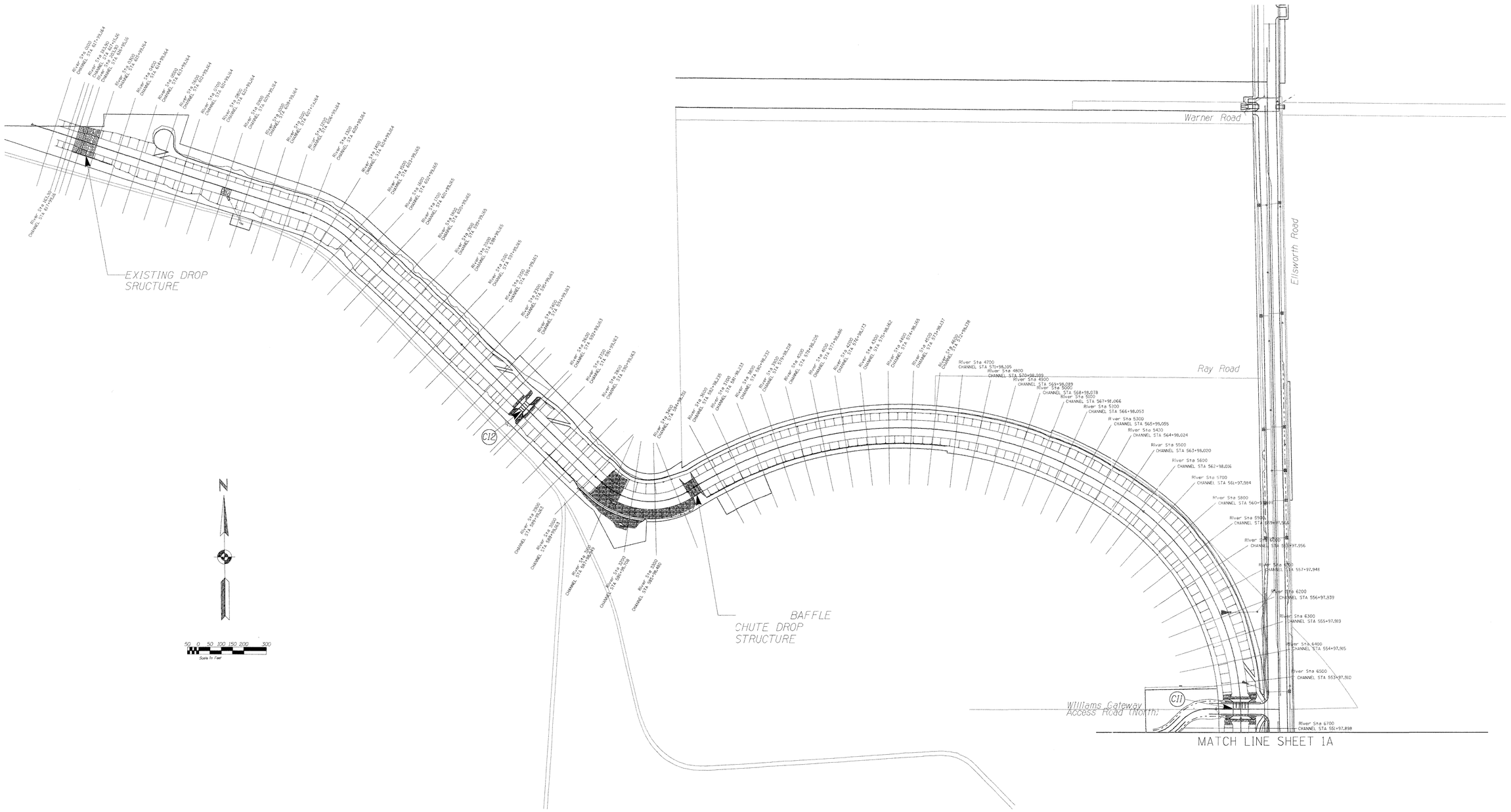
	BY	DATE
DESIGNED	J. EDISON	11/12/04
DRAWN	J. EDISON	11/12/04
CHECKED	R.DAVIES	11/12/04

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499
amec

Registered Professional Engineer (Civil)
ROBERT L. DAVIES
21674
ARIZONA U.S.A.

RIVER STATION

SHEET 1A OF 2A



NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	J. EDISON	11/12/04
DRAWN	J. EDISON	11/12/04
CHECKED	R.DAVIES	11/12/04

Registered Professional Engineer (Civil)
CERTIFICATE NO.
21674
ROBERT L.
DAVIES
Date Signed
ARIZONA U.S.A.

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499

RIVER STATION

SHEET 2A OF 2A

```
                    HEC-RAS Version 3.1.2 April 2004
                      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: Ellsworth Channel
Project File : EllsworthChannel.prj
Run Date and Time: 05/20/2005 2:01:17 PM

Project in English units

Project Description:
Ellsworth Road Channel

*****************************************************************************

PLAN DATA

Plan Title: Final Plugged Full CIP Q
Plan File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.p07

          Geometry Title: Final Plugged
          Geometry File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.g06

          Flow Title    : Proposed Condition Flows (Full CIP)
          Flow File     : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.f01

Plan Description:
Final Plugged:
Proposed Geometry with 1' of debris modeled along culvert
bottoms.
Full CIP Flow Condition


Plan Summary Information:
Number of:  Cross Sections =  232    Multiple Openings  =    0
            Culverts       =    6    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:     Mixed Flow

*****************************************************************************

FLOW DATA

Flow Title: Proposed Condition Flows (Full CIP)
Flow File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.f01

Flow Data (cfs)
*************************************************************
* River           Reach           RS      *            PF 1 *
* River           Ellsworth       17100   *             600 *
* River           Ellsworth       13900   *             600 *
* River           Ellsworth       9600    *            1172 *
* River           Ellsworth       8600    *            1744 *
*************************************************************

Boundary Conditions
*****************************************************************************************************
* River           Reach           Profile          *            Upstream                  Downstream    *
*****************************************************************************************************
* River           Ellsworth       PF 1             *      Normal S = 0.000656       Known WS = 1358.27 *
*****************************************************************************************************
      .
*****************************************************************************

GEOMETRY DATA
```

Geometry Title: Final Plugged
Geometry File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.g06

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 17100

INPUT
Description: Channel Station 44799.16
Station Elevation Data num= 140

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1391.14	10.76	1391.3	11.78	1391.32	11.93	1391.32	12.08	1391.32
12.11	1391.33	12.24	1391.37	14.18	1391.98	14.19	1391.98	14.2	1391.98
16.42	1391.57	16.6	1391.54	16.75	1391.42	17.25	1391	17.73	1390.6
18.46	1390	18.53	1389.94	18.59	1389.89	19.75	1389.89	20.07	1389.89
20.08	1389.96	20.08	1390	20.15	1390.5	20.22	1391	20.32	1391.59
20.38	1392	20.48	1392.53	20.56	1393	20.6	1393.22	20.61	1393.28
20.72	1393.09	20.77	1393	20.93	1392.77	21.5	1392	21.65	1391.82
21.79	1391.67	22.56	1391.74	23.86	1391.83	24.69	1391.97	24.87	1392
25.71	1392.14	26.43	1392.26	27.36	1392.42	28.4	1392.3	29.16	1392.16
30.01	1392	31.24	1391.74	34.32	1391.16	37.59	1391.09	39.22	1391.13
39.77	1391.13	40.07	1391.13	42.01	1391.21	44.18	1391.22	45.92	1391.27
46.22	1391.28	46.75	1391.28	47.49	1391.29	48.4	1391.3	52.97	1391.3
53.05	1391.3	53.1	1391.3	53.18	1391.3	53.26	1391.3	53.31	1391.3
57.02	1391.33	60.17	1391.33	60.19	1391.33	60.26	1391.32	60.28	1391.32
60.31	1391.32	60.34	1391.32	60.36	1391.32	60.96	1391.32	66.42	1391.11
66.96	1391.08	67.75	1391.04	68.5	1391	68.6	1391	69.08	1390.97
70.34	1390.96	71.58	1391	71.59	1391.25	71.63	1391.96	72.1	1391.84
75.47	1391	82.76	1390.97	88.92	1390.97	89.1	1390.97	89.51	1390.98
90.43	1391	90.57	1391	93.16	1391.05	102.94	1391.24	137.92	1391.94
170.1	1391.29	177.92	1391.15	179.28	1391.08	179.79	1391.05	180.86	1391
185.39	1391	190.74	1391	191.55	1391.2	191.71	1391.24	194.74	1392
202.47	1392.15	209.04	1392.27	211.25	1392.31	211.43	1392.27	212.5	1392
215.61	1392	216.7	1392	217.09	1392	218.5	1392.05	250	1384.17
260.17	1384.37	290.85	1392.04	291.41	1392	292.16	1392	292.86	1392
302.74	1392	322.71	1392	322.72	1391.91	322.73	1391.88	322.73	1392.1
322.76	1393	325.2	1393	331.62	1393	340.29	1392.56	347.9	1392.18
349.39	1392.11	351.56	1392	352.36	1391.96	355.65	1391.96	365.28	1392
368.66	1392.03	371.03	1392.03	372.94	1392.08	411.88	1392.12	437.8	1392.18

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.5	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.5	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1392.05	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 17000

INPUT
Description: Channel Station 44899.16
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.62	24.72	1390.7	25.57	1390.7	26.05	1390.7	26.32	1390.7
27.69	1390.68	53.69	1390.41	54.34	1390.39	55.53	1390.38	56.86	1390.49
57.4	1390.55	65.33	1390.52	67.35	1390.54	70.05	1390.75	70.53	1390.8
71.39	1390.88	72.71	1391	72.73	1391.27	72.73	1391.31	72.9	1391.28
74.3	1391	76.33	1390.49	79.12	1389.8	82.1	1390.29	82.14	1390.3
89.1	1390.64	89.31	1390.65	137.99	1391.62	138.1	1391.62	138.19	1391.62
178.1	1390.82	178.15	1390.82	185.1	1390.47	188.07	1389.98	188.1	1389.97
197.65	1392.36	197.75	1392.39	216.74	1392.42	250	1384.11	260.17	1384.31
290.85	1391.98	306.85	1392.3	311.45	1391.15	314.33	1391.87	320.04	1393
332.97	1392.54	347.8	1392	348.65	1391.97	350.81	1391.89	352.66	1391.83
358.33	1391.89	363.09	1391.89	366.92	1391.98	445.1	1392.07	469.86	1392.13

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	216.74	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
216.74	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.99	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16900

INPUT
Description: Channel Station 44999.16
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.5	17.81	1390.57	27.22	1390.61	32.62	1390.57	36.57	1390.53
54.87	1390.33	56.78	1390.17	56.82	1390.16	57.17	1390.23	58.6	1390.49
59.6	1390.49	67.23	1390.47	73.43	1390.53	74.95	1390.57	75.01	1390.55
79.24	1389.49	79.28	1389.49	82.27	1389.99	82.3	1389.99	89.27	1390.34
89.48	1390.34	138.16	1391.32	138.27	1391.32	138.36	1391.32	178.27	1390.52
178.32	1390.51	185.27	1390.17	185.29	1390.16	188.27	1389.67	188.36	1389.69
198.98	1392.35	217.02	1392.29	250	1384.05	260.17	1384.25	290.85	1391.92
306.85	1392.24	311.45	1391.09	314.39	1391.82	315.02	1393	320.69	1392.81
330.91	1392.47	344.8	1392	347.8	1391.9	352.52	1391.74	355.14	1391.74
360.89	1391.88	478.31	1392.01	500	1392.07				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.02	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.02	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.93	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16800

INPUT
Description: Channel Station 45099.16
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.48	28.78	1390.33	50.23	1390.28	55.06	1390.28	56.83	1390.06
57.06	1390.03	58.87	1390.42	59.01	1390.45	59.35	1390.45	67.85	1390.4
72.88	1390.41	76.32	1390.43	79.04	1390.45	79.06	1390.44	83.78	1389.27
86.77	1389.77	86.8	1389.77	93.77	1390.12	93.94	1390.12	138.34	1391.01
138.44	1391.01	138.52	1391.01	177.1	1390.24	177.15	1390.24	184.1	1389.89
184.13	1389.88	187.1	1389.39	187.2	1389.41	198.25	1392.18	217.47	1392.12
250	1383.99	260.17	1384.19	290.85	1391.86	306.85	1392.18	311.45	1391.03
313.9	1391.64	344.24	1392	346.24	1391.94	353.1	1391.73	354.87	1391.78
500	1391.95								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.47	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.47	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.87	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16700

INPUT
Description: Channel Station 45199.16
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.3	30.3	1390.27	30.63	1390.27	30.92	1390.27	31.06	1390.27
31.54	1390.27	56.41	1390.11	56.94	1390.05	57.49	1390	57.94	1389.96
58.02	1389.95	58.05	1389.96	58.23	1390	58.45	1390.04	59.56	1390.25
66.97	1390.34	68.52	1390.36	69.83	1390.37	71.72	1390.38	77.6	1390.42
77.62	1390.37	77.67	1390.3	81.81	1390.12	82.67	1390.47	82.7	1390.46
88.28	1389.08	91.27	1389.57	91.3	1389.57	98.27	1389.92	98.4	1389.93
121.63	1390.39	138.51	1390.73	138.6	1390.73	138.69	1390.73	175.94	1389.98
182.94	1389.63	182.96	1389.63	185.94	1389.13	186.04	1389.16	198.06	1392.16
217.43	1392.07	250	1383.93	260.17	1384.13	290.85	1391.8	306.85	1392.12
311.45	1390.97	314.24	1391.67	322.61	1392	339.02	1392	340.79	1391.95
346.11	1391.81	348.83	1391.74	352.82	1391.63	355.88	1391.63	383.6	1391.72
500	1391.85								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.43	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.43	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.81	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16600

INPUT
Description: Channel Station 45299.16
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.2	10.68	1390.23	31.49	1390.31	54.52	1390.13	56.4	1390.12
56.91	1390.06	57.4	1390	57.52	1389.98	58.53	1389.86	58.87	1389.94
59.09	1390	59.32	1390.06	59.89	1390.21	66.96	1390.24	68.39	1390.24
69.45	1390.25	70.53	1390.25	77.74	1390.25	78.27	1390.22	79.02	1390.17
85.81	1390.05	87.37	1390.4	87.39	1390.39	92.78	1389.05	95.77	1389.55
95.79	1389.55	102.77	1389.9	102.86	1389.9	138.69	1390.61	138.77	1390.62
174.52	1389.9	174.77	1389.9	181.72	1389.55	181.77	1389.55	184.75	1389.05
184.77	1389.05	197.2	1392.15	197.33	1392.19	217	1392.12	250	1383.87
260.17	1384.07	290.85	1391.74	306.85	1392.06	311.45	1390.91	314.03	1391.55
323.94	1392	329.33	1392	331.05	1392	332.15	1392	335.48	1392
341.62	1391.85	353.44	1391.57	371.54	1391.6	399.29	1391.59	425.52	1391.67
500	1391.76								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.75	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16500

INPUT
Description: Channel Station 45399.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1389.97	5.84	1389.98	11.56	1390	18.04	1390.02	27.47	1390.04
31.18	1390.05	38.98	1390.02	41.81	1390	54.06	1389.93	56.98	1389.91
57.27	1389.86	58.48	1389.66	59.26	1389.8	59.99	1389.94	65.59	1389.99
66.14	1390	66.45	1390	69.73	1390.03	75.5	1390.06	77.51	1390.06
79.48	1390.04	80.37	1390.04	81.66	1390.01	81.97	1390	85.45	1390
86.38	1390	95.86	1389.62	95.89	1389.61	95.94	1389.63	95.96	1389.63
102.94	1389.98	103.03	1389.98	121.8	1390.35	138.94	1390.7	139.02	1390.69
174.94	1389.98	174.99	1389.97	181.94	1389.63	184.91	1389.13	184.94	1389.13
197.09	1392.16	217.1	1392.03	250	1383.81	260.17	1384.01	290.85	1391.68
306.85	1392	311.45	1390.85	313.82	1391.44	327.61	1392	336.18	1391.8
343.01	1391.63	347.08	1391.54	349.41	1391.48	350.8	1391.45	353.64	1391.38
389.07	1391.52	416.54	1391.56	442.71	1391.55	467.44	1391.63	500	1391.67

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.1	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.1	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	210.45	1392.15	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16400

INPUT
Description: Channel Station 45499.16
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1389.83	26.97	1389.91	32.12	1389.92	34.55	1389.91	37.65	1389.89
47.58	1389.82	56.72	1389.76	57.34	1389.68	58.84	1389.49	59.98	1389.79
60.36	1389.89	66.76	1389.89	69.48	1389.89	71.59	1389.89	75.54	1389.88
79.47	1389.9	81.72	1389.91	86.55	1389.94	88.2	1389.95	90.05	1389.96
91.44	1389.96	93.06	1389.97	95.22	1389.65	96.11	1389.87	103.09	1390.22
103.11	1390.22	103.2	1390.22	139.03	1390.94	139.11	1390.94	139.19	1390.94
175.11	1390.22	175.16	1390.22	182.11	1389.87	185.08	1389.38	185.11	1389.37
185.2	1389.4	196.25	1392.16	216.81	1392.04	250	1383.75	260.17	1383.95
290.85	1391.62	306.85	1391.94	311.45	1390.79	314.34	1391.51	325.16	1392
331.96	1391.89	338.64	1391.79	342.22	1391.73	344.45	1391.7	345.96	1391.67
347.11	1391.66	348.03	1391.64	354	1391.57	359.13	1391.56	399.99	1391.34
435.73	1391.48	461.54	1391.52	486.13	1391.51	500	1391.56		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

```
*****************************************************************************
       0    .025  216.81    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.81  290.85              100     100     100              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
       0  210.11 1392.18       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16300

INPUT
Description: Channel Station 45599.16
Station Elevation Data    num=      53
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1389.69   32.22 1389.64   33.59 1389.64   37.66 1389.65   56.26  1389.7
   58.18 1389.46   59.35 1389.32   60.57  1389.8   60.64 1389.83   61.03 1389.83
    70.3 1389.73   71.45 1389.74   75.08 1389.76   81.69 1389.78   83.07 1389.78
   83.91  1389.8   84.49 1389.81   86.81 1389.85   94.97 1389.82   96.28 1390.14
  103.26 1390.49  103.28 1390.49  103.37  1390.5  139.19 1391.21  139.28 1391.21
  175.02  1390.5  175.28 1390.49  182.22 1390.15  182.28 1390.14  185.25 1389.65
  185.28 1389.64  185.36 1389.67  195.23 1392.13  216.38 1392.09     250 1383.69
  260.17 1383.89  290.85 1391.56  306.85 1391.88  311.45 1390.73  315.12 1391.64
  315.13    1392  315.18    1392  315.29    1392  350.57 1391.62  352.33  1391.6
  353.49 1391.58     354 1391.58  354.56 1391.58  354.89 1391.58  410.73 1391.52
  448.96 1391.31   482.4 1391.45     500 1391.47

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  216.38    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.38  290.85              100     100     100              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
       0  209.82 1392.19       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16200

INPUT
Description: Channel Station 45699.16
Station Elevation Data    num=      46
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1389.29   20.73 1389.33   35.37 1389.38   43.67 1389.35   55.39 1389.38
   56.43 1389.38   56.74 1389.36   59.77 1389.08   61.05  1389.5    61.4 1389.62
    64.9 1389.62   68.88 1389.62   75.67 1389.65   82.62 1389.67   84.42 1389.66
   88.97  1389.8   92.23 1389.91   94.77    1390   96.45 1390.42  103.43 1390.76
  103.45 1390.77  122.05 1391.14  139.36 1391.48  139.45 1391.49  175.19 1390.77
  175.45 1390.77  182.39 1390.42  182.45 1390.42  185.42 1389.92  185.45 1389.92
  185.51 1389.93  193.61 1391.96  217.01 1391.87     250 1383.63  260.17 1383.83
  290.85  1391.5  306.85 1391.82  311.45 1390.67  314.38  1391.4  324.38 1391.44
  357.97 1391.58  370.81 1391.57  410.34 1391.53  462.34 1391.47  497.93 1391.28
     500 1391.29

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  217.01    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.01  290.85              100     100     100              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
       0   218.5 1391.51       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16100

INPUT
Description: Channel Station 45799.16
Station Elevation Data    num=      47
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1389.29   20.64 1389.29   36.84 1389.27   48.77 1389.33   57.01 1389.37
   58.43 1389.22   59.57  1389.1   59.91 1389.07   60.15 1389.14   61.24  1389.5
   62.14 1389.46   63.87 1389.39   72.43 1389.44   74.94 1389.45   76.08 1389.45
   84.46 1389.52   85.77 1389.53   87.18 1389.63   92.28    1390   94.74 1390.22
   96.61 1390.69  103.61 1391.04  139.53 1391.76  139.61 1391.76  175.36 1391.04
  175.61 1391.04  182.56 1390.69  182.61 1390.69  185.59 1390.19  185.61 1390.19
  185.67  1390.2  192.56 1391.92  217.41 1391.71     250 1383.57  260.17 1383.77
  290.85 1391.44  306.85 1391.76  311.45 1390.61  314.05 1391.26  341.08 1391.39
```

```
  347.47 1391.41  358.65 1391.46  364.74 1391.11  396.03 1391.53  429.19 1391.52
   465.8 1391.48     500 1391.45

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  217.41    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.41  290.85             100     100     100              .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   218.5 1391.45       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16000

INPUT
Description: Channel Station 45899.16
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1389.11   31.81 1389.17   36.97 1389.18   38.32 1389.18   40.58  1389.2
   57.11 1389.31   58.89 1389.04   59.13    1389   59.17 1388.99   59.22 1388.99
   59.23 1388.99   59.26    1389   59.76 1389.15   60.77 1389.45   62.38 1389.31
   62.91 1389.26   74.67 1389.39   75.83  1389.4   79.25  1389.4   87.12  1389.4
   88.25 1389.57   88.89 1389.65   91.04 1389.96   91.35    1390   92.65 1390.19
   94.32 1390.32   96.78 1390.94   96.81 1390.94  103.78 1391.29  103.87 1391.29
   139.7 1392.01  139.78 1392.01  175.52 1391.29  175.78 1391.29  182.72 1390.94
  182.78 1390.94  185.76 1390.44  185.78 1390.44  187.79 1390.94  187.81 1390.94
  217.52 1391.63     250 1383.51  260.17 1383.71  290.85 1391.38  306.85  1391.7
  311.45 1390.55  314.37 1391.28  336.22 1391.34  359.93 1391.43  364.74 1391.01
  370.79 1390.59   374.6 1390.37  457.06 1391.48  487.57 1391.47     500 1391.46

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  217.52    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.52  290.85              33.5    33.5    33.5              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   218.5 1391.49       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15966.5

INPUT
Description: Begin Channel Bottom Transition (Begin Flow Constriction)
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
   94.13 1390.31   96.84 1390.99  103.84 1391.34  139.84 1392.06  175.84 1391.34
  182.84 1390.99  185.84 1390.49  188.19 1391.08  189.51 1390.97   194.5 1391.74
  217.68 1391.56     250 1383.49  260.17 1383.69  290.85 1391.36  306.85 1391.68
  311.45 1390.53  314.75 1391.35

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
   94.13    .025  217.68     .04     250    .028  260.17     .04  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.68  290.85             19.34   19.34   19.34              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15947.5

INPUT
Description: Full Riprap Section
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
   94.06  1390.3   96.76 1390.98   96.92 1391.01  103.75 1391.35  104.05 1391.36
  139.68 1392.08  139.91 1392.08  175.61 1391.37     176 1391.35   182.6 1391.02
  183.01 1390.99  185.59 1390.56  186.01 1390.55  187.94 1391.03  189.15 1391.19
  189.26 1391.18  189.93 1391.18  194.24 1391.74  196.44  1391.9  217.37 1391.63
  235.61 1384.86     250 1383.48  260.17 1383.68  274.46 1385.06  290.85 1391.35
  306.74 1391.66  307.08 1391.61   311.3 1390.55  311.75 1390.59   315.1 1391.43

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
   94.06    .025  217.37     .04  290.85    .025   315.1    .035
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.37  290.85               10      10      10             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   94.06     226    1391       F
     274   315.1    1391       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15937.5

INPUT
Description: Upstream End of Wingwall
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
   94.02  1390.3   96.88 1391.01     104 1391.37  139.83 1392.09  175.89 1391.37
  182.89 1391.02  185.89 1390.52  189.02  1391.3   189.8 1391.23  196.31 1391.99
  217.22 1391.66  235.54 1383.76     250 1383.47  274.46 1383.96  290.85 1391.34
  306.85 1391.66  311.45 1390.51  315.27 1391.47

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
   94.02    .025  217.22    .015  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.22  290.85              16.83   16.83   16.83             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   94.02     231    1391       F
     269  315.27    1391       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15920.67

INPUT
Description: Upstream Face of C3
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  239.09    1392  239.09 1383.46  260.92 1383.46  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        239.09  260.92               50      50      50             .1       .3

CULVERT


RIVER: River
REACH: Ellsworth          RS: 15895

INPUT
Description:
Distance from Upstream XS =      15
Deck/Roadway Width        =      20
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*********************************************
       0  1391.3              500  1391.3

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  239.09    1392  239.09 1383.46  260.92 1383.46  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Coeff Contr.   Expan.
        239.09  260.92             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*********************************************
       0  1391.3              500  1391.3

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
  239.09    1392  239.09 1383.42  260.92 1383.42  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Coeff Contr.   Expan.
        239.09  260.92             .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         =
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 #3           Box       6      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      50     .015     .015        1                  .4                  1
Number of Barrels =  2
Upstream   Elevation =  1383.46
Centerline Stations
    Sta.    Sta.
  244.45  255.45
Downstream Elevation =  1383.43
Centerline Stations
    Sta.    Sta.
  244.45  255.45

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15870.67

INPUT
Description: Downstream Face of C3
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
  239.09    1392  239.09 1383.42  260.92 1383.42  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        239.09  260.92             15.17   15.17   15.17              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15855.5

INPUT
Description: Downstream End of Wingwall (Full Riprap Section)
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************************
   94.83 1390.47   97.02 1391.02  104.02 1391.37  140.03 1392.09  176.03 1391.37
  183.03 1391.02   185.2 1390.48  190.54 1391.03  198.34 1390.66  212.67 1390.33
  216.51 1391.29  218.51 1391.29  235.54 1383.71     250 1383.42  274.46 1383.91
  290.85 1391.29  306.85 1391.61  313.25 1390.01

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
   94.83    .025  218.51     .04  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        218.51  290.85               10      10      10              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   94.83     232    1391       F
     269  313.25    1391       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15845.5

INPUT
```

Description: End Full Riprap Section
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
93.55	1390.14	95.77	1390.69	99.5	1391.13	102.84	1391.3	106.36	1391.41
139.22	1392.06	141.64	1392.05	175.59	1391.37	176.92	1391.32	182.66	1391.03
183.78	1390.83	184.86	1390.56	185.85	1390.54	190.25	1390.96	192.49	1390.96
198.13	1390.64	199.03	1390.6	212.61	1390.35	213.11	1390.44	216.49	1391.28
216.55	1391.28	218.51	1391.28	235.54	1384.81	250	1383.41	260.17	1383.62
274.46	1385	290.85	1391.28	307.65	1391.62	308.21	1391.53	314.36	1390

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
93.55	.025	218.51	.04	235.54	.028	274.46	.04	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	19.28	19.28	19.28	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
93.55	227	1391	F
274	314.36	1391	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15826.6

INPUT
Description: End Channel Bottom Transition (Fully Expanded Flow)
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
91	1389.47	97.07	1390.99	104.07	1391.34	140.07	1392.06	176.07	1391.34
183.07	1390.99	185.18	1390.47	191.96	1391.02	198.63	1390.52	213	1390.4
216.51	1391.27	218.51	1391.27	250	1383.4	260.17	1383.6	290.85	1391.27
309.85	1391.65	316.59	1389.97						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
91	.025	218.51	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	17.6	17.6	17.6	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15809

INPUT
Description: Channel Station 46090.16, culvert section 1
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1389.03	18.13	1389.12	21.64	1389.13	36.19	1389.13	43.36	1389.21
59.56	1389.26	62.06	1389.27	74.57	1389.39	86.67	1389.22	89.82	1389.15
91.09	1389.46	91.67	1389.61	93.27	1390.01	93.78	1390.12	97.92	1391.01
99.97	1391.11	102	1391.21	104.11	1391.32	114.31	1391.52	123.5	1391.71
138.62	1392.01	139.15	1392.02	140.11	1392.04	140.87	1392.02	141.6	1392.01
155.72	1391.73	166.08	1391.52	176.11	1391.32	178.12	1391.22	180.04	1391.12
182.31	1391.01	185.32	1391.01	192.82	1391.01	206.18	1391.89	207.27	1391.96
207.27	1391.89	207.3	1391.01	207.68	1391.01	210.23	1391.01	210.31	1391.01
210.55	1391.01	210.61	1391.01	210.88	1391.01	210.98	1391.01	211.04	1391.01
211.64	1390.81	212.98	1390.35	215.34	1390.94	215.62	1391.01	215.83	1391.01
218.5	1391.31	250	1383.43	260.17	1383.6	290.85	1391.27	294.21	1391.01
303.87	1391.01	312.96	1390.35	314.32	1390.24	317.1	1390.01	317.12	1390.01
317.13	1390.01	317.14	1390.01	317.15	1390	317.29	1389.97	317.29	1390
317.29	1390.01	317.31	1390.56	317.31	1390.77	317.32	1391.01	318.69	1391.01
322.99	1391.01	350.95	1390.12	353.11	1390.05	353.66	1390.04	356.75	1389.97
366.29	1389.76	372.53	1389.7	376.33	1389.63	448.65	1389.63	449.09	1389.63
500	1390.32								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.5	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.5	290.85	9	9	9	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15800

INPUT
Description: Channel Station 46099.16
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	1389.02	18.13	1389.11	21.64	1389.12	36.19	1389.12	43.36	1389.2
59.56	1389.25	62.06	1389.26	74.57	1389.38	86.67	1389.21	89.82	1389.14
89.85	1389.14	97.1	1390.95	97.12	1390.96	104.1	1391.3	104.12	1391.31
104.21	1391.31	140.12	1392.03	175.86	1391.31	176.12	1391.31	183.06	1390.96
183.13	1390.95	185.12	1390.46	212.84	1390.34	216.51	1391.26	218.51	1391.26
250	1383.39	260.17	1383.59	290.85	1391.26	313.71	1391.72	320.72	1389.97
322.99	1391	350.95	1390.11	353.11	1390.04	353.66	1390.03	356.75	1389.96
366.29	1389.75	372.53	1389.69	376.33	1389.62	448.65	1389.62	449.09	1389.62
500	1390.31								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15700

INPUT
Description: Channel Station 46199.16
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.86	1.24	1388.86	12.03	1388.86	32.9	1388.82	40.86	1388.82
52.15	1388.97	54.77	1389	60.06	1389.06	62.35	1389.09	65.2	1389.12
72.62	1389.15	87.68	1389.19	89.03	1389.11	89.3	1389.1	90.8	1389.36
91.52	1389.28	91.55	1389.29	97.29	1390.72	104.27	1391.07	104.29	1391.07
104.38	1391.08	140.29	1391.79	140.37	1391.79	176.29	1391.07	176.34	1391.07
183.29	1390.72	183.53	1390.66	195.63	1390.97	212.43	1390.18	216.51	1391.2
218.51	1391.2	250	1383.33	260.17	1383.53	290.85	1391.2	313.87	1391.66
321.39	1389.78	321.82	1391	322.37	1391	323.64	1391	325.88	1390.93
354.31	1390	356.07	1389.95	358.03	1389.89	364.79	1389.74	500	1389.75

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15600

INPUT
Description: Channel Station 46299.16
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.6	17.79	1388.64	25.45	1388.65	25.95	1388.66	26.61	1388.65
50.32	1388.7	50.59	1388.7	51.14	1388.7	53.3	1388.72	55.43	1388.72
56.49	1388.73	57.52	1388.73	58.64	1388.73	69.61	1388.8	81.5	1388.9
81.57	1388.91	81.66	1388.93	81.97	1389	85.49	1389.72	85.75	1389.77
85.91	1389.74	88.14	1389.2	88.73	1389.05	91.2	1389.39	93.11	1389.39
97.44	1390.47	97.46	1390.47	97.48	1390.47	104.46	1390.82	104.54	1390.82
140.37	1391.54	140.46	1391.54	176.2	1390.83	176.46	1390.82	183.4	1390.47
183.46	1390.47	183.67	1390.42	185.8	1390.89	196.85	1391.21	212.17	1390.05
216.51	1391.14	218.51	1391.14	250	1383.27	260.17	1383.47	290.85	1391.14
306.85	1391.46	314.12	1389.64	339.64	1390	344.56	1390	349.96	1390
351.18	1389.97	355.9	1389.87	357.61	1389.83	358.33	1389.81	359.16	1389.8
362.72	1389.8	416.39	1389.88	420.5	1389.88	500	1389.88		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	50	50	50	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15550

INPUT
Description: Channel Station 46349.16, upstream end of riprap
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.61	15.93	1388.62	23.24	1388.63	31.64	1388.64	31.69	1388.64
52.97	1388.74	69.21	1388.78	82.22	1388.79	82.3	1388.81	82.52	1388.84
82.6	1388.85	83.83	1389.04	85.48	1389.29	86.7	1389.48	87.43	1389.35
89	1389.07	92.54	1389.5	93.45	1389.6	94.9	1389.78	97.1	1390.04
97.29	1390.05	105.74	1390.71	110.85	1390.81	113.48	1390.86	117.45	1390.93

122.1	1391.02	123.27	1391.04	123.71	1391.05	126.43	1391.1	128.28	1391.13
132.17	1391.21	135.1	1391.26	136.72	1391.29	137.73	1391.31	143.1	1391.41
157.85	1391.11	161.4	1391.04	161.61	1391.04	167.86	1390.92	171.29	1390.85
173.36	1390.81	180.46	1390.66	196.48	1390.97	199.99	1391.04	202.29	1391.22
203.13	1391.28	205.44	1391.46	208.45	1391.7	209.13	1391.75	210.83	1391.89
211.46	1391.06	211.5	1391.04	211.54	1391.04	212.12	1391.04	212.56	1391.04
212.57	1391.04	212.65	1391.04	212.9	1391.02	213.09	1390.98	213.3	1390.29
213.87	1390.43	216.29	1391.04	218.49	1391.04	218.51	1391.11	250	1383.24
260.17	1383.44	290.85	1391.11	293.63	1391.04	294.62	1391.04	303.93	1390.42
309.62	1390.04	309.85	1389.99	309.9	1389.98	309.93	1389.97	310.03	1389.95
310.32	1389.89	310.5	1389.85	311.04	1389.85	311.05	1389.74	311.59	1389.76
311.88	1390.04	312.81	1390.04	313.16	1390.04	313.47	1390.04	313.81	1390.04
314.09	1390.04	314.42	1390.04	314.69	1390.04	322.48	1390.04	326.79	1390.01
334.15	1390.02	355.92	1389.99	364.67	1389.98	371.47	1389.93	414.56	1390
420.45	1390.01	426.94	1390.01	496.17	1390.06	500	1390.07		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.04	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	64	90	120	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15460

INPUT
Description: Channel Station 46439.16, culvert section 4
Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.56	15.93	1388.57	23.24	1388.58	31.64	1388.59	31.69	1388.59
52.97	1388.69	69.21	1388.73	82.22	1388.74	82.3	1388.76	82.52	1388.79
82.6	1388.8	83.83	1388.99	85.48	1389.24	86.7	1389.43	87.43	1389.3
89	1389.02	92.54	1389.45	93.45	1389.55	94.9	1389.73	97.1	1389.99
97.29	1390	105.74	1390.66	110.85	1390.76	113.48	1390.81	117.45	1390.88
122.1	1390.97	123.27	1390.99	123.71	1391	126.43	1391.05	128.28	1391.08
132.17	1391.16	135.1	1391.21	136.72	1391.24	137.73	1391.26	143.1	1391.36
157.85	1391.06	161.4	1390.99	161.61	1390.99	167.86	1390.87	171.29	1390.8
173.36	1390.76	180.46	1390.61	196.48	1390.92	199.99	1390.99	202.29	1391.17
203.13	1391.23	205.44	1391.41	208.45	1391.65	209.13	1391.7	210.83	1391.84
211.46	1391.01	211.5	1390.99	211.54	1390.99	212.12	1390.99	212.56	1390.99
212.57	1390.99	212.65	1390.99	212.9	1390.97	213.09	1390.93	213.3	1390.24
213.87	1390.38	216.29	1390.99	218.5	1390.09	238.26	1388.61	245.52	1383.18
250	1383.18	265.63	1383.18	265.63	1387.25	271.63	1388.83	290.85	1390.09
293.63	1390.99	294.62	1390.99	303.93	1390.37	309.62	1389.99	309.85	1389.94
309.9	1389.93	309.93	1389.92	310.03	1389.9	310.32	1389.84	310.5	1389.8
311.04	1389.8	311.05	1389.69	311.59	1389.71	311.88	1389.99	312.81	1389.99
313.16	1389.99	313.47	1389.99	313.81	1389.99	314.09	1389.99	314.42	1389.99
314.69	1389.99	322.48	1389.99	326.79	1389.96	334.15	1389.97	355.92	1389.94
364.67	1389.93	371.47	1389.88	414.56	1389.95	420.45	1389.96	426.94	1389.96
496.17	1390.01	500	1390.02						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	216.29	.015	293.63	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
216.29	293.63	10	10	10	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15450

INPUT
Description: Channel Station 46449.16, culvert section 3
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.24	15.93	1387.25	23.24	1387.26	31.64	1387.27	31.69	1387.27
52.97	1387.37	69.21	1387.41	82.22	1387.42	82.3	1387.44	82.52	1387.47
82.6	1387.48	83.83	1387.67	85.48	1387.92	86.7	1388.11	87.43	1387.98
89	1387.7	92.54	1388.13	93.45	1388.23	94.9	1388.41	97.1	1388.67
97.29	1388.68	105.74	1389.34	110.85	1389.44	113.48	1389.49	117.45	1389.56
122.1	1389.65	123.27	1389.67	123.71	1389.68	126.43	1389.73	128.28	1389.76
132.17	1389.84	135.1	1389.89	136.72	1389.92	137.73	1389.94	143.1	1390.04
157.85	1389.74	161.4	1389.67	161.61	1389.67	167.86	1389.55	171.29	1389.48
173.36	1389.44	180.46	1389.29	196.48	1389.6	199.99	1389.67	202.29	1389.85
203.13	1389.91	205.44	1390.09	208.45	1390.33	209.13	1390.38	210.83	1390.52
211.46	1389.69	211.5	1389.67	211.54	1389.67	212.12	1389.67	212.56	1389.67
212.57	1389.67	212.65	1389.67	212.9	1389.65	213.09	1389.61	213.3	1388.92
213.87	1389.06	216.29	1389.67	218.5	1390.09	238.26	1388.61	245.52	1386.9
245.52	1381.86	250	1381.86	265.63	1381.86	265.63	1387.25	271.63	1388.83
290.85	1390.09	306.84	1389.77	309.62	1388.67	309.85	1388.62	309.9	1388.61
309.93	1388.6	310.03	1388.58	310.32	1388.52	310.5	1388.48	311.04	1388.48
311.05	1388.37	311.59	1388.39	311.88	1388.67	312.81	1388.67	313.16	1388.67
313.47	1388.67	313.81	1388.67	314.09	1388.67	314.42	1388.67	314.69	1388.67
322.48	1388.67	326.79	1388.64	334.15	1388.65	355.92	1388.62	364.67	1388.61

```
  371.47 1388.56  414.56 1388.63  420.45 1388.64  426.94 1388.64  496.17 1388.69
     500  1388.7

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .025   218.5    .015  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         218.5  290.85               258     258     258              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  245.81 1389.92        F
  266.81     500 1389.92        F

CULVERT


RIVER: River
REACH: Ellsworth          RS: 15350

INPUT
Description:
Distance from Upstream XS =       .1
Deck/Roadway Width        =      240
Weir Coefficient          =      2.6
Upstream Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0  1389.9              500  1389.9

Upstream Bridge Cross Section Data
Station Elevation Data    num=     101
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1387.24   15.93 1387.25   23.24 1387.26   31.64 1387.27   31.69 1387.27
   52.97 1387.37   69.21 1387.41   82.22 1387.42    82.3 1387.44   82.52 1387.47
    82.6 1387.48   83.83 1387.67   85.48 1387.92    86.7 1388.11   87.43 1387.98
      89  1387.7   92.54 1388.13   93.45 1388.23    94.9 1388.41    97.1 1388.67
   97.29 1388.68  105.74 1389.34  110.85 1389.44  113.48 1389.49  117.45 1389.56
   122.1 1389.65  123.27 1389.67  123.71 1389.68  126.43 1389.73  128.28 1389.76
  132.17 1389.84   135.1 1389.89  136.72 1389.92  137.73 1389.94   143.1 1390.04
  157.85 1389.74   161.4 1389.67  161.61 1389.67  167.86 1389.55  171.29 1389.48
  173.36 1389.44  180.46 1389.29  196.48  1389.6  199.99 1389.67  202.29 1389.85
  203.13 1389.91  205.44 1390.09  208.45 1390.33  209.13 1390.38  210.83 1390.52
  211.46 1389.69   211.5 1389.67  211.54 1389.67  212.12 1389.67  212.56 1389.67
  212.57 1389.67  212.65 1389.67   212.9 1389.65  213.09 1389.61   213.3 1388.92
  213.87 1389.06  216.29 1389.67   218.5 1390.09  238.26 1388.61  245.52  1386.9
  245.52 1381.86     250 1381.86  265.63 1381.86  265.63 1387.25  271.63 1388.83
  290.85 1390.09  306.84 1389.77  309.62 1388.67  309.85 1388.62   309.9 1388.61
  309.93  1388.6  310.03 1388.58  310.32 1388.52   310.5 1388.48  311.04 1388.48
  311.05 1388.37  311.59 1388.39  311.88 1388.67  312.81 1388.67  313.16 1388.67
  313.47 1388.67  313.81 1388.67  314.09 1388.67  314.42 1388.67  314.69 1388.67
  322.48 1388.67  326.79 1388.64  334.15 1388.65  355.92 1388.62  364.67 1388.61
  371.47 1388.56  414.56 1388.63  420.45 1388.64  426.94 1388.64  496.17 1388.69
     500  1388.7

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .025   218.5    .015  290.85    .025

Bank Sta: Left   Right    Coeff Contr.   Expan.
         218.5  290.85              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  245.81 1389.92        F
  266.81     500 1389.92        F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0  1389.2          .   500  1389.2

Downstream Bridge Cross Section Data
Station Elevation Data    num=     134
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1388.25   60.13 1388.44   69.15 1388.28   93.13 1388.37   96.58 1388.39
  124.12 1388.45  139.64 1388.47  161.29 1388.49  172.36 1388.51  176.48 1388.65
  177.07 1388.67   186.9 1388.81  187.55 1388.82  188.75  1388.8  191.19 1388.65
  193.04 1388.18  193.76    1388     195    1388  197.43    1388  202.57    1388
  209.15 1388.28  239.83 1380.61     250 1380.41  281.51 1388.28  287.04    1388
  289.89    1388  295.91    1388  297.53    1388  301.89    1388  303.66 1388.44
  305.84 1388.99  305.91 1389.01   307.1 1389.23  313.97 1389.91  314.88 1389.92
  315.26 1389.93  315.74 1389.94  316.21 1389.94  317.03 1389.95  317.25 1389.96
  318.14 1389.97  320.07    1390  320.63 1390.01  323.36 1390.05   325.2 1390.08
  326.35 1390.09  329.41 1390.14  330.19 1390.15  330.76 1390.16  331.15 1390.16
  332.02 1390.18  333.07 1390.19  334.42 1390.21  335.29 1390.23  335.77 1390.23
   335.9 1390.24  336.12 1390.24   336.2 1390.24  336.97 1390.25  338.61 1390.28
  339.95  1390.3  341.21 1390.31  342.88 1390.34  343.92 1390.35  351.94 1390.47
  352.29 1390.48  352.42 1390.48  352.51 1390.48  352.55 1390.48  352.58 1390.48
  352.63 1390.48   352.7 1390.48  352.82 1390.49     353 1390.49  353.11 1390.49
```

353.32	1390.49	353.48	1390.5	358.08	1390.56	358.83	1390.51	359.23	1390.48
359.86	1390.44	360.44	1390.4	361.94	1390.29	366.14	1390	366.31	1390
366.84	1390	369.11	1390	370.45	1390	374	1390	389.86	1390
390.42	1389.99	394.12	1389.92	399.2	1389.83	399.41	1389.83	400.4	1389.81
402.2	1389.78	402.52	1389.78	402.58	1389.79	402.65	1389.79	402.75	1389.79
402.87	1389.79	402.97	1389.79	403.05	1389.79	415.23	1389.94	415.25	1389.94
415.78	1389.95	416.94	1389.97	419.06	1390	419.24	1390	421.48	1390.23
422.47	1390.34	423.97	1390.5	424.75	1390.58	427.98	1390.93	428.15	1390.95
428.58	1391	432.46	1391.42	435.28	1391.73	435.39	1391.71	435.44	1391.7
435.5	1391.68	435.56	1391.67	435.73	1391.64	437.03	1391.35	438.42	1391.05
438.6	1391	442.33	1390.28	444.08	1390	444.69	1389.94	444.78	1389.93
444.83	1389.92	455.45	1389.89	498.85	1389.46	500	1389.46		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.04	281.51	.025

Bank Sta: Left	Right	Coeff Contr.	Expan.
209.15	281.51	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	226.98	1389.13	F
261.98	500	1389.13	F

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 =
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 #4	Box	6	10

FHWA Chart # 11- Skewed headwall; Chamfered or beveled Inlet
FHWA Scale # 1 - Headwall skewed 45 deg.; inlet edges chamfered 3/4 inch
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	0	240	.015	.015	1	.4	1

Number of Barrels = 2
Upstream Elevation = 1381.86
Centerline Stations

Sta.	Sta.
250.81	261.81

Downstream Elevation = 1380.41
Centerline Stations

Sta.	Sta.
238.98	249.98

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15192

INPUT
Description: Channel Station 46707.16, culvert section 2
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.25	60.13	1388.44	69.15	1388.28	93.13	1388.37	96.58	1388.39
124.12	1388.45	139.64	1388.47	161.29	1388.49	172.36	1388.51	176.48	1388.65
177.07	1388.67	186.9	1388.81	187.55	1388.82	188.75	1388.8	191.19	1388.65
193.04	1388.18	193.76	1388	195	1388	197.43	1388	202.57	1388
209.15	1388.28	239.83	1380.61	250	1380.41	281.51	1388.28	287.04	1388
289.89	1388	295.91	1388	297.53	1388	301.89	1388	303.66	1388.44
305.84	1388.99	305.91	1389.01	307.1	1389.23	313.97	1389.91	314.88	1389.92
315.26	1389.93	315.74	1389.94	316.21	1389.94	317.03	1389.95	317.25	1389.96
318.14	1389.97	320.07	1390	320.63	1390.01	323.36	1390.05	325.2	1390.08
326.35	1390.09	329.41	1390.14	330.19	1390.15	330.76	1390.16	331.15	1390.16
332.02	1390.18	333.07	1390.19	334.42	1390.21	335.29	1390.23	335.77	1390.23
335.9	1390.24	336.12	1390.24	336.2	1390.24	336.97	1390.25	338.61	1390.28
339.95	1390.3	341.21	1390.31	342.88	1390.34	343.92	1390.35	351.94	1390.47
352.29	1390.48	352.42	1390.48	352.51	1390.48	352.55	1390.48	352.58	1390.48
352.63	1390.48	352.7	1390.48	352.82	1390.49	353	1390.49	353.11	1390.49
353.32	1390.49	353.48	1390.5	358.08	1390.56	358.83	1390.51	359.23	1390.48
359.86	1390.44	360.44	1390.4	361.94	1390.29	366.14	1390	366.31	1390
366.84	1390	369.11	1390	370.45	1390	374	1390	389.86	1390
390.42	1389.99	394.12	1389.92	399.2	1389.83	399.41	1389.83	400.4	1389.81
402.2	1389.78	402.52	1389.78	402.58	1389.79	402.65	1389.79	402.75	1389.79
402.87	1389.79	402.97	1389.79	403.05	1389.79	415.23	1389.94	415.25	1389.94
415.78	1389.95	416.94	1389.97	419.06	1390	419.24	1390	421.48	1390.23
422.47	1390.34	423.97	1390.5	424.75	1390.58	427.98	1390.93	428.15	1390.95
428.58	1391	432.46	1391.42	435.28	1391.73	435.39	1391.71	435.44	1391.7
435.5	1391.68	435.56	1391.67	435.73	1391.64	437.03	1391.35	438.42	1391.05
438.6	1391	442.33	1390.28	444.08	1390	444.69	1389.94	444.78	1389.93
444.83	1389.92	455.45	1389.89	498.85	1389.46	500	1389.46		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.04	281.51	.025

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        209.15  281.51                92      92      92              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  226.98 1389.13        F
  261.98     500 1389.13        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15100

INPUT
Description: Channel Station 46799.16, culvert section 1
Station Elevation Data    num=      53
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1387.83  118.85 1388.33  132.41 1388.04  135.57 1388.06  136.77 1388.07
  142.09 1388.11  151.12 1388.18  160.08 1388.21   183.5 1388.25  187.82 1388.25
  188.25 1388.15  188.83    1388   189.2    1388  192.07 1388.25  193.15 1388.52
  209.15  1388.2  239.83 1380.53     250 1380.33   281.5  1388.2  297.49 1388.52
  298.38 1388.74  312.28  1389.1  317.09 1389.77  323.92  1389.4  326.28 1389.04
   327.5 1389.35  327.72  1389.4  328.81 1389.46  334.73 1389.75  370.75 1390.47
  371.74 1390.45  406.78 1389.75  407.33 1389.72  413.78  1389.4  414.54  1389.2
  414.63 1389.18  420.78    1390  424.08 1390.44  428.33    1391  429.11  1391.1
  433.83 1391.73  436.79 1391.03  436.94    1391  437.42 1390.89  441.23    1390
  441.43 1389.95  441.63 1389.91  473.12 1389.72  484.36 1389.65  488.35 1389.63
  492.62 1389.59  495.16  1389.6     500  1389.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************
       0    .025  209.15     .04   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        209.15   281.5           102.51     100   97.56              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  187.82 1388.25        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15000

INPUT
Description: Channel Station 46899.16 (End Riprap)
Station Elevation Data    num=      49
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1387.78  115.83 1388.27   128.5    1388   133.9    1388  134.11    1388
  137.66 1388.04  164.28  1388.3  180.36 1388.31  186.96 1388.34  187.99 1388.33
  198.62 1388.12  212.48 1387.29  239.83 1380.45     250 1380.25   281.5 1388.12
  304.47 1388.58  305.76  1388.9  313.92 1389.11  318.35  1389.5   324.8 1389.21
  327.58 1388.83  327.99 1388.93  328.89 1389.16  333.69  1389.4   335.9 1389.51
   371.9 1390.22   407.9  1389.5  413.21 1389.24   414.9 1389.15  415.16 1389.09
  415.29 1389.06  419.22  1389.9  421.96    1390  423.63 1390.24  428.91    1391
  433.12 1391.54  434.29  1391.7  434.48 1391.35  434.66    1391  438.16 1390.52
  441.17 1390.11  441.84 1390.08  443.27    1390  445.48 1389.88   445.6 1389.87
  445.72 1389.86  445.99 1389.86   486.4 1389.44     500 1389.49

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  212.48    .032  239.83    .028     250    .032   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        212.48   281.5              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  186.96 1388.34        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 14900

INPUT
Description: Channel Station 46999.16
Station Elevation Data    num=      66
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1387.73  112.73 1388.21  122.63    1388  127.52    1388  128.72    1388
  129.57    1388  130.03    1388  130.04    1388  130.18    1388  130.46    1388
  130.89    1388  144.62    1388  144.69    1388  144.86    1388  145.23    1388
  145.47    1388  145.84    1388  146.14    1388  149.34 1388.03  167.88 1388.25
  188.78 1388.26  190.38 1388.27   192.1 1388.27  193.73 1388.28  201.93 1388.31
  202.56 1388.15  203.15    1388  204.18    1388  207.17    1388  207.96    1388
  208.03 1388.32  239.83 1380.37     250 1380.17   281.5 1388.04  299.21 1388.39
  300.02  1388.6   311.2 1388.78  319.66 1389.34  328.44 1388.98  329.47 1388.76
  329.69 1388.81  330.06  1388.9  334.86 1389.14  337.06 1389.25  373.06 1389.97
```

```
  409.07 1389.25  410.78 1389.17  416.07  1388.9  416.78 1388.78  419.07  1388.4
  421.64 1389.04  430.16 1391.17  432.19 1391.34   434.8 1391.66  435.61 1391.41
  437.23    1391  439.06 1390.69   441.6 1390.16  443.59 1390.07  444.95    1390
  446.38 1389.93  448.05 1389.82  470.37 1389.61   475.3 1389.57  487.57 1389.45
     500 1389.48

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  208.03    .032  239.83    .028     250    .032   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.03   281.5              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  193.73 1388.28       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 14800

INPUT
Description: Channel Station 47099.16
Station Elevation Data    num=      63
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1387.69  109.62 1388.15  116.75    1388  120.28    1388  121.14    1388
  121.75    1388  122.08    1388  122.09    1388  122.19    1388  122.39    1388
   122.7    1388  135.95    1388  137.82    1388  140.44    1388  161.77    1388
  161.86    1388  162.72    1388  163.39 1388.01  167.68 1388.04  180.29 1388.14
  193.43  1388.2  201.47  1388.2  202.03  1388.2  202.23 1388.15  202.83    1388
  208.18  1388.2  239.83 1380.29     250 1380.09   281.5 1387.96  299.84 1388.33
  300.07 1388.38  306.86 1388.46   316.1 1388.69  321.04 1389.21  324.52 1389.08
  325.73 1388.77  328.23 1388.15  329.19 1388.31  331.23 1388.65  336.02 1388.89
  338.23    1389  374.23 1389.72  410.23    1389  411.94 1388.91  417.23 1388.65
  417.95 1388.53  420.23 1388.15  423.07 1388.86  432.71 1391.27     434  1391.4
  435.31 1391.62  435.57 1391.15  435.69    1391  437.91 1390.74  440.94 1390.35
  445.85 1390.09  447.58    1390  450.42 1389.85  451.38 1389.79  462.29 1389.31
  475.66 1389.14   488.7 1389.45     500  1389.5

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  208.18    .032  239.83    .028     250    .032   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.18   281.5              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  202.03  1388.2       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 14700

INPUT
Description: Channel Station 47199.16
Station Elevation Data    num=      71
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1387.64  106.52 1388.09  110.87    1388  113.03    1388  113.56    1388
  113.93    1388  114.13    1388  114.14    1388   114.2    1388  114.33    1388
  114.51    1388  122.61    1388  123.76    1388  125.36    1388  139.36    1388
  140.05    1388  141.38    1388  143.46    1388  153.39 1387.98  167.49 1387.94
  172.04 1387.94  193.91 1387.96  193.93 1387.96  193.95 1387.96  202.53    1388
  208.58 1388.02  239.83 1380.21     250 1380.01   281.5 1387.88  302.13 1388.29
  306.73 1387.14  311.19 1388.26  317.57 1388.36  322.41 1388.89  331.32 1388.57
  332.35 1388.39  332.39  1388.4  339.39 1388.75  375.39 1389.47   411.4 1388.75
  416.42 1388.49   418.4  1388.4  419.23 1388.26   421.4  1387.9  431.12 1390.33
  434.72 1391.23  435.66 1391.53  437.44 1391.26  439.64    1391  442.53 1390.85
  448.08 1390.57  450.09 1390.48  452.33 1390.33  453.95 1390.15  455.21    1390
  455.53 1389.96  456.07  1389.9  457.19 1389.76  463.08    1389  466.82    1389
  468.66    1389  471.39 1389.18  475.29 1389.44  476.69 1389.54  477.76 1389.62
  487.48 1389.81  488.17 1389.84  488.63 1389.86  488.92 1389.88  489.11 1389.89
     500 1389.93

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  208.58    .032  239.83    .028     250    .032   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.58   281.5              100     100     100              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  106.52 1388.09       F
  375.36     500 1389.47       F

CROSS SECTION
```

RIVER: River
REACH: Ellsworth RS: 14600

INPUT
Description: Channel Station 47299.16
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.6	103.41	1388.03	105	1388	105.78	1388	105.98	1388
106.11	1388	106.19	1388	106.21	1388	106.26	1388	106.32	1388
109.28	1388	109.69	1388	110.28	1388	115.38	1388	115.63	1388
116.12	1388	116.87	1388	120.49	1387.99	126.2	1387.98	133.79	1388
134.13	1388	134.34	1388	148.92	1387.89	167.4	1387.9	188.7	1387.83
193.81	1387.84	197.95	1387.84	202.83	1387.84	208.82	1387.31	208.96	1387.85
239.83	1380.13	250	1379.93	281.5	1387.8	303.4	1388.24	308	1387.09
311.47	1387.96	318.6	1388.03	323.11	1388.66	332.46	1388.34	333.51	1388.13
333.56	1388.15	340.56	1388.5	376.56	1389.21	412.56	1388.49	414.26	1388.41
419.56	1388.14	419.78	1388.09	420.49	1387.97	425.87	1389.32	427.07	1389.31
430.91	1390	433.11	1390.52	435.18	1391	435.23	1391.08	435.32	1391.21
435.33	1391.17	435.35	1391	435.84	1390.95	436.3	1390.91	436.7	1390.87
437.88	1390.71	444.57	1390.17	446.65	1390	450.24	1389.62	453.65	1389.25
456.36	1389	458.42	1389	459.83	1389	463.9	1389.95	464.11	1390
469.25	1390.43	472.49	1390.6	483.56	1390.08	484.78	1390.02	485.22	1390
485.88	1389.97	486.07	1389.96	486.14	1389.96	486.17	1389.96	487.25	1389.96
500	1389.85								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.96	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.96	281.5	21	21	21	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103.41	1388.03	F
376.53	500	1389.22	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14579

INPUT
Description: Channel Station 47320.16
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.57	103.41	1388	105	1387.97	105.78	1387.97	105.98	1387.97
106.11	1387.97	106.19	1387.97	106.21	1387.97	106.26	1387.97	106.32	1387.97
109.28	1387.97	109.69	1387.97	110.28	1387.97	115.38	1387.97	115.63	1387.97
116.12	1387.97	116.87	1387.97	120.49	1387.96	126.2	1387.95	133.79	1387.97
134.13	1387.97	134.34	1387.97	148.92	1387.86	167.4	1387.87	188.7	1387.8
193.81	1387.81	197.95	1387.81	202.83	1387.81	208.82	1387.28	209.15	1387.77
212.35	1386.97	239.83	1380.1	250	1379.9	281.5	1387.78	290.47	1386.97
290.63	1386.97	290.65	1386.96	290.77	1386.87	290.82	1386.83	292	1385.97
294.88	1385.97	295.46	1385.97	299.68	1386.65	301.83	1386.97	302.95	1386.97
304.9	1386.97	305.01	1386.97	305.04	1386.97	306.16	1386.97	308.3	1387.51
309.93	1387.91	310.03	1387.92	310.68	1387.97	313.14	1388.2	318.05	1388.62
322.54	1388.42	338.36	1388.34	340.53	1388.47	364.15	1388.94	365.49	1388.97
365.88	1388.98	376.53	1389.19	385.26	1389.02	387.54	1388.97	404.91	1388.62
409	1388.54	409.96	1388.52	412.53	1388.47	413.67	1388.4	420.09	1387.99
420.36	1387.97	421.44	1387.97	421.53	1387.99	421.73	1388.04	425.5	1388.97
427.07	1389.28	430.91	1389.97	433.11	1390.49	435.18	1390.97	435.23	1391.05
435.32	1391.18	435.33	1391.14	435.35	1390.97	435.84	1390.92	436.3	1390.88
436.7	1390.84	437.88	1390.68	444.57	1390.14	446.65	1389.97	450.24	1389.59
453.65	1389.22	456.36	1388.97	458.42	1388.97	459.83	1388.97	463.9	1389.92
464.11	1389.97	469.25	1390.4	472.49	1390.57	483.56	1390.05	484.78	1389.99
485.22	1389.97	485.88	1389.94	486.07	1389.93	486.14	1389.93	486.17	1389.93
487.25	1389.93	500	1389.82						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	212.35	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	10	10	10	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103.41	1388	F
376.53	500	1389.19	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14569

INPUT
Description: Channel Station 47330.16
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	1387.57	103.41	1388	105	1387.97	105.78	1387.97	105.98	1387.97
106.11	1387.97	106.19	1387.97	106.21	1387.97	106.26	1387.97	106.32	1387.97
109.28	1387.97	109.69	1387.97	110.28	1387.97	115.38	1387.97	115.63	1387.97
116.12	1387.97	116.87	1387.97	120.49	1387.96	126.2	1387.95	133.79	1387.97
134.13	1387.97	134.34	1387.97	148.92	1387.86	167.4	1387.87	188.7	1387.8
193.81	1387.81	197.95	1387.81	202.83	1387.81	208.82	1387.28	209.15	1387.77
239.83	1380.1	250	1379.9	281.5	1387.78	290.47	1386.97	290.63	1386.97
290.65	1386.96	290.77	1386.87	290.82	1386.83	292	1385.97	294.88	1385.97
295.46	1385.97	299.68	1386.65	301.83	1386.97	302.95	1386.97	304.9	1386.97
305.01	1386.97	305.04	1386.97	306.16	1386.97	308.3	1387.51	309.93	1387.91
310.03	1387.92	310.68	1387.97	313.14	1388.2	318.05	1388.62	322.54	1388.42
338.36	1388.34	340.53	1388.47	364.15	1388.94	365.49	1388.97	365.88	1388.98
376.53	1389.19	385.26	1389.02	387.54	1388.97	404.91	1388.62	409	1388.54
409.96	1388.52	412.53	1388.47	413.67	1388.4	420.09	1387.99	420.36	1387.97
421.44	1387.97	421.53	1387.99	421.73	1388.04	425.5	1388.97	427.07	1389.28
430.91	1389.97	433.11	1390.49	435.18	1390.97	435.23	1391.05	435.32	1391.18
435.33	1391.14	435.35	1390.97	435.84	1390.92	436.3	1390.88	436.7	1390.84
437.88	1390.68	444.57	1390.14	446.65	1389.97	450.24	1389.59	453.65	1389.22
456.36	1388.97	458.42	1388.97	459.83	1388.97	463.9	1389.92	464.11	1389.97
469.25	1390.4	472.49	1390.57	483.56	1390.05	484.78	1389.99	485.22	1389.97
485.88	1389.94	486.07	1389.93	486.14	1389.93	486.17	1389.93	487.25	1389.93
500	1389.82								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	68	68	68	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14501

INPUT
Description: Channel Station 47398.16
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.55	78.21	1387.88	99.22	1387.79	112.35	1388	114.79	1388
117.33	1388	121.49	1388	128.26	1388	132.77	1388	135.36	1388
137.35	1388	140.83	1388	141.54	1388	144.9	1388	145.99	1388
148.96	1388	151.95	1388	153.52	1388	156.49	1388	163.45	1388.1
165.15	1388.08	167.19	1388.07	167.68	1388.06	172.06	1388.01	172.52	1388
182.49	1387.93	186.47	1387.9	193.63	1387.8	200.08	1387.95	200.55	1387.96
200.98	1387.97	201.48	1387.97	201.7	1387.95	201.79	1387.93	201.85	1387.93
202.28	1387.9	204.61	1387.68	208.63	1387.31	209.15	1387.72	239.83	1380.05
250	1379.85	281.5	1387.73	284.61	1387	289.14	1387	290.82	1387
300.96	1387	301.66	1387	302.07	1387	303.57	1387.38	306.06	1388
306.7	1388.16	307.56	1388.37	311.08	1388.41	317.19	1388.42	317.84	1388.54
318.48	1388.6	328.23	1388.11	330.93	1388	331.34	1388	336.25	1388
336.63	1388.02	341.2	1388.25	358.39	1388.59	377.2	1388.97	396.34	1388.59
413.2	1388.25	417.8	1388.02	418.16	1388	421.63	1388	423.51	1388
425.83	1388.41	429.07	1389	431.23	1389.64	432.44	1390	434	1390.55
434.57	1390.75	434.99	1390.89	435	1390.66	435.02	1390	435.7	1389.88
439.77	1389.46	444.45	1389.49	447.28	1389.48	447.52	1389.48	448.9	1389.4
452.02	1389	457.08	1389	458.15	1389	460.26	1389.27	463.08	1389.27
469.17	1389.39	474.6	1389.17	475.07	1389.17	475.85	1389.17	488.84	1389.17
490.34	1389.18	491.2	1389.18	500	1389.18				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	10	10	10	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14491

INPUT
Description: Channel Station 47408.16
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.54	78.21	1387.87	99.22	1387.78	112.35	1387.99	114.79	1387.99
117.33	1387.99	121.49	1387.99	128.26	1387.99	132.77	1387.99	135.36	1387.99
137.35	1387.99	140.83	1387.99	141.54	1387.99	144.9	1387.99	145.99	1387.99
148.96	1387.99	151.95	1387.99	153.52	1387.99	156.49	1387.99	163.45	1388.09
165.15	1388.07	167.19	1388.06	167.68	1388.05	172.06	1388	172.52	1387.99
182.49	1387.92	186.47	1387.89	193.63	1387.79	200.08	1387.94	200.55	1387.95
200.98	1387.96	201.48	1387.96	201.7	1387.94	201.79	1387.92	201.85	1387.92
202.28	1387.89	204.61	1387.67	208.63	1387.3	209.15	1387.71	239.83	1380.04
250	1379.84	281.5	1387.72	284.61	1386.99	289.14	1386.99	290.82	1386.99
300.96	1386.99	301.66	1386.99	302.07	1386.99	303.57	1387.37	306.06	1387.99
306.7	1388.15	307.56	1388.36	311.08	1388.4	317.19	1388.41	317.84	1388.53
318.48	1388.59	328.23	1388.1	330.93	1387.99	331.34	1387.99	336.25	1387.99
336.63	1388.01	341.2	1388.24	358.39	1388.58	377.2	1388.96	396.34	1388.58

413.2	1388.24	417.8	1388.01	418.16	1387.99	421.63	1387.99	423.51	1387.99
425.83	1388.4	429.07	1388.99	431.23	1389.63	432.44	1389.99	434	1390.54
434.57	1390.74	434.99	1390.88	435	1390.65	435.02	1389.99	435.7	1389.87
439.77	1389.45	444.45	1389.48	447.28	1389.47	447.52	1389.47	448.9	1389.39
452.02	1388.99	457.08	1388.99	458.15	1388.99	460.26	1389.26	463.08	1389.26
469.17	1389.38	474.6	1389.16	475.07	1389.16	475.85	1389.16	488.84	1389.16
490.34	1389.17	491.2	1389.17	500	1389.17				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	40	40	40	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	201.48	1387.96	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14451

INPUT
Description: Channel Station 47488.16
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.55	23.3	1387.65	93.59	1387.33	112.36	1387.63	112.9	1387.63
132.39	1387.42	132.46	1387.42	132.6	1387.41	135.85	1387.04	135.91	1387.04
136.09	1387.04	136.43	1387.04	137.01	1387.04	138.59	1386.6	140.72	1386.14
140.95	1386.15	141.12	1386.16	141.34	1386.16	142.32	1386.16	154.04	1386.34
155.1	1386.36	167.19	1386.55	167.71	1386.56	168.24	1386.57	174.74	1386.67
174.87	1386.67	174.97	1386.67	175.08	1386.67	175.4	1386.68	175.58	1386.69
175.91	1386.7	176.73	1386.74	182.39	1387.04	182.7	1387.04	182.98	1387.04
183.15	1387.04	183.2	1387.04	183.26	1387.04	183.79	1387.06	184.4	1387.08
184.97	1387.1	185.5	1387.12	202.93	1387.7	206.62	1387.41	208.44	1387.28
209.15	1387.68	239.83	1380.01	250	1379.81	281.5	1387.69	285.39	1387.04
290.82	1387.04	302.57	1387.04	304.05	1387.04	304.66	1387.04	306.44	1387.48
306.82	1387.58	306.97	1387.62	307.08	1387.64	307.42	1387.67	312.12	1387.93
314.95	1387.7	316.09	1387.93	316.71	1388.04	317.68	1388.3	318.43	1388.48
318.91	1388.6	320.43	1388.49	320.81	1388.46	321.02	1388.45	321.19	1388.44
321.32	1388.43	321.48	1388.41	321.83	1388.39	322.53	1388.34	325.5	1388.13
326.84	1388.04	338.18	1388.04	341.05	1388.04	341.07	1388.04	341.3	1388.04
344.49	1388.1	353.15	1388.28	377.05	1388.76	401.71	1388.26	409.91	1388.1
412.83	1388.04	413.03	1388.04	413.05	1388.04	414.05	1388.04	426.47	1388.04
430.39	1389.02	430.47	1389.04	430.85	1389.17	433.46	1390.04	433.91	1390.26
434.08	1390.34	434.31	1390.45	434.66	1390.61	434.67	1390.45	434.68	1390.04
434.69	1389.76	434.71	1389.04	434.89	1388.97	435.08	1388.9	435.94	1388.56
453.78	1388.72	455.53	1388.73	456.83	1388.75	457.77	1388.77	458.03	1388.78
458.29	1388.78	458.47	1388.79	458.53	1388.79	458.66	1388.79	459.1	1388.79
465.88	1388.93	472.34	1388.93	482.61	1388.6	500	1388.66		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	51	51	51	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	202.93	1387.7	F
318.91	500	1388.6	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14400

INPUT
Description: Channel Station 47499.16
Station Elevation Data num= 209

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.51	23.3	1387.61	93.59	1387.29	112.36	1387.59	112.9	1387.59
132.39	1387.38	132.46	1387.38	132.6	1387.37	135.85	1387	135.91	1387
136.09	1387	136.43	1387	137.01	1387	138.59	1386.56	140.72	1386.1
140.95	1386.11	141.12	1386.12	141.34	1386.12	142.32	1386.12	154.04	1386.3
155.1	1386.32	167.19	1386.51	167.71	1386.52	168.24	1386.53	174.74	1386.63
174.87	1386.63	174.97	1386.63	175.08	1386.63	175.4	1386.64	175.58	1386.65
175.91	1386.66	176.73	1386.7	182.39	1387	182.7	1387	182.98	1387
183.15	1387	183.2	1387	183.26	1387	183.79	1387.02	184.4	1387.04
184.97	1387.06	185.5	1387.08	202.93	1387.66	206.62	1387.37	208.44	1387.24
208.67	1387.76	239.83	1379.97	250	1379.77	281.5	1387.64	300.63	1388.02
305.23	1386.87	308.09	1387.59	314.92	1387.66	322.28	1388.64	331.54	1388.02
333.57	1387.52	334.05	1387.64	341.05	1387.99	377.05	1388.71	413.05	1387.99
420.05	1387.64	420.09	1387.63	422.24	1387.27	424.25	1387.77	426.47	1388
430.24	1388.94	430.47	1389	430.7	1389.08	433.46	1390	434.11	1390.31
434.36	1390.43	434.67	1390.57	434.67	1390.54	434.68	1390.07	434.68	1390
434.71	1389	434.78	1388.97	434.99	1388.89	435.13	1388.84	435.97	1388.52
445.94	1388.6	457.62	1388.69	461.9	1388.77	477.03	1388.7	484.02	1388.46

512.45	1388.5	526.15	1388.59	537.08	1388.63	573.04	1388.65	579.14	1388.62
602.3	1388.67	624.24	1388.71	629.38	1388.75	633.51	1388.75	651.75	1388.82
666.27	1388.83	675.63	1388.68	684.93	1388.55	689.17	1388.48	691.56	1388.83
692.1	1388.91	692.41	1388.94	693.12	1389	696.29	1389.26	696.52	1389.28
696.76	1389.3	697.01	1389.32	697.26	1389.34	698.92	1389.45	701.14	1389.62
704.52	1389.85	705.09	1389.9	706.48	1390	709.22	1390.19	713.86	1390.54
715.22	1390.8	716.2	1391	718.32	1391	719.16	1391	719.75	1390.98
719.84	1390.94	721.47	1390.9	727.53	1390.83	735.91	1390.52	736.16	1390.48
737.33	1390.31	739.07	1390.05	739.4	1390	742.25	1389.42	744.06	1389.09
746	1389.2	747.48	1389.3	751.43	1389.31	761.47	1389.29	761.74	1389.29
761.8	1389.29	761.9	1389.29	770.37	1389.67	770.63	1389.68	774.96	1389.3
776.98	1389.13	778.49	1389	780.45	1388.86	780.89	1388.83	781.16	1388.81
798.18	1388.62	798.88	1388.61	799.47	1388.6	800.44	1388.59	801.89	1388.57
812.83	1388.44	815.3	1388.42	817.37	1388.39	822.17	1388.33	838.66	1388.15
841.46	1388.15	845.15	1388.17	874.92	1388	879.45	1388	897.52	1388
907.28	1387.86	931.93	1387.85	945.04	1388	945.54	1388	959.02	1388.18
961.12	1388.23	972.19	1388.23	975.88	1388.39	982.59	1388.45	987.34	1388.73
989.28	1388.8	993.09	1389	994.88	1389	995.84	1388.98	996.45	1389
999.94	1389.11	1004.03	1389.32	1012.44	1389.86	1013.54	1389.93	1014.5	1390
1025.78	1390.84	1027.46	1391	1033.51	1391.44	1034.56	1391.49	1035.99	1391.57
1045.95	1392	1046.26	1392.01	1047.23	1392.03	1048.2	1392.06	1049.21	1392.32
1051.79	1393	1052.38	1393.16	1053.22	1393.38	1054.62	1393.75	1055.56	1394
1057.52	1394.52	1059.31	1395	1059.64	1395.09	1063.06	1396	1063.34	1396.08
1063.45	1396.1	1063.68	1396.17	1065.57	1396.67	1066.8	1397	1067.1	1397.08
1067.4	1397.16	1068.32	1397.17	1070.71	1397.21	1082.68	1397.52		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.67	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.67	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	202.93	1387.66	F
318.91	1082.68	1388.6	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14300

INPUT
Description: Channel Station 47599.16
Station Elevation Data num= 172

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.19	87.95	1386.79	99.49	1386.98	100.86	1386.96	123.43	1386.72
131.91	1386.79	134.82	1386.81	157.25	1386.87	157.82	1386.88	158.92	1386.88
160.48	1386.89	162.17	1386.89	168.65	1386.9	171.13	1386.91	185.37	1386.87
185.96	1386.87	186.41	1386.87	204.63	1386.93	207.15	1387.56	209.15	1387.56
239.83	1379.89	250	1379.69	281.5	1387.56	300.09	1387.93	304.69	1386.78
305.22	1386.92	316.13	1386.71	321.93	1387.8	331	1387.66	333.44	1387.35
333.9	1387.46	340.9	1387.81	376.9	1388.46	412.9	1387.81	414.87	1387.71
419.9	1387.46	419.93	1387.46	420.78	1387.31	421.61	1387.52	423.92	1387.29
426.95	1388	430.21	1388.89	430.62	1389	431.53	1389.28	432.3	1389.52
432.33	1389.53	433.85	1390	434.23	1390	434.33	1390	434.34	1390
434.35	1390.11	434.36	1390.25	434.38	1389.47	434.4	1389	434.67	1388.83
434.85	1388.71	435.03	1388.6	435.11	1388.55	435.16	1388.52	435.22	1388.48
435.37	1388.39	449.93	1388.24	456.19	1388.18	456.96	1388.17	460.55	1388.16
482.98	1388.13	483.91	1388.13	486.14	1388.13	508.95	1388.16	529.72	1388.13
553.67	1388.2	564.06	1388.2	573.4	1388.18	582.81	1388.17	583.45	1388.15
594.01	1388	596.5	1387.96	598.07	1387.94	601.54	1387.88	604.43	1387.84
604.77	1387.96	604.9	1388	605.02	1388.05	605.79	1388.38	606.26	1388.42
607.97	1388.55	611.35	1388.8	612.94	1388.92	614.14	1389	620.12	1389.44
624.65	1389.87	626.17	1390	629.76	1390.14	631.73	1390.21	637.2	1390.44
647.79	1390.15	649.48	1390.08	651.32	1390	651.35	1390	651.38	1390
651.4	1390	651.64	1390	651.79	1389.99	651.97	1389.98	652.41	1389.91
653.21	1389.78	654.32	1389.62	654.81	1389.55	658.3	1389	658.5	1388.91
659.67	1388.54	668.79	1388.5	671.77	1388.5	695.96	1388.6	701.58	1388.58
706.52	1388.57	711.12	1388.56	719.47	1388.51	723.01	1388.51	728.97	1388.46
768.84	1388.27	788.74	1388	789.77	1388	812.25	1388	812.6	1388
812.75	1388	824.25	1388	835.21	1388	841.36	1388	863.14	1388
867.49	1388	888.63	1388.63	894.2	1388.77	903.1	1389	904.89	1389.18
906.48	1389.33	913.26	1390	917.07	1390.39	922.59	1391	927.23	1391.14
927.76	1391.16	928.64	1391.19	929.53	1391.22	930.68	1391.26	939.77	1391.55
942.98	1391.65	947.6	1391.79	950.08	1391.87	953.99	1392	954.16	1392.01
955.07	1392.03	955.59	1392.05	957.69	1392.72	958.57	1393	959.51	1393.28
961.8	1393.94	961.96	1393.98	962.03	1394	964.51	1394.68	965.65	1395
967.3	1395.45	969.39	1396	969.7	1396.14	970.43	1396.47	971.56	1396.9
975.59	1396.94	980.11	1397	982.36	1397	983.51	1397	984.13	1397
984.21	1397.01	989.02	1397.09						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	211.39	1387	F

319.35 989.02 1388.51 F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14200

INPUT
Description: Channel Station 47699.16 (Modified to Include GM Access Road Berm, per Sheet CHC5)
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1386.67	82.32	1386.3	86.62	1386.37	88.82	1386.33	96.63	1386.25
99.57	1386.27	100.57	1386.28	127.55	1386.33	178.89	1386.74	186.44	1386.81
196.49	1386.96	200.01	1387	203.41	1387.05	204.67	1387.06	204.78	1387.03
204.91	1387	205.39	1387.04	207.15	1387.48	209.15	1387.48	239.83	1379.81
250	1379.61	281.5	1387.48	303.67	1387.92	308.27	1386.77	310.89	1387.43
318.32	1387.45	322.43	1387.89	330.47	1387.47	332.87	1387.09	333.75	1387.31
340.75	1387.66	376.75	1388.2	412.75	1387.66	414.72	1387.56	419.75	1387.31
419.92	1387.27	420.35	1387.16	441.75	1388.25	502.75	1390	666.75	1391
804.75	1391	809.75	1390	817.75	1390	831.75	1391	839.75	1392
845.75	1395								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
319.78	845.75	1388.47	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14100

INPUT
Description: Channel Station 47799.16
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1386.14	55.92	1385.89	64.55	1385.93	64.57	1385.93	70.26	1385.97
79.65	1386	79.75	1386	79.76	1386	81.14	1386	81.66	1386
82.39	1386	82.4	1386	85.13	1386	90.3	1386	90.88	1386
91.06	1386	91.22	1386	92.42	1386	93.97	1386	108.17	1386.1
123.67	1386.21	160.14	1386.61	176.66	1386.73	186.69	1386.75	202.34	1386.86
204.96	1386.87	204.98	1386.86	207.15	1387.4	209.15	1387.4	239.83	1379.73
250	1379.53	281.5	1387.4	297.5	1387.72	302.1	1386.57	304.62	1387.2
318.16	1387.3	322.52	1387.81	330.35	1387.29	332.57	1386.8	333.6	1387.06
340.6	1387.41	366.65	1387.8	376.6	1387.95	402.5	1387.56	412.6	1387.41
417.62	1387.16	419.6	1387.06	419.63	1387.05	421.78	1386.69	426.95	1387.99
428.8	1388	431.4	1388.82	433.68	1389.62	436.08	1388.5	437.11	1388.05
437.24	1388	437.43	1387.98	437.51	1387.97	437.56	1387.97	438.59	1387.95
453.65	1387.75	456.36	1387.84	458.74	1387.93	460.39	1388	461.8	1388.06
466.39	1388.25	469.47	1388.55	473.77	1389	473.96	1389.02	474.3	1389.05
476.2	1389.53	478.08	1389.8	479.55	1390	486.25	1390	490.42	1390
495.05	1390	498.04	1389.17	498.57	1389	499.3	1388.77	500.6	1388.35
501.07	1388.2	503.16	1388.14	508.24	1388	510.63	1387.93	513.77	1387.83
517.36	1387.96	518.75	1387.99	519.11	1387.99	519.57	1387.99	519.63	1388
521.49	1387.91	522.78	1387.84	527.41	1387.55	541.52	1387.49	549.4	1387.44
555.66	1387.45	572.53	1387.57	575.36	1387.56	578.05	1387.45	579.87	1387.37
588.59	1387.01	588.81	1387	588.92	1387	598.86	1386.61	615.08	1386.85
624.92	1387	631.86	1387.11	688.45	1388	695	1388.47	702.13	1388.93
703.18	1389	703.75	1389.32	704.95	1390	705.68	1390.37	706.94	1391
707.96	1391.51	708.93	1392	709.74	1392.41	710.91	1393	711.87	1393.5
712.86	1394	715.35	1394.76	715.8	1395	716.52	1395	717.47	1395
721.31	1395.32	726.78	1395.49	729.01	1395.56	731.76	1395.98	732.24	1396.05
732.95	1395.97	748.35	1395.15	762.37	1394.66	776.67	1394.27		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	210.75	1387	F
320.21	776.67	1388.42	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14000

INPUT
Description: Channel Station 47899.16 (Riprap for Culvert C6)

Station Elevation Data num= 164

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.63	7.59	1385.67	7.72	1385.67	36.27	1385.87	83.36	1386
83.81	1386	83.89	1386	90.81	1386	93.44	1386	97.07	1386
97.08	1386	110.78	1386	118.89	1386	119.82	1386	121.25	1386
133.03	1385.65	134.29	1385.67	137.28	1385.68	155.59	1386	155.81	1386
156.86	1386.04	166.01	1386.36	167.88	1386.43	172.06	1386.56	183.85	1386.71
191.98	1386.84	199.45	1386.94	199.91	1386.92	200.26	1386.91	203.34	1386.36
205.38	1386	206.46	1386.86	234.91	1379.75	250	1379.45	265.09	1379.75
291.49	1386.35	307.49	1386.67	309.68	1387.22	317.92	1387.29	322.01	1387.89
330.74	1387.36	333.35	1386.71	333.45	1386.74	340.45	1387.09	376.45	1387.7
412.45	1387.09	419.45	1386.74	422.45	1386.24	427.88	1387.6	428.48	1387.86
429.19	1388	429.6	1388.13	430.24	1388.33	432.4	1389	432.95	1389.17
433.25	1389.27	433.35	1389.3	433.37	1389.17	433.39	1389	439.91	1388.61
444.48	1388.34	445.99	1388.25	451.94	1388	459.15	1387.38	460.55	1387.25
460.91	1387.21	461.24	1387.13	462.93	1387.14	470.45	1387.14	472.51	1387.14
474.4	1387.14	474.58	1387.14	476.12	1387.14	483.96	1387.13	484.59	1387.13
485.32	1387.13	485.87	1387.14	487.13	1387.15	488.33	1387.16	489.45	1387.16
493.82	1387.27	494.16	1387.28	495.68	1387.3	496.09	1387.32	497.5	1387.34
497.97	1387.36	498.52	1387.39	499.78	1387.41	500.41	1387.44	500.94	1387.47
501.57	1387.49	502.32	1387.53	503.24	1387.55	504.04	1387.59	504.44	1387.59
505.34	1387.64	506.42	1387.69	506.62	1387.69	507.79	1387.74	507.87	1387.75
507.94	1387.75	508.8	1387.79	509.25	1387.79	509.3	1387.78	510.62	1387.77
511.76	1387.76	512.04	1387.74	513.1	1387.73	514.05	1387.72	514.48	1387.7
515.33	1387.69	515.89	1387.65	516.63	1387.63	517.3	1387.58	517.92	1387.55
518.76	1387.48	519.23	1387.45	520.26	1387.36	520.55	1387.34	521.83	1387.22
521.91	1387.21	522.35	1387.17	524.58	1387.21	527.02	1387.25	528.84	1387.28
529.88	1387.3	537.68	1387.53	539.45	1387.42	540.12	1387.38	541.68	1387.28
546.11	1387	548.25	1386.87	552.65	1386.59	558.04	1386.69	564.11	1386.8
575.46	1387	594.43	1387.33	604.28	1387.51	608.23	1387.58	609.81	1387.6
611.15	1387.63	612.31	1387.65	613.31	1387.67	614.2	1387.68	614.98	1387.7
629.97	1387.96	630.54	1387.98	631.33	1388	632.69	1388.28	646.09	1389.88
646.77	1390.03	646.88	1390.05	654.68	1391.24	661.28	1392.25	666.94	1393.11
671.84	1393.85	676.12	1394.5	679.9	1395.08	683.26	1395.59	683.51	1395.63
695.61	1394.22	705.49	1393.7	714.51	1393.39	727.26	1393.05		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.46	.04	234.91	.04	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.46	291.49	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
320.64	727.26	1388.38	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13900

INPUT
Description: Channel Station 47999.16
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.74	2.27	1385.76	87.06	1386	87.88	1386	88.02	1386
100.48	1386	105.21	1386	111.76	1386	135.26	1386	135.29	1386
137.43	1386	137.5	1386	138.21	1385.99	139.86	1385.94	142.94	1386
148.1	1386	150.3	1385.85	156.8	1385.4	163.75	1385.64	166.11	1385.71
172.45	1385.89	176.39	1386	195.74	1386.76	198.61	1386.87	198.64	1386.87
200.06	1386.88	201.04	1386.69	204.57	1386	205.97	1386.9	234.91	1379.67
250	1379.37	265.09	1379.67	291.49	1386.27	307.49	1386.59	309.72	1387.15
318	1387.18	321.23	1387.83	323.48	1387.75	328.45	1386.5	330.29	1386.04
333.29	1386.54	340.29	1386.89	376.29	1387.61	412.29	1386.89	417.32	1386.64
419.29	1386.54	420.14	1386.4	422.29	1386.04	423.31	1386.3	426.2	1387.02
428.22	1387.59	429.65	1388	430.31	1388.19	431.59	1388.56	432.89	1388.94
433.02	1388.97	434.88	1388.52	436.09	1388.18	436.9	1388	437.15	1388
442.77	1387.56	445.91	1387.34	447.52	1387.23	449.63	1387	452.66	1386.77
460.7	1386.12	461.82	1386.1	463.81	1386.11	467.47	1386.39	470.94	1386.67
477.69	1386.79	478.58	1386.81	479.93	1386.83	481.77	1386.87	484.42	1386.92
487.1	1386.97	488.88	1387	489.08	1387	491	1387.04	492.68	1387.07
498.86	1387.18	500.36	1387.2	501.29	1387.22	501.92	1387.23	502.38	1387.24
502.71	1387.25	504.82	1387.28	508.33	1387.23	551.17	1387.28	551.51	1387.28
555	1387.3	568.13	1387.73	576.39	1388	576.99	1388	577.04	1388
577.09	1388	577.13	1388	591.84	1388.51	592.75	1388.54	605.76	1389
605.8	1389	606.17	1389.02	606.87	1389.05	608.81	1389.48	610.28	1389.81
611.97	1390.2	612.96	1390.43	613.61	1390.58	620.77	1392.39	623.65	1393.09
626.43	1393.42	629.79	1394.17	630.34	1394.29	631.67	1394.49	632.8	1394.66
633.78	1394.81	634.64	1394.94	635.39	1395.05	636.06	1395.15	636.66	1395.24
636.7	1395.25	659	1392.7	664.11	1392.44	668.81	1392.28	676.19	1392.1

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	205.97	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.97	291.49	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
321.07	676.19	1388.34	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13800

INPUT
Description: Channel Station 48099.16
Station Elevation Data num= 214

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.74	90.76	1386	91.95	1386	92.15	1386	110.14	1386
116.98	1386	126.44	1386	128.58	1386	129.19	1386	129.36	1386
133.73	1386	136.64	1385.94	155.32	1385.63	158.37	1385.59	159.03	1385.58
159.45	1385.57	159.73	1385.57	161.33	1385.52	164.3	1385.65	172.25	1386
182.95	1386.45	196.03	1387	198.56	1387.11	198.81	1387.12	199.14	1387.03
199.27	1387	201.57	1386.37	202.91	1386	204.26	1387.25	234.91	1379.59
250	1379.29	265.09	1379.59	291.49	1386.19	307.49	1386.51	312.43	1387.74
315.21	1387.76	321.73	1388.28	329.2	1387.63	333.01	1386.64	333.14	1386.67
340.14	1387.02	376.14	1387.74	412.14	1387.02	417.17	1386.77	419.14	1386.67
419.99	1386.53	422.14	1386.17	428.67	1387.8	429.63	1388	431.18	1388.34
432.75	1388.7	434	1388.55	434.7	1388.46	438.78	1388	442.95	1387.54
447.88	1387	450.14	1386.75	451.06	1386.65	457.12	1386	457.56	1385.95
460.01	1385.7	464.69	1385.66	465.92	1385.66	468.06	1385.95	468.16	1385.97
468.28	1385.99	468.37	1386	468.52	1386.02	468.88	1386.07	469.21	1386.11
469.5	1386.15	470.99	1386.35	473.03	1386.62	474.39	1386.81	476.03	1386.83
476.26	1386.83	478.58	1386.86	479.67	1386.88	481.42	1386.9	484.36	1386.94
485.43	1386.95	486.13	1386.96	488.77	1386.99	490	1387	490.01	1387
490.02	1387	490.03	1387	490.06	1387	490.07	1387	490.08	1387
490.1	1387	491.48	1387.02	491.83	1387.02	492.17	1387.03	502.36	1387.76
505.69	1387.93	506.46	1387.92	521.14	1387.3	523.72	1387.11	528.33	1387.19
542.07	1387.5	547.32	1387.1	547.67	1387.07	548.05	1387.04	548.47	1387.01
548.58	1387	548.71	1386.99	548.89	1386.98	549.12	1386.96	550.11	1386.65
552.18	1386	554	1385.33	554.89	1385	555.06	1384.94	556.02	1384.58
556.17	1384.6	556.32	1384.63	556.79	1384.7	557.76	1384.91	558.17	1385
558.18	1385	558.45	1385.06	558.65	1385.1	558.79	1385.13	558.91	1385.15
559	1385.17	559.08	1385.19	559.15	1385.2	559.39	1385.25	559.5	1385.26
559.61	1385.28	559.67	1385.29	560.01	1385.34	562.2	1385.66	564	1385.89
564.63	1385.97	566.01	1385.47	566.19	1385.4	566.43	1385.53	566.6	1385.62
567.29	1386	567.48	1386.1	567.57	1386.15	567.86	1386.31	569.11	1387
569.22	1387.06	569.45	1387.18	569.59	1387.26	569.68	1387.31	569.75	1387.35
569.8	1387.38	569.83	1387.4	569.87	1387.41	569.91	1387.44	569.95	1387.46
569.96	1387.46	569.97	1387.47	570.16	1387.57	570.35	1387.66	570.44	1387.7
570.67	1387.8	571.14	1388	572.94	1388.78	573.27	1388.92	573.45	1389
575.36	1389.83	575.75	1390	577.62	1390.81	578.06	1391	579.9	1391.8
580.37	1392	582.2	1392.79	582.67	1393	584.49	1393.79	584.98	1394
586.46	1394.64	586.65	1394.73	586.85	1394.81	587.8	1394.83	588.04	1394.84
588.68	1394.85	592.62	1394.93	596.53	1395	600.31	1395.07	600.83	1395.08
600.87	1395.07	601.21	1395	603.04	1394.6	605.8	1394	608.33	1393.45
610.39	1393	614.86	1392.03	614.99	1392	616.97	1391.57	617.62	1391.43
618.86	1391.16	619.79	1391.11	620.68	1391.07	622.14	1391	622.32	1390.99
623.72	1390.91	623.79	1390.91	623.85	1390.92	623.99	1390.92	624.02	1390.93
624.05	1390.93	624.06	1390.93	624.08	1390.93	637.24	1390.75	638.41	1390.74
639.17	1390.75	639.93	1390.76	640.67	1390.78	658.79	1391.09		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	204.26	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
204.26	291.49	98.87	100	101.06	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
320.88	658.79	1388.21	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13700

INPUT
Description: Channel Station 48199.16
Station Elevation Data num= 170

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.73	94.63	1386	96.18	1386	96.44	1386	119.86	1386
128.78	1386	131.19	1386	131.42	1386	132.82	1386	148.71	1386
156.42	1385.97	158.44	1385.98	160.9	1385.97	161.18	1385.98	161.34	1385.98
161.79	1385.97	162.79	1385.99	163.18	1386	171.92	1386.21	187.99	1386.59
199.64	1386.88	200.19	1386.65	201.45	1386.12	201.73	1386	202.68	1385.92
205.2	1386.94	234.91	1379.51	250	1379.21	265.09	1379.51	291.49	1386.11
307.49	1386.43	313.68	1387.97	315.83	1387.96	320.33	1388.38	328.66	1387.74
332.35	1386.7	333.05	1386.87	340.05	1387.22	376.05	1387.94	412.05	1387.22
413.49	1387.15	419.05	1386.87	419.66	1386.77	422.05	1386.37	427.64	1387.77
429.04	1388.12	429.12	1388	430.06	1388.11	433.32	1388.49	433.33	1388.49
433.33	1388.5	433.34	1388.5	433.59	1388	442.23	1387.19	444.26	1387
455.88	1386.01	455.98	1386	458.42	1385.8	459.72	1385.69	461.86	1385.68
463.2	1385.67	468.21	1385.61	468.3	1385.64	469.48	1386	470.05	1386.2
471.76	1386.78	471.81	1386.79	471.84	1386.81	471.86	1386.81	471.87	1386.82
471.89	1386.82	471.9	1386.83	471.99	1386.86	473.03	1386.86	483.72	1386.92
483.95	1386.94	485.23	1387	494.7	1387.42	498.99	1387.65	505.14	1387.07
505.88	1387	506.38	1386.95	508.23	1386.77	516.06	1386.96	517.7	1387

519.42	1387.04	520.5	1387.07	525.55	1387.19	526.94	1387.22	527.3	1387.23
527.33	1387.23	527.73	1387.24	527.8	1387.18	527.95	1387.06	528.01	1387
528.08	1386.95	528.45	1386.64	529.28	1386	530.42	1385.16	530.64	1385
530.75	1384.91	532	1384	532.38	1383.72	532.94	1383.31	535.11	1383.31
538.64	1383.28	541.03	1383.46	544.83	1383.76	545.12	1383.78	545.3	1383.8
545.31	1383.81	545.33	1383.82	545.57	1384	546.07	1384.36	546.97	1385
547.91	1385.67	548.37	1386	549.01	1386.45	549.78	1387	550.29	1387.36
551.04	1387.89	551.14	1387.93	551.31	1388	552.46	1388.46	553.79	1389
555.67	1389.76	556.26	1390	558.21	1390.78	558.74	1391	559.15	1391.16
561.22	1392	561.63	1392.16	563.7	1393	564.09	1393.16	565.69	1393.81
566.18	1394	567.6	1394.58	567.73	1394.63	567.86	1394.68	568.27	1394.69
570.4	1394.74	580.44	1394.99	581.96	1394.66	583.58	1394.32	585.06	1394
588.17	1393.34	589.75	1393	592.28	1392.46	594.36	1392.02	594.46	1392
595.47	1391.79	597.09	1391.44	602.32	1391.18	602.58	1391.17	602.84	1391.15
603.01	1391.13	603.15	1391.12	603.94	1391	603.99	1391	604.19	1391
604.22	1391	604.24	1391	606.61	1390.77	606.68	1390.77	606.75	1390.76
606.81	1390.77	606.86	1390.76	608.05	1390.67	608.15	1390.65	636.33	1391.14

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	205.2	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.2	291.49	98.65	100	101.34	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
321.76	636.33	1388.3	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13600

INPUT
Description: Channel Station 48299.16
Station Elevation Data num= 211

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.71	99.92	1386	101.82	1386	102.14	1386	131.02	1386
133.17	1386	133.27	1386	133.44	1386	133.74	1386	143.91	1385.96
154.31	1385.88	156.13	1385.88	162.29	1385.8	166.5	1385.93	169.13	1386
180.61	1386.31	191.5	1386.59	192.58	1386.62	199.46	1386.79	200.24	1386.59
201.02	1386.39	202.56	1386	205.16	1386.86	234.91	1379.43	250	1379.13
265.09	1379.43	291.49	1386.03	307.49	1386.35	312.94	1387.71	318.31	1387.74
322	1388.33	331.72	1387.4	334.11	1386.84	335.06	1387.08	342.01	1387.43
342.06	1387.43	344.8	1387.48	378.08	1388.15	414.1	1387.43	419.65	1387.16
421.11	1387.09	423.45	1386.69	424.11	1386.59	425.22	1386.86	429.5	1387.93
430.43	1387.97	430.55	1388	430.66	1388.01	430.81	1388.02	434.68	1388.3
434.69	1388.15	434.71	1388	437.8	1387.7	445.06	1387	445.65	1386.96
446.3	1386.91	447.09	1386.85	454.5	1386.32	455.11	1386.28	456.27	1386.2
458.98	1386	459	1386	459.03	1386	461.14	1385.84	464.51	1385.59
467.23	1385.54	469.72	1385.49	471.74	1385.89	472.01	1385.94	472.32	1386
472.42	1386.02	473.09	1386.14	474.96	1386.49	482.86	1386.62	488.07	1386.7
493.67	1386.78	495.02	1386.97	495.21	1387	495.26	1387	495.27	1387
495.28	1387	497.44	1387.28	497.52	1387.29	497.59	1387.3	497.66	1387.3
498.41	1387.38	498.47	1387.39	498.54	1387.4	498.6	1387.4	498.66	1387.41
499.8	1387.53	499.83	1387.53	499.86	1387.53	500.7	1387.62	501.31	1387.55
501.76	1387.5	502.97	1387.34	505.73	1387	505.81	1387	505.83	1387
505.85	1387	505.87	1387	505.89	1387	505.91	1387	505.95	1387
505.96	1387	505.97	1387	506	1387	506.16	1386.98	506.28	1386.96
506.37	1386.95	506.44	1386.94	506.5	1386.93	506.81	1386.89	506.94	1386.88
507	1386.87	507.14	1386.86	508.8	1386.9	513.55	1387	513.67	1387
513.86	1387	517.87	1387.08	518.95	1387.1	521.04	1387.16	521.18	1387.03
521.22	1387	521.94	1386.35	522.33	1386	522.61	1385.76	523.45	1385
523.87	1384.63	524.58	1384	525.14	1383.5	525.7	1383	525.96	1382.77
525.99	1382.74	530.51	1382.67	531.38	1382.66	532.08	1382.71	535.85	1383
536.16	1383.02	536.98	1383.08	537.59	1383.53	538.24	1384	539.04	1384.58
539.62	1385	540.54	1385.66	541	1386	541.53	1386.38	542.38	1387
542.57	1387.13	543.72	1387.95	543.76	1387.97	543.84	1388	545.42	1388.64
546.31	1389	547.19	1389.35	548.81	1390	550.04	1390.49	550.89	1390.83
551.32	1391	552.2	1391.35	553.84	1392	554.09	1392.1	556.35	1393
556.87	1393.21	558.86	1394	560.03	1394.46	560.32	1394.58	560.64	1394.71
562.79	1394.76	566.85	1394.87	571.97	1395	572.53	1395.01	573.03	1395.03
573.1	1395.01	573.16	1395	574.07	1394.8	577.65	1394	581.08	1393.24
582.14	1393	586.01	1392.13	586.6	1392	586.64	1391.99	589.23	1391.41
593.26	1391.1	594.56	1391	594.61	1391	594.96	1390.97	594.99	1390.96
595.04	1390.96	595.05	1390.96	595.08	1390.95	595.14	1390.94	595.18	1390.94
595.22	1390.94	595.22	1390.93	595.25	1390.93	595.26	1390.93	596.33	1390.84
596.54	1390.82	604.91	1390.96	606.39	1390.96	608.07	1390.97	638.53	1391.03
640.55	1391.03	642.55	1391.02	644.51	1391.01	646.43	1391.01	647.85	1391.06
651.8	1391.07								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	205.16	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.16	291.49	99.78	100	100.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
321.65	651.8	1388.25	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13500

INPUT
Description: Channel Station 48399.16
Station Elevation Data num= 185

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.69	107.79	1386	110.06	1386	110.44	1386	136.59	1386
136.66	1386	138.94	1386.16	146.17	1386.1	148.31	1386.11	149.58	1386.08
152.49	1386	154.38	1386	162.09	1386	163.82	1386.01	164.84	1386
165.19	1386	166.8	1386	167.76	1385.99	181.4	1386.38	184.3	1386.46
198.71	1386.9	200.11	1386.55	200.93	1386.35	202.31	1386	204.18	1387.03
234.91	1379.35	250	1379.05	265.09	1379.35	291.49	1385.95	307.49	1386.27
313.23	1387.7	321.76	1387.75	326.3	1388.43	336.46	1387.31	337.75	1386.93
339.16	1387.28	339.34	1387.29	346.16	1387.63	348.15	1387.67	382.19	1388.35
389.07	1388.22	418.23	1387.64	420.29	1387.53	425.23	1387.29	426.31	1387.02
426.85	1386.88	427.89	1387	436.14	1387.84	437.73	1388	437.84	1388.01
437.87	1388.01	437.91	1388.02	437.96	1388.02	437.98	1388.02	438.15	1388.04
438.78	1388.11	438.78	1388.08	438.79	1388	439.46	1387.92	440.93	1387.75
441.94	1387.63	442.38	1387.58	442.75	1387.54	443.41	1387.46	447.24	1387
454.42	1386.54	463.02	1386	466.06	1385.79	466.79	1385.74	467.83	1385.7
472.22	1385.49	475.01	1385.88	475.9	1386	477.55	1386.22	477.62	1386.23
477.69	1386.24	478.22	1386.26	496.39	1386.71	498.47	1386.73	498.58	1386.73
505.86	1386.79	514.44	1386.86	521.91	1386.93	522.66	1386.23	522.9	1386
523.45	1385.49	523.99	1385	524.23	1384.78	525.09	1384	525.94	1383.24
526.2	1383	526.41	1382.81	527.05	1382.23	530.26	1382.09	532	1382
533.41	1381.92	533.71	1381.9	533.83	1381.91	534.05	1381.92	535.11	1382
536.55	1382.1	539.27	1382.29	539.58	1382.57	539.94	1382.88	540.07	1383
540.29	1383.19	540.74	1383.6	541.19	1384	541.65	1384.36	542.2	1384.78
542.47	1385	542.73	1385.19	543.84	1386	544.65	1386.6	545.21	1387
545.32	1387.08	545.42	1387.16	546.12	1387.43	547.53	1388	548.69	1388.46
550.02	1389	550.03	1389	551.19	1389.46	552.54	1390	554.4	1390.73
555.07	1391	556.07	1391.39	557.65	1392	559.4	1392.68	560.22	1393
560.73	1393.2	562.8	1394	563.28	1394.19	563.38	1394.22	564.56	1394.26
569.71	1394.44	575.96	1394.63	577.49	1394.29	578.77	1394	579.02	1393.94
583.25	1393	583.43	1392.96	586.62	1392.24	587.72	1392	587.88	1391.96
592.19	1391	593.21	1390.77	593.35	1390.74	593.44	1390.72	593.69	1390.71
594.59	1390.7	597.4	1390.64	597.41	1390.61	597.42	1390.61	597.45	1390.59
597.48	1390.58	597.51	1390.57	597.54	1390.56	597.59	1390.55	597.62	1390.53
597.66	1390.52	597.7	1390.51	597.74	1390.5	597.77	1390.49	597.82	1390.44
597.86	1390.43	597.91	1390.39	597.96	1390.39	598.01	1390.36	598.07	1390.36
598.12	1390.33	598.17	1390.33	598.22	1390.33	598.27	1390.29	598.31	1390.29
598.35	1390.26	598.39	1390.25	617.73	1390.3	619.64	1390.29	620.79	1390.28
621.44	1390.28	623.23	1390.26	625	1390.25	626.76	1390.23	633.51	1390.21

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	204.18	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
204.18	291.49	100.01	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
320	633.51	1387.86	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13400

INPUT
Description: Channel Station 48499.16
Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.67	115.81	1386	118.45	1386	118.89	1386	140.21	1386
140.36	1386	145.5	1386.37	161.81	1386.23	166.65	1386.24	169.5	1386.17
171.27	1386.12	171.29	1386.12	171.34	1386.12	171.39	1386.12	171.4	1386.12
171.43	1386.12	199.16	1386.47	200.04	1386.49	200.18	1386.45	200.34	1386.41
201.99	1386	203.74	1385.86	205.56	1386.61	234.91	1379.27	250	1378.97
265.09	1379.27	291.49	1385.87	307.49	1386.19	313.22	1387.62	319.26	1387.52
330.6	1388.16	341.52	1387.03	341.57	1387.04	343.31	1387.47	350.32	1387.82
380.72	1388.43	386.35	1388.54	412.9	1388.02	422.38	1387.83	427.21	1387.59
429.38	1387.48	430.96	1387.08	431.77	1386.88	432.85	1387	436.04	1387.29
442.94	1387.92	447.21	1387.27	449.55	1387	457.8	1386.5	465.28	1386
466.04	1385.95	473.05	1385.54	477.36	1385.23	478.02	1385.19	478.97	1385.43
479.65	1385.61	481.2	1386	481.46	1386.07	481.8	1386.15	482.25	1386.27
489.18	1386.05	490.74	1386	491.07	1386	491.55	1385.99	491.82	1385.99
492.83	1385.96	494.13	1385.98	494.36	1385.98	494.7	1385.99	495.2	1385.99
496.03	1385.99	496.87	1386	497.83	1386.02	499.46	1386.05	500.45	1386.07
503.02	1386.11	508.67	1386.34	508.99	1386.35	509.34	1386.36	509.74	1386.38
510.2	1386.4	524.28	1387	524.29	1387	524.31	1387	525.09	1387.03
525.66	1387.06	525.69	1387.03	525.72	1387	526.26	1386.44	526.68	1386
527.43	1385.22	528.25	1384.38	528.62	1384	528.69	1383.92	528.93	1383.67
529.06	1383.53	529.54	1383	529.81	1382.7	529.84	1382.67	530.16	1382.66
535.05	1382.56	540.38	1382.97	540.75	1383	540.99	1383.02	542.43	1383.13
543.99	1383.25	544.45	1383.57	545.05	1384	546.13	1384.75	546.48	1385
547.01	1385.37	547.92	1386	548.98	1386.74	549.35	1387	549.42	1387.05
549.69	1387.24	550.01	1387.36	551.21	1387.83	551.66	1388	551.87	1388.08

554.24	1389	556.07	1389.71	556.82	1390	559.06	1390.87	559.4	1391
560.75	1391.52	561.99	1392	562.93	1392.37	564.56	1393	565.14	1393.23
566.83	1393.9	568.72	1393.95	570.23	1394	571.19	1394.03	573.66	1394.1
579.28	1394.28	580.5	1394.03	580.65	1394	581.65	1393.79	585.46	1393
586.61	1392.76	590.27	1392	591.72	1391.7	595.08	1391	598.16	1390.36
598.6	1390.27	598.95	1390.19	599.11	1390.18	599.23	1390.16	599.57	1390.12
600.6	1390	601.44	1389.9	602.4	1389.79	604.63	1389.52	604.67	1389.53
625.24	1389.72								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	205.56	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.56	291.49	102.36	100	97.83	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
319.44	625.24	1387.54	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13300

INPUT
Description: Channel Station 48599.16
Station Elevation Data num= 147

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.65	122.65	1386	125.66	1386	126.16	1386	142.44	1386
142.67	1386	150.77	1386.58	171.81	1386.4	173.04	1386.38	174.29	1386.41
193.34	1386.82	197.15	1386.91	199.03	1386.44	200.79	1386	201.34	1385.86
203.36	1387.07	234.91	1379.19	250	1378.89	265.09	1379.19	291.49	1385.79
307.49	1386.11	310.92	1386.96	320.18	1386.73	329.2	1386.87	334.88	1387.68
344.68	1386.95	345.05	1387.05	346.79	1387.48	347.98	1387.54	353.79	1387.83
359.42	1387.94	389.79	1388.55	422.8	1387.89	425.8	1387.83	432.29	1387.51
432.8	1387.48	433.03	1387.42	436.1	1386.65	438.42	1387	442.63	1387.44
444.26	1387.61	445.48	1387.73	446.63	1387.63	453.83	1387	459.43	1386.51
465.18	1386	473.54	1385.26	476.45	1385	476.95	1384.96	478.07	1384.86
478.84	1384.79	479.48	1384.95	479.65	1385	482.01	1385.58	483.74	1386
483.98	1386.06	484.21	1386.11	491.2	1386.1	498.56	1386.09	502.37	1386.06
506.51	1386.05	509.17	1386.02	524.31	1386.18	524.42	1386.18	525.01	1386.2
525.24	1386.05	525.32	1386	526	1385.57	526.89	1385	528.09	1384.26
528.51	1384	528.55	1383.97	529.13	1383.62	531.9	1383.5	533.35	1383.43
536.97	1383.54	545.53	1383.8	545.7	1383.91	545.83	1384	546.13	1384.2
547.32	1385	547.64	1385.22	548.59	1385.85	548.81	1386	549.06	1386.17
549.23	1386.29	550.17	1386.92	550.29	1387	550.44	1387.09	550.48	1387.11
551.41	1387.42	551.91	1387.58	553.22	1388	553.45	1388.08	556.31	1389
558.27	1389.64	559.4	1390	560.46	1390.35	562.48	1391	563.82	1391.43
565.57	1392	568.1	1392.82	568.66	1393	569.22	1393.18	569.9	1393.4
577.13	1393.83	579.99	1394	580.49	1394.03	580.8	1394.05	580.87	1394.05
580.89	1394.05	581.13	1394	583.24	1393.58	586.2	1393	588.37	1392.57
591.27	1392	593.94	1391.47	596.34	1391	601.3	1390.02	601.41	1390
602.28	1389.83	602.4	1389.8	602.49	1389.79	602.88	1389.75	607.4	1389.35
607.46	1389.36	607.58	1389.37	607.69	1389.39	607.74	1389.39	607.85	1389.4
607.96	1389.41	608.05	1389.41	608.12	1389.39	608.19	1389.37	608.25	1389.35
608.32	1389.34	608.44	1389.34	608.51	1389.32	608.57	1389.31	608.63	1389.3
608.68	1389.29	608.73	1389.28	608.78	1389.27	608.82	1389.26	608.86	1389.26
608.87	1389.26	627.02	1389.04						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	203.36	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
203.36	291.49	103.02	100	97.3	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
316.1	627.02	1386.84	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13200

INPUT
Description: Channel Station 48699.16
Station Elevation Data num= 140

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.64	126.09	1386	129.48	1386	130.05	1386	141.27	1386
141.59	1386	152.67	1386.79	163.22	1386.7	169.85	1386.61	170.22	1386.62
171.14	1386.61	175.62	1386.32	183.4	1386.14	185.4	1386.1	189.45	1386
189.64	1386	190.04	1385.99	202.54	1385.71	204.05	1385.33	205.12	1385.07
205.39	1385	205.61	1385	206.03	1385.59	206.51	1385.71	208.51	1385.71
234.91	1379.11	250	1378.81	265.09	1379.11	291.49	1385.71	307.49	1386.03
308.85	1386.37	328.89	1386.55	334.56	1387.16	342.97	1386.68	345.28	1387.26
352.28	1387.61	388.32	1388.34	421.61	1387.68	424.36	1387.62	431.08	1387.29
431.37	1387.27	431.45	1387.25	433.81	1386.67	434.97	1387	438.01	1387
439.15	1387.1	445.1	1387.56	448.95	1387.25	452.18	1387.04	452.74	1387
457.15	1386.66	465.89	1386	471.27	1385.59	477.77	1385.1	482.31	1385.54

485.7	1385.88	488.6	1385.91	495.08	1386	497.58	1386.02	504.72	1386.09
511.1	1386.01	512.19	1386	526.41	1385.62	528.66	1385.55	529.59	1385.53
529.73	1385.52	530.45	1385.34	531.38	1385.11	531.81	1385	532	1384.95
532.42	1384.86	533.4	1384.64	533.79	1384.73	533.83	1384.74	533.9	1384.76
534.66	1385	534.7	1385	534.71	1385	536.81	1385.7	536.86	1385.71
536.91	1385.73	537.2	1385.84	543.85	1385.91	546.8	1385.94	547.13	1385.94
547.3	1386	547.45	1386.05	549.93	1386.89	550.25	1387	552.58	1387.79
553.2	1388	554.08	1388.3	556.15	1389	558.18	1389.69	559.1	1390
560.14	1390.35	562.05	1391	563.92	1391.63	565	1392	565.31	1392.1
567.95	1393	568.33	1393.13	568.8	1393.29	576.23	1393.83	578.57	1394
579.38	1394.06	579.42	1394.06	579.43	1394.06	579.75	1394	580.54	1393.85
585.09	1393	590.14	1392.05	590.41	1392	590.5	1391.98	595.72	1391
597.23	1390.71	598.72	1390.43	600.57	1390.4	601.3	1390.38	602.52	1390.22
603.19	1390.14	604.23	1390	605.48	1389.84	606.55	1389.7	606.9	1389.66
607.06	1389.63	607.53	1389.57	607.62	1389.55	607.65	1389.54	607.77	1389.51
607.87	1389.48	607.95	1389.43	608.02	1389.37	608.09	1389.33	608.16	1389.29
608.22	1389.25	608.28	1389.22	608.34	1389.18	608.4	1389.14	628.44	1389.25

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	103.09	100	97.23	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	152.67	1386.79	F
388.37	628.44	1388.34	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13100

INPUT
Description: Channel Station 48799.16
Station Elevation Data num= 146

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.65	122.75	1386	126.53	1386	127.17	1386	133.33	1386
133.74	1386	147.78	1387	148.1	1387	149.42	1387	156.51	1387
158.11	1387	158.89	1387	159.69	1386.96	164.43	1386.75	168.85	1386.39
173.6	1386	174.16	1385.96	178.64	1385.59	199.3	1385.39	201.83	1385.36
202.22	1385.36	203.6	1385.35	204.12	1385.22	205	1385	205.39	1385.35
206.51	1385.63	208.51	1385.63	234.91	1379.03	250	1378.73	265.09	1379.03
291.49	1385.63	307.49	1385.95	312.09	1384.8	316.46	1385.89	322.26	1385.95
328.24	1386.72	336.18	1386.38	336.36	1386.32	338.23	1386.79	345.25	1387.14
349.71	1387.24	381.35	1387.88	417.44	1387.17	424.46	1386.83	425.44	1386.58
432.31	1387	436.65	1387.27	438.46	1387.38	438.8	1387.22	438.87	1387
438.93	1387	439	1387	439.06	1387	439.11	1387	439.13	1387
439.14	1387	439.7	1387	439.79	1387	440.78	1387	441.19	1387
443.03	1387	452	1386.51	458.05	1386.22	459.34	1386.16	462.56	1386
463.72	1385.95	466.76	1385.82	472.24	1385.91	475.84	1385.93	478.43	1385.81
485.45	1385.53	497.52	1385.52	502.88	1385.51	509.99	1385.46	515.62	1385.42
524.92	1385.36	534.05	1385.48	537.85	1385.53	541.06	1385.57	541.28	1385.66
541.52	1385.74	542.2	1386	543.68	1386.56	544.85	1387	547.07	1387.84
547.5	1388	548.66	1388.44	550.06	1388.97	550.15	1389	552.47	1389.86
552.84	1390	555.28	1390.9	555.55	1391	556.09	1391.2	558.26	1392
559.53	1392.47	560.98	1393	561.22	1393.09	562.6	1393.6	566.59	1393.82
567.64	1393.88	569.65	1394	570.74	1394.06	572.47	1394.17	573.3	1394.21
573.73	1394.11	574.23	1394	576.24	1393.54	578.61	1393	582.12	1392.2
582.98	1392	584.84	1391.58	587.35	1391	588.44	1390.75	590.05	1390.38
591.7	1390	592.35	1389.85	592.64	1389.78	593.03	1389.79	594.48	1389.77
595.3	1389.76	595.67	1389.76	595.73	1389.75	596.15	1389.69	596.49	1389.64
596.77	1389.6	597.03	1389.57	597.9	1389.44	598.1	1389.41	598.28	1389.39
598.45	1389.36	598.74	1389.32	598.91	1389.29	599.05	1389.27	599.17	1389.25
599.28	1389.23	599.38	1389.21	599.47	1389.2	599.55	1389.18	599.62	1389.17
599.68	1389.16	599.77	1389.14	600.62	1389.02	600.69	1389.01	600.74	1389
622.39	1389.19								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	95.48	100	104.29	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	158.89	1387	F
381.63	622.39	1387.9	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13000

INPUT
Description: Channel Station 48899.16
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	1385.65	122.46	1386	126.57	1386	127.26	1386	129.01	1386
129.49	1386	132.84	1386.24	133.15	1386.22	133.53	1386.22	142.27	1386.18
152.03	1386.26	152.5	1386.26	159.27	1386.1	160.32	1386	163.82	1385.65
167.18	1385.33	170.52	1385	170.73	1384.98	171.08	1384.94	174.57	1384.96
177.03	1384.96	199.71	1384.98	200.86	1384.98	201.44	1384.99	201.89	1385
203.19	1385	204.21	1384.97	206.51	1385.55	208.51	1385.55	234.91	1378.95
250	1378.65	265.09	1378.95	291.49	1385.55	307.49	1385.87	312.09	1384.72
315.99	1385.69	320.32	1385.68	322.78	1385.56	324.91	1386.01	331.31	1385.97
332.23	1385.77	333.91	1386.19	340.91	1386.54	376.91	1387.26	412.91	1386.55
419.92	1386.2	422.92	1385.7	426.36	1386.56	431.56	1387	433.24	1387.13
433.7	1387.17	433.71	1387.08	433.72	1387	437.39	1386.7	445.98	1386
450.09	1385.82	461.04	1385.32	467.67	1385.44	472.54	1385.46	478.59	1385.26
478.87	1385.25	480.54	1385.24	487.42	1385.19	492.99	1385.15	501.45	1385.05
502.2	1385.04	503.1	1385.04	504.2	1385.03	505.56	1385.02	507.29	1385
507.79	1385	507.84	1385	509.51	1384.98	511.25	1384.96	512.4	1384.95
517.37	1384.9	517.67	1384.91	517.93	1384.91	523.24	1385	523.33	1385
523.4	1385	523.92	1385.01	532.69	1385.14	533.23	1385.15	536.67	1385.21
537.44	1385.55	538.23	1385.9	538.46	1386	540.47	1386.89	540.73	1387
540.79	1387.03	543.01	1388	543.74	1388.32	545.28	1389	547.16	1389.82
547.56	1390	548.1	1390.24	549.84	1391	550.05	1391.09	551.93	1391.91
552.14	1392	552.27	1392.06	554.44	1393	556.63	1393.95	556.7	1393.98
556.71	1393.98	557.34	1394	558.6	1394.04	566.17	1394.29	567.29	1394.01
567.33	1394	568.29	1393.77	571.38	1393	573.07	1392.58	575.42	1392
578.84	1391.15	579.46	1391	581.18	1390.57	583.5	1390	584.08	1389.86
584.97	1389.64	585.33	1389.55	586.1	1389.55	588.22	1389.57	588.25	1389.56
588.33	1389.54	588.41	1389.53	589.39	1389.4	589.45	1389.4	589.54	1389.38
589.59	1389.39	613.35	1389.26	614.48	1389.26	615.59	1389.27	616.68	1389.27
617.76	1389.28	618.83	1389.28	620.97	1389.29	622.36	1389.3	623.74	1389.3
625.12	1389.3	626.48	1389.31	628.36	1389.31				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	96.55	100	103.25	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	152.5	1386.26	F
377	628.36	1387.28	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12900

INPUT
Description: Channel Station 48999.16
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.64	127.76	1386	129.1	1386	129.22	1386	132.64	1386
134.08	1386	147.33	1385.61	160.25	1385.26	161.98	1385.22	165.55	1385.11
173.6	1385.08	193.78	1385	200.52	1384.97	201.78	1384.97	202.63	1385
202.76	1385	203.85	1385.04	204.21	1385.05	204.24	1385.04	204.39	1385
204.8	1385	204.94	1385.07	206.51	1385.47	208.51	1385.47	234.91	1378.87
250	1378.57	265.09	1378.87	291.49	1385.47	307.49	1385.79	312.09	1384.64
316.23	1385.67	320.68	1385.68	324.66	1386.57	333.03	1386.17	335.83	1385.55
336.01	1385.59	343.01	1385.94	379.06	1386.65	415.11	1385.92	422.11	1385.57
425.12	1385.07	431.1	1386.56	431.27	1386.35	435.71	1386.96	442.32	1386.5
449.28	1386	452.76	1385.87	457.72	1385.7	462.85	1385.51	471.54	1385.23
478.35	1385	481.26	1384.91	482.62	1384.87	485.71	1384.9	486.67	1384.91
495.26	1384.98	495.37	1384.99	496.33	1384.97	516.71	1384.71	517.86	1384.69
518.41	1384.69	518.73	1384.68	519.66	1384.67	520.44	1384.69	522.26	1384.72
531.86	1384.91	534.04	1384.87	536.99	1384.82	537.58	1384.81	537.62	1384.83
538.05	1385	538.35	1385.12	540.52	1386	542.42	1386.77	543	1387
543.6	1387.24	545.48	1388	547.13	1388.67	547.96	1389	549.35	1389.56
550.03	1389.83	550.45	1390	551.04	1390.23	552.96	1391	553.63	1391.27
555.47	1392	556.66	1392.48	557.98	1393	558.5	1393.21	558.99	1393.4
561.74	1393.52	568.15	1393.81	571.47	1393.03	571.58	1393	575.77	1392.01
575.81	1392	575.9	1391.98	580.01	1391	581.27	1390.7	584.19	1390
585.27	1389.74	586.96	1389.34	589.66	1389.27	591.36	1389.23	591.4	1389.23
591.44	1389.24	591.48	1389.24	591.5	1389.25	612.59	1389.01	623.61	1388.9

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	101.64	100	98.37	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	134.08	1386	F
365.44	623.61	1387	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12800

INPUT

Description: Channel Station 49099.16
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.61	99.94	1385.89	100.71	1385.88	132.67	1385.62	134.01	1386
134.55	1386	134.8	1386	134.89	1386	135.34	1386	136.02	1386
136.88	1386	141.56	1386	143.02	1386	163.75	1385.28	169.83	1385.1
173.16	1385.05	176.18	1385	178.69	1384.96	182.04	1384.91	193.57	1384.92
201.57	1384.93	203.2	1384.95	204.07	1384.97	204.89	1384.98	206.51	1385.39
208.51	1385.39	234.91	1378.79	250	1378.49	265.09	1378.79	291.49	1385.39
307.49	1385.71	312.09	1384.56	316.13	1385.57	325.28	1385.61	329.51	1386.54
330.03	1386.53	338.03	1384.53	341.03	1385.03	341.06	1385.03	348.04	1385.37
348.9	1385.39	384.07	1386.09	420.11	1385.36	427.11	1385	430.12	1384.5
437.74	1386.41	440.51	1386.77	445.9	1386.41	452.8	1386	465.35	1385.65
468.82	1385.55	471.31	1385.44	481.44	1385	482.3	1384.97	486.79	1384.77
494.05	1384.72	500.19	1384.67	518	1384.5	520.72	1384.48	522.64	1384.47
528.88	1384.46	528.91	1384.46	529.53	1384.48	536.24	1384.72	536.56	1384.72
537.22	1384.7	542.63	1384.6	543.2	1384.83	543.62	1385	544.98	1385.55
546.08	1386	547.2	1386.45	548.55	1387	549.9	1387.55	550.28	1387.7
551.01	1388	552.8	1388.73	553.47	1389	553.74	1389.11	555.94	1390
556.76	1390.33	558.42	1391	560.08	1391.67	560.9	1392	563.37	1393
563.38	1393	563.77	1393.16	563.82	1393.18	564.8	1393.19	573.73	1393.33
574.56	1393.13	575.12	1393	578.58	1392.19	579.36	1392	583.44	1391.04
583.6	1391	583.94	1390.92	587.82	1390	590.72	1389.31	591	1389.24
591.1	1389.24	592.85	1389.25	593.47	1389.16	594.53	1389	594.98	1388.93
597.53	1388.68	627.85	1388.39						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
208.51 291.49 103.54 100 96.09 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	143.02	1386	F
383.72	627.85	1386.12	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12700

INPUT
Description: Channel Station 49199.16
Station Elevation Data num= 118

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.6	53.32	1385.75	55.17	1385.71	130.82	1385.13	131.65	1385.36
131.76	1385.39	131.93	1385.41	132.13	1385.42	150.22	1385.14	151.67	1385.16
152.44	1385.17	157.09	1385	165.32	1384.82	171.18	1384.73	172.69	1384.69
178.3	1384.59	180.23	1384.55	181.43	1384.53	183.44	1384.55	201.1	1384.73
202.88	1384.72	204.09	1384.7	206.51	1385.31	208.51	1385.31	234.91	1378.71
250	1378.41	265.09	1378.71	291.49	1385.31	307.49	1385.63	312.09	1384.48
315.87	1385.42	325.02	1385.55	328.37	1386.28	337.44	1384.01	340.45	1384.52
347.46	1384.87	383.52	1385.6	419.58	1384.89	426.59	1384.54	429.59	1384.04
437.61	1386.36	449.92	1385.12	455.8	1385	456.8	1384.98	459.23	1384.93
460.83	1384.9	471.78	1384.98	474.63	1385	476.43	1385.45	478.63	1386
480.29	1386.34	481.01	1386.49	481.59	1386.61	484.23	1386.44	491.55	1386
497.59	1385.82	508.65	1385.48	518.65	1385.08	520.5	1385	522.35	1384.92
528.84	1384.65	535.31	1384.57	541.26	1384.56	553.97	1384.36	560.23	1384.28
571.29	1384.39	572.38	1384.4	573.84	1384.45	580.9	1384.7	582.68	1384.73
584.36	1384.77	584.54	1384.83	584.98	1385	585.26	1385.1	587.63	1386
589.08	1386.55	590.27	1387	591.12	1387.32	591.94	1387.63	592.92	1388
594.91	1388.75	595.57	1389	597.92	1389.89	598.22	1390	600.15	1390.73
600.87	1391	601.02	1391.06	603.51	1392	603.87	1392.14	605.49	1392.75
608.6	1392.88	611.3	1393	613.59	1393.11	615.28	1393.19	615.79	1393.07
616.11	1393	618.14	1392.54	620.48	1392	622.54	1391.52	624.8	1391
627.47	1390.37	629.03	1390	629.77	1389.82	631.71	1389.36	633.21	1389.22
634.03	1389.14	634.32	1389.09	634.84	1389	635.66	1388.86	636.61	1388.72
637.32	1388.64	637.95	1388.55	638.48	1388.48	638.91	1388.41	639.9	1388.32
662.34	1388.12	669.78	1388.15	670.53	1388.14				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
208.51 291.49 100.41 100 99.62 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	53.32	1385.75	F
359.14	670.53	1386	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12600

INPUT
Description: Channel Station 49299.16

Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.61	3.15	1385.62	6	1385.55	91.73	1384.9	92.39	1384.89
95.52	1384.9	108.33	1384.94	113.28	1384.96	124.21	1384.77	124.36	1384.88
124.6	1385	126.51	1385.19	141.93	1385.34	143.15	1385.32	144.35	1385.31
150.75	1385.2	151.6	1385.2	152.53	1385.2	155.99	1385	159.4	1385
159.48	1385	159.53	1385	159.62	1384.99	161.9	1384.64	167.23	1384.48
171.5	1384.33	175.61	1384.35	195.03	1384.4	198.09	1384.43	201.94	1384.46
203.49	1384.47	206.51	1385.23	208.51	1385.23	234.91	1378.63	250	1378.33
265.09	1378.63	291.49	1385.23	307.49	1385.55	312.09	1384.4	315.47	1385.24
320.01	1386.11	329.59	1383.72	332.6	1384.22	339.6	1384.57	375.65	1385.29
411.69	1384.57	418.7	1384.23	421.7	1383.73	429.7	1386.48	432.35	1385.78
433.22	1386	433.51	1386.07	434.89	1386.42	442.16	1386.09	444.13	1386
445.89	1385.92	462.89	1385.15	466.53	1385.03	467.54	1385	472.63	1384.84
476.24	1384.73	481.14	1384.57	484.46	1384.55	495.08	1384.5	509.97	1384.4
513.3	1384.37	517.86	1384.3	527.9	1384.15	530.73	1384.33	533.88	1384.54
536.68	1384.55	538.29	1384.56	538.96	1384.83	539.39	1385	541.8	1385.97
541.89	1386	541.97	1386.03	544.4	1387	546.01	1387.64	546.95	1388
548.92	1388.77	549.52	1389	549.86	1389.13	552.12	1390	552.26	1390.06
554.41	1390.88	554.73	1391	555.09	1391.14	557.35	1392	558.47	1392.43
558.7	1392.51	559.12	1392.53	568.72	1392.98	570.27	1392.65	573.44	1392
576.24	1391.42	578.24	1391	579.86	1390.65	582.92	1390	586.96	1389.11
587.48	1389	587.69	1388.95	587.75	1388.94	588.41	1388.86	591.24	1388.52
592.18	1388.4	592.87	1388.32	594.64	1388.12	594.66	1388.12	616.39	1388.11
619.89	1388.04	625.42	1387.93	625.73	1387.93				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	94.09	100	105.5	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	141.93	1385.34	F
432.76	625.73	1386.42	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12500

INPUT
Description: Channel Station 49399.16
Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.24	56.38	1384.78	57.74	1384.76	60.71	1384.77	72.87	1384.82
77.56	1384.83	122.9	1383.99	124.55	1384	125.16	1384.01	125.17	1384.01
125.26	1384	125.93	1384	126.21	1384	127.74	1384.54	129.02	1385
131.51	1385.88	131.83	1386	132.85	1386	134.64	1386	135.83	1386
136.18	1386	140.26	1386	140.53	1386	144.34	1386	144.83	1386
151.78	1386	154.18	1386	155.39	1386	156.79	1385.71	158.34	1385.49
159.35	1385.49	159.85	1385	160.18	1385	160.57	1384.77	161.22	1384.6
167.18	1384.4	169.67	1384.33	173.17	1384.32	194.35	1384.35	200.45	1384.38
203.53	1384.4	206.51	1385.15	208.51	1385.15	234.91	1378.55	250	1378.25
265.09	1378.55	291.49	1385.15	307.49	1385.47	312.09	1384.32	317.07	1385.56
320.38	1386.19	329.69	1383.87	330.02	1383.92	332.69	1384.37	339.7	1384.72
375.72	1385.44	377.09	1385.41	411.75	1384.72	418.76	1384.37	421.76	1383.88
429.76	1386.26	430.32	1386	430.39	1386.01	432.15	1386.18	433.81	1386.11
436.52	1386	440.42	1385.85	460.96	1385.04	461.98	1385.01	462.2	1385
472.1	1384.68	475.73	1384.56	476.41	1384.54	478.41	1384.47	480.17	1384.45
493.51	1384.3	502.45	1384.25	510.38	1384.21	518.81	1384.01	519.22	1384
519.72	1383.99	526.17	1383.85	526.46	1383.87	528.01	1384	528.64	1384.05
532.76	1384.36	535.57	1384.46	536.59	1384.5	537.64	1384.93	537.82	1385
538.25	1385.17	540.3	1386	541.2	1386.37	542.77	1387	544.22	1387.59
545.24	1388	547.34	1388.85	547.71	1389	548.93	1389.5	550.18	1390
550.45	1390.11	550.69	1390.21	552.65	1391	554.47	1391.74	555.11	1392
556.11	1392.41	556.22	1392.45	556.26	1392.47	556.29	1392.48	556.61	1392.49
566.87	1392.78	569.11	1392.26	570.25	1392	571.85	1391.63	574.56	1391
578.23	1390.15	578.87	1390	579.58	1389.83	583.17	1389	583.78	1388.86
584.58	1388.67	589.37	1388.13	590.47	1388	590.71	1387.97	592.94	1387.72
593.45	1387.67	594.5	1387.59	620.68	1387.31				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	100.08	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
432.11	620.68	1386.15	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12400

INPUT

Description: Channel Station 49499.16
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.8	19.17	1384.64	21.37	1384.62	24.28	1384.63	36.23	1384.67
40.85	1384.69	85.41	1383.86	87.02	1383.87	130.23	1384.46	131.11	1385
131.13	1385	131.83	1385.14	132.3	1385.16	136.35	1385.52	139.12	1385.6
141.21	1385.6	144.95	1385.59	147.22	1385.57	149.53	1385.55	152.56	1385.54
154.95	1385.51	162.97	1385	163.23	1385	163.64	1384.91	165.06	1384.55
165.37	1384.46	167.21	1384.43	181.56	1384.22	190.79	1384.26	194.9	1384.27
198.25	1384.35	203.35	1384.43	204.11	1384.47	206.51	1385.07	208.51	1385.07
234.91	1378.47	250	1378.17	265.09	1378.47	291.49	1385.07	307.49	1385.39
312.09	1384.24	315.16	1385.01	320.62	1385.06	324.68	1385.93	331.98	1384.1
334.98	1384.61	341.99	1384.96	379.63	1385.71	415.66	1385	422.67	1384.65
425.67	1384.15	432.55	1385.87	433.21	1385.58	433.77	1385.65	434.12	1385.7
434.37	1385.74	435.78	1385.92	441.48	1385.74	464.51	1385	464.53	1385
465.21	1384.98	473.96	1384.68	481.56	1384.4	484.77	1384.37	497.97	1384.21
502.81	1384.15	504.09	1384.14	505.04	1384.12	512.32	1384.02	514.19	1384
515.2	1383.99	529.8	1383.84	531.06	1383.92	532.48	1384	540.24	1384.42
540.48	1384.44	540.53	1384.46	541.82	1384.97	541.89	1385	541.9	1385.01
544.4	1386	545.28	1386.35	546.91	1387	549.28	1387.94	549.42	1388
549.59	1388.07	550.02	1388.24	551.93	1389	552.89	1389.38	554.42	1390
555.73	1390.53	556.88	1391	558.2	1391.54	559.33	1392	559.66	1392.14
560.03	1392.29	566.46	1392.27	570.1	1392.27	570.5	1392.18	571.37	1392
572.79	1391.7	576.11	1391	579.36	1390.32	580.87	1390	584.77	1389.19
585.66	1389	587.44	1388.63	590.27	1388.04	591.22	1388.03	592.41	1388
595.19	1387.59	595.82	1387.51	596.48	1387.55	598.12	1387.76	598.79	1387.57
601.06	1387.16	601.45	1387.09	602.06	1387	602.22	1386.95	602.34	1386.94
602.42	1386.93	602.53	1386.93	607.95	1386.87	625.37	1387.07	626.79	1387.08

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	102.09	100	97.8	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
435.78	626.79	1385.92	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12300

INPUT
Description: Channel Station 49599.16
Station Elevation Data num= 118

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.52	44.08	1383.72	45.69	1383.72	134.42	1384.92	134.54	1385
134.56	1385	135.1	1385	135.49	1385	136.43	1385	137.33	1385
138.88	1385	143.54	1384.89	147.79	1384.9	152.3	1384.91	164	1384.58
165.24	1384.6	166.81	1384.59	168.05	1384.46	172.78	1384.32	181.31	1384.08
185.2	1384.09	197.5	1384.13	203.32	1384.19	206.51	1384.99	208.51	1384.99
234.91	1378.39	250	1378.09	265.09	1378.39	291.49	1384.99	307.49	1385.31
312.09	1384.16	314.92	1384.86	324.13	1384.81	327.39	1385.75	330.69	1384.93
333.07	1384.33	334.84	1384.63	336.07	1384.83	340.17	1385.04	343.07	1385.18
365.68	1385.63	382.43	1385.97	398.4	1385.65	418.43	1385.25	421.62	1385.09
425.43	1384.9	425.48	1384.89	425.54	1384.87	427.38	1385	431.26	1385.26
434.42	1385.46	435.62	1385.54	436.26	1385.58	438.3	1385.71	445.27	1385.52
464.43	1385	466.35	1384.93	468.4	1384.87	480.32	1384.48	484.22	1384.34
489.48	1384.24	500.61	1384	500.81	1384	501.03	1384	501.13	1384
502.59	1383.99	509.61	1383.95	511.74	1383.94	512.7	1383.94	515.25	1383.93
518.27	1383.91	521.47	1383.91	533.32	1383.88	534.54	1383.95	535.58	1384
537.1	1384.08	543.54	1384.41	544.46	1384.78	545.01	1385	546.74	1385.69
547.5	1386	548.73	1386.49	549.88	1386.95	550	1387	550.42	1387.17
552.49	1388	553.88	1388.55	555	1389	557.12	1389.85	557.5	1390
558.03	1390.21	560	1391	561.25	1391.5	562.53	1392	562.61	1392.03
562.7	1392.07	563.35	1392.07	573.46	1392.2	574.22	1392.04	574.42	1392
575.57	1391.75	578.98	1391	582.38	1390.25	583.24	1390.07	583.54	1390
587.19	1389.2	588.1	1389	591.47	1388.26	592.66	1388	593.02	1387.92
594.39	1387.61	595.85	1387.55	601.99	1387.25	602.86	1387.09	603.44	1387.01
603.83	1387.02	604.06	1387	631.25	1387.09				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	103.82	100	96.25	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	138.88	1385	F
382.32	631.25	1385.96	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12200

INPUT
Description: Channel Station 49699.16
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.66	89.76	1384.85	92.09	1384.86	94.11	1384.87	95.84	1384.88
97.25	1384.88	130.26	1385	130.96	1385	130.99	1385	132.47	1385
136.74	1385	140.02	1385	142.29	1384.89	164.48	1384.21	168.75	1384.14
176.83	1384.07	181.15	1384.1	192.08	1384.16	202.9	1384.1	203.24	1384.09
206.51	1384.91	208.51	1384.91	234.91	1378.31	250	1378.01	265.09	1378.31
291.49	1384.91	307.49	1385.23	312.09	1384.08	313.91	1384.53	319.85	1384.67
322.31	1385.62	326.58	1384.56	329.58	1385.06	336.6	1385.41	377.76	1386.22
413.8	1385.5	413.88	1385.5	420.81	1385.15	421.14	1385.06	422.23	1385
429.02	1385.32	431.29	1385.41	434.37	1385.57	436.24	1385.53	458.24	1385
458.97	1384.98	463.02	1384.89	464.92	1384.84	469.55	1384.67	480.89	1384.23
490.98	1384.05	493.89	1384	495.91	1383.97	496.58	1383.96	497.04	1383.96
498.6	1383.96	511.82	1383.91	528.39	1383.76	529.67	1383.76	530.37	1383.8
531.58	1383.87	533.65	1384	535.87	1384.13	540.52	1384.42	541.75	1384.9
542.02	1385	544.44	1385.93	544.61	1386	546.03	1386.55	547.19	1387
547.37	1387.07	548.51	1387.51	549.78	1388	550.41	1388.24	552.37	1389
553.54	1389.45	554.96	1390	556.82	1390.71	557.56	1391	558.61	1391.4
559.76	1391.85	560.15	1392	560.29	1392	560.31	1392	560.6	1392
561.34	1392.02	562.01	1392.02	562.61	1392.03	570.16	1392.14	570.45	1392.08
570.84	1392	573.51	1391.44	575.62	1391	579.81	1390.12	580.39	1390
581.76	1389.71	585.17	1389	586.21	1388.78	589.93	1388	590.41	1387.89
591.65	1387.63	594.88	1387.38	598.24	1387.1	598.35	1387.09	598.72	1387.1
599.29	1387.02	600.36	1387.04	601	1387	631.37	1387.1		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	92.68	100	106.55	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	140.02	1385	F
378.36	631.37	1386.22	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12100

INPUT
Description: Channel Station 49799.16
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.98	54.06	1384.73	56.25	1384.73	58.15	1384.74	59.77	1384.75
61.1	1384.75	129.92	1385	130.18	1385	130.36	1385	130.46	1385
130.72	1385	131.25	1385	133.65	1385	136.25	1385	140.17	1385
149.49	1384.72	159.38	1384.7	166.55	1384.48	174.04	1384.27	176.78	1384.18
187.1	1384.23	190.34	1384.24	197.69	1384.26	202.29	1384.27	204.14	1384.28
204.36	1384.29	206.51	1384.83	208.51	1384.83	234.91	1378.23	250	1377.93
265.09	1378.23	291.49	1384.83	307.49	1385.15	312.09	1384	314.15	1384.51
320.2	1384.63	322.48	1385.42	324.91	1384.81	327.75	1385.29	327.91	1385.31
334.91	1385.66	378.06	1386.53	414.11	1385.82	421.12	1385.47	422.63	1385.09
433.51	1385.22	446.51	1385.03	448.8	1385	449.44	1385	451.04	1384.97
465.65	1384.69	474.44	1384.36	479.58	1384.15	483.14	1384.08	486.89	1384
493.43	1383.87	496.38	1383.81	504.59	1383.82	510.61	1383.83	513.88	1383.78
525.7	1383.59	529.09	1383.53	530.08	1383.6	535.4	1384	539.53	1384.3
540.3	1384.36	540.49	1384.37	540.55	1384.39	540.69	1384.44	542.1	1385
544.29	1385.86	544.65	1386	544.98	1386.13	547.2	1387	549	1387.71
549.75	1388	550.08	1388.13	550.6	1388.33	552.3	1389	554.37	1389.81
554.85	1390	555.19	1390.14	557.4	1391	558.88	1391.58	559.61	1391.87
562.25	1391.98	562.57	1392	563.55	1392.05	568.41	1392.3	570.46	1392.4
570.54	1392.38	572.3	1392	574.98	1391.38	576.68	1391	580.37	1390.16
581.09	1390	585.42	1389.01	585.47	1389	585.81	1388.92	589.82	1388
592.18	1387.46	592.84	1387.31	594.51	1387.22	596.95	1387.1	598.92	1387
600.11	1386.96	600.96	1386.93	601.36	1386.91	601.39	1386.91	622.54	1387.06
636.28	1387.25								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	99.46	100	100.61	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	140.17	1385	F
377.97	636.28	1386.52	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12000

INPUT
Description: Channel Station 49899.16

Station Elevation Data num= 129

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.32	18.09	1384.57	20.23	1384.58	22.09	1384.59	23.67	1384.59
24.98	1384.6	113.27	1384.92	135.14	1385	138.2	1385	139.86	1385
141.22	1385	145.12	1385	148.58	1385	154.58	1385	156.35	1385
160.95	1385	167.33	1384.6	171.77	1384.34	172.11	1384.33	172.55	1384.3
172.99	1384.29	181.76	1384.11	194.13	1384.23	204.22	1384.32	204.8	1384.32
206.51	1384.75	208.51	1384.75	234.91	1378.15	250	1377.85	265.09	1378.15
291.49	1384.75	307.49	1385.07	312.09	1383.92	313.78	1384.32	326.42	1384.6
329.97	1385.64	331.73	1385.4	332.33	1385.55	332.42	1385.55	339.34	1385.9
342.08	1385.95	384.34	1386.8	420.41	1386.09	427.43	1385.74	430.19	1385.05
437.4	1385	437.61	1385	439.27	1384.98	439.52	1384.98	439.52	1384.99
439.52	1385	440.94	1385	442.54	1385	443.65	1385	445.15	1385
449.86	1385	450.41	1385	450.58	1385	450.85	1385	451.05	1385
457.94	1384.81	471.48	1384.42	475.23	1384.27	477.91	1384.15	479.18	1384.09
480.87	1384	481.41	1383.97	484.94	1383.79	497.25	1383.64	501.8	1383.58
504.29	1383.61	512.65	1383.68	529.37	1383.44	535.61	1383.35	537.06	1383.44
537.82	1383.49	538.51	1383.54	540.09	1383.63	540.72	1383.67	541.89	1383.74
545.3	1383.95	545.78	1383.97	545.78	1383.98	545.8	1384	545.96	1384.06
546.72	1384.34	547.04	1384.46	547.23	1384.53	548.51	1385	549.32	1385.3
550.02	1385.57	551.18	1386	551.62	1386.17	553.84	1387	555.44	1387.6
556.49	1388	558.3	1388.69	559.12	1389	561.38	1389.86	561.75	1390
563.55	1390.68	564.38	1391	565.64	1391.48	566.41	1391.78	566.46	1391.79
566.54	1391.8	572.06	1392	572.72	1392.02	577.53	1392.21	577.61	1392.19
578.46	1392	578.64	1391.96	583	1391	586.67	1390.19	587.51	1390
588.23	1389.84	591.99	1389	592.07	1388.98	593	1388.77	596.44	1388
596.52	1387.98	598.25	1387.59	600.93	1387.45	607.37	1387.1	607.72	1387.12
608.05	1387.19	625.81	1387.44	630.93	1387.45	642.9	1387.31		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	100.05	100	100.03	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	160.95	1385	F
384.19	642.9	1386.8	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11900

INPUT
Description: Channel Station 49999.16
Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.49	74.96	1384.76	139.69	1385	145.92	1385	146.19	1385.82
147.62	1385.85	149.23	1385	149.58	1385	150.39	1385	151.91	1385
159.72	1385	160.34	1385	161.71	1384.92	166.77	1384.98	167.59	1384.93
168.62	1385	171.48	1385	174.87	1385	175.77	1384.78	177.73	1384.25
184.67	1384.07	185.04	1384.07	186.26	1384.03	187.65	1384	187.75	1384
187.76	1384	188.72	1384	192.16	1384	192.67	1384	197.01	1386.17
202.51	1386.17	234.91	1378.07	250	1377.77	265.09	1378.07	291.49	1384.67
312.34	1385.08	316.94	1383.93	317.76	1384.14	318.4	1384.14	331.22	1384.69
334.02	1385.06	336.97	1385.72	337.22	1385.78	344.2	1386.11	345.08	1386.15
351.68	1386.28	362.96	1386.51	375.35	1386.76	390.6	1387.07	401.87	1386.84
426.67	1386.35	427.1	1386.33	433.12	1386.03	433.65	1386.01	433.69	1386
433.72	1386	439.06	1384.66	440.08	1384.95	441.54	1384.9	442.69	1384.86
443.21	1384.84	443.43	1384.83	443.45	1384.83	443.64	1384.82	443.96	1384.81
444.32	1384.8	444.53	1384.79	444.65	1384.79	444.72	1384.79	446.64	1384.73
454.83	1384.96	461.96	1384.8	463.46	1384.8	478.35	1384.2	478.37	1384.2
478.39	1384.2	478.4	1384.19	478.41	1384.19	478.43	1384.19	478.46	1384.19
484.34	1384	484.95	1383.99	486.23	1383.96	489.21	1383.77	491.67	1383.6
505.13	1383.6	508.7	1383.59	518.73	1383.67	520.95	1383.69	526.52	1383.62
545.07	1383.38	545.49	1383.4	546.07	1383.42	550.65	1383.57	552.79	1383.65
552.9	1383.69	553.4	1383.88	553.72	1384	556.05	1384.88	556.36	1385
557.23	1385.33	559	1386	559.51	1386.19	561.65	1387	563.25	1387.6
564.32	1388	566.4	1388.77	567.01	1389	568.48	1389.55	569.71	1390
570.48	1390.29	572.4	1391	572.85	1391.17	573.64	1391.46	578.2	1391.57
585.24	1391.75	588.48	1391.13	589.16	1391	593.03	1390.25	594.33	1390
596.65	1389.55	599.5	1389	603.24	1388.27	604.65	1388	605.23	1387.89
613.25	1387.26	614.36	1387.17	616.32	1387.05	616.5	1387.24	616.59	1387.23
624.14	1387.15	638.19	1387.38	642.33	1387.32				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	202.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
202.51	291.49	105.72	100	94.44	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	160.34	1385	F
390.45	642.33	1387.06	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11800

INPUT
Description: Channel Station 50099.16
Station Elevation Data num= 123

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.48	23.81	1384.56	134.79	1384.98	139.76	1385	139.93	1385
139.96	1385	139.97	1385	143.24	1385.63	145.87	1386	146.44	1386
148.6	1386	153.07	1386.25	157.64	1386.29	158.15	1386.3	161.83	1386.33
163.5	1386.34	166.53	1386.36	174.21	1386.05	174.37	1386.05	174.45	1386.05
174.63	1386	177.26	1385.27	178.23	1385	178.57	1384.94	180.49	1384.59
181.14	1384.55	189.96	1384.11	193.11	1384.14	197.01	1386.09	202.51	1386.09
234.91	1377.99	250	1377.69	265.09	1377.99	291.49	1384.59	315.89	1385.08
320.26	1383.98	320.59	1383.99	332.6	1386.97	333.61	1386.96	344.46	1386.8
344.62	1386.8	344.96	1386.8	345.04	1386.3	346.46	1386.38	392.07	1387.29
428.09	1386.56	435.09	1386.21	439.1	1385.21	441.7	1385	444.51	1384.76
446.97	1384.56	446.98	1384.92	446.98	1385	447.08	1385	447.42	1385
447.72	1385	448.39	1385.32	448.41	1385.31	450.06	1385.48	450.11	1385.47
450.43	1385.4	457.23	1385	464.53	1385	464.83	1385	464.98	1385
465.08	1384.99	466.36	1384.76	469.39	1384.62	470.47	1384.57	472.39	1384.42
477.57	1384.01	478.44	1384.01	478.96	1384	480.25	1384	485.77	1383.97
489.89	1383.81	491.78	1383.73	495.48	1383.71	508.83	1383.6	517.63	1383.73
523.35	1383.81	539.69	1383.48	546.73	1383.34	550	1383.36	550.19	1383.37
552.79	1383.37	554.3	1383.94	554.46	1384	555.68	1384.46	557.1	1385
558.9	1385.68	559.74	1386	561.22	1386.56	562.39	1387	563.15	1387.29
565.04	1388	566.49	1388.55	567.68	1389	569.87	1389.83	570.33	1390
570.72	1390.15	572.98	1391	573.17	1391.07	573.71	1391.28	578.66	1391.42
585.19	1391.61	586.43	1391.38	588.44	1391	590.64	1390.59	593.76	1390
598.86	1389.04	599.08	1389	599.64	1388.89	604.26	1388.03	604.48	1388.01
604.77	1388	614.76	1387.49	616.32	1387.41	616.87	1387.38	617.99	1387.32
618.26	1387.32	637.32	1387.06	646.38	1386.93				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	202.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
202.51	291.49	99.31	100	100.6	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	166.53	1386.36	F
391.98	646.38	1387.28	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11700

INPUT
Description: Channel Station 50199.16
Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.5	82.3	1384.81	133.2	1385	133.21	1385	133.24	1385
133.25	1385	133.26	1385	133.39	1385	133.4	1385	136.96	1385.63
139.43	1386	139.54	1386	140.09	1386	140.38	1386	148.79	1386
151.33	1386	152.59	1386	153.21	1386	156.38	1386	164.27	1386.76
165.42	1386.67	166.28	1386.71	167.76	1386.61	169.3	1386.69	170.54	1386.64
173.06	1386.79	173.55	1386.81	176.19	1386	176.65	1385.72	177.28	1385
177.52	1384.71	177.67	1384.49	178.66	1384.44	184.52	1384.19	201.75	1384.2
203.36	1384.2	203.73	1384.2	203.84	1384.17	204.16	1384.09	204.51	1384
205.27	1384.2	206.51	1384.51	208.51	1384.51	234.91	1377.91	250	1377.61
265.09	1377.91	291.49	1384.51	307.49	1384.83	310.53	1384.07	323.41	1387.29
324.41	1387.28	339.69	1387.05	339.92	1387.05	340	1386.55	341.42	1386.63
387	1387.54	423.01	1386.82	430.01	1386.47	439.73	1384.04	440.59	1384.44
441.62	1384.32	441.65	1384.95	441.65	1385	442.22	1385.51	442.37	1385.65
442.39	1385.67	442.69	1385.94	451.31	1385.53	460.94	1385.08	461.07	1385.04
461.18	1385	463.36	1384.25	464.08	1384	464.19	1383.96	464.37	1383.9
464.61	1383.89	467.35	1383.85	471.8	1383.71	476.28	1383.78	481.86	1383.86
487.25	1383.82	490.25	1383.79	503.26	1383.7	505.66	1383.68	506.55	1383.68
507.86	1383.67	540.41	1383.4	543.79	1383.44	547.19	1383.47	547.89	1383.73
548.62	1384	550	1384.51	551.09	1384.91	551.32	1385	552.3	1385.36
554.01	1386	554.79	1386.29	556.71	1387	557.89	1387.44	559.4	1388
561.69	1388.85	562.09	1389	562.84	1389.28	564.78	1390	565.96	1390.44
567.46	1391	568.85	1391.52	569.37	1391.72	577.18	1391.83	580.54	1391.89
583.31	1391.28	584.61	1391	587.76	1390.31	589.17	1390	590.03	1389.81
593.74	1389	596.51	1388.39	597.63	1388.15	599.04	1388.03	599.42	1388
611.02	1387.03	611.4	1387	611.41	1387	611.46	1387	611.6	1387
611.69	1387	611.79	1386.95	612.19	1386.82	612.88	1386.65	613.47	1386.71
613.75	1386.76	643.22	1386.34	655.3	1386.39				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	95.66	100	104.2	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

0	173.06	1386.79	F
387.07	655.3	1387.54	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11600

INPUT
Description: Channel Station 50299.16
Station Elevation Data num= 123

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.49	43.37	1384.66	92	1384.84	136.3	1385	136.38	1385
136.41	1385	137.67	1385	137.69	1385	137.74	1385	137.82	1385
138.02	1385	140.54	1385	140.78	1385	141.28	1385	142.09	1385
159.18	1385	167.17	1385	170.81	1385.26	174.6	1385	177.87	1385
180.09	1384.68	180.69	1384.59	181.89	1384.55	190	1384.3	197.44	1384.56
201.43	1384.7	204.08	1384.04	204.23	1384	205.02	1384	206.73	1384.87
234.91	1377.83	250	1377.53	265.09	1377.83	291.49	1384.43	307.49	1384.75
314.21	1383.07	331.8	1387.47	332.72	1387.46	332.8	1387.46	342.45	1387.32
342.92	1387.32	342.95	1387.32	343.03	1386.82	344.45	1386.9	390.1	1387.82
426.15	1387.1	433.16	1386.75	444.01	1384.05	444.33	1384.05	449.65	1384.01
450.77	1384	452.32	1384	460.23	1384	463.86	1383.9	466.07	1383.83
466.6	1383.83	466.92	1383.81	467.6	1383.84	471.68	1384	472	1384.01
474.63	1384.12	476.92	1384.21	484.66	1384.13	487.23	1384.09	489.51	1384.06
493.42	1384	515.03	1383.72	516.48	1383.7	516.82	1383.69	517.19	1383.69
517.62	1383.68	518	1383.69	518.53	1383.68	544.19	1383.62	546.88	1383.67
549.87	1383.71	550.03	1383.77	550.59	1383.98	550.64	1384	550.84	1384.08
553.28	1385	554.84	1385.59	555.93	1386	556.51	1386.22	558.58	1387
560.9	1387.87	561.23	1388	561.67	1388.16	563.89	1389	566.2	1389.87
566.56	1390	569.07	1390.94	569.24	1391	569.34	1391.04	571.84	1391.97
571.94	1391.97	574	1392	577.52	1392.05	583.48	1392.14	584	1392.03
584.11	1392	588.13	1391.11	588.63	1391	589.66	1390.77	593.12	1390
595.19	1389.54	597.59	1389	601.57	1388.11	602.04	1388	602.31	1387.94
604.27	1387.5	608.89	1387.1	610.09	1387	611.29	1386.9	617.92	1386.44
618.1	1386.35	618.16	1386.31	618.49	1386.24	630.92	1386.29	642.59	1386.13
650.23	1386.13	661.75	1386.17	663.51	1386.18				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.73	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.73	291.49	100.01	100	100.01	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	170.81	1385.26	F
389.97	663.51	1387.81	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11500

INPUT
Description: Channel Station 50399.16
Station Elevation Data num= 116

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.48	1.89	1384.49	49.53	1384.67	98.72	1384.84	104.41	1384.86
140.11	1384.56	141.64	1385	141.7	1385	141.84	1385	142.08	1385
144.84	1385	146.87	1385	153.07	1385	167	1385	168.58	1385
177.99	1384.92	181.73	1384.97	187.89	1384.81	192.09	1384.58	195.36	1384.41
199.1	1384.55	201.34	1384.64	202.74	1384.29	203.91	1384	206.23	1384
206.51	1384.85	234.91	1377.75	250	1377.45	265.09	1377.75	291.49	1384.35
307.56	1384.67	313.36	1383.22	331.77	1387.8	331.87	1387.8	332.77	1387.79
333.24	1387.78	347.75	1387.57	348.25	1387.57	348.33	1387.07	349.75	1387.15
395.4	1388.07	431.45	1387.35	438.46	1387	446.5	1385	446.57	1384.94
447.5	1384.69	447.92	1384.59	448.14	1384.53	449.68	1384.13	453.96	1384.7
462.54	1384.9	469.8	1384.85	471.22	1384.59	473.04	1384.22	477.39	1384.19
483.59	1384.13	489.72	1384.06	493.45	1384	494.25	1383.98	494.82	1383.96
495.09	1383.95	502.83	1383.93	522.08	1383.85	544.83	1383.84	550.02	1383.83
550.53	1383.83	553.65	1383.99	553.91	1384	554.42	1384.03	556.74	1384.18
557.99	1384.65	558.9	1385	560.48	1385.6	561.52	1386	563.94	1386.92
564.13	1387	564.67	1387.2	566.75	1388	567.24	1388.18	569.38	1389
570.67	1389.49	572	1390	574.48	1390.94	574.63	1391	574.76	1391.05
574.88	1391.09	576.19	1391.59	577.27	1392	577.42	1392.06	587.64	1392.14
588.78	1392.15	589.15	1392.15	589.16	1392.15	589.87	1392	590.11	1391.95
594.61	1391	597.2	1390.43	599.15	1390	603.49	1389.05	603.72	1389
603.89	1388.96	608.35	1388	610.79	1387.47	612.97	1387	615.05	1386.54
615.95	1386.35	618.71	1386.22	623.72	1386	624.03	1385.98	624.92	1385.93
625.04	1385.97	625.2	1386.01	627.46	1386.01	639.4	1386.06	656.1	1386.1
670.85	1386.16								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	291.49	103.72	100	96.19	.1	.3

```
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
       0  168.58    1385        F
  291.34  670.85 1384.31        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 11400

INPUT
Description: Channel Station 50499.16
Station Elevation Data    num=      66
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1384.47   47.66 1384.65   53.38 1384.67  141.54 1383.95  143.17 1384.42
  143.22 1384.44  144.22    1385  144.95    1385   145.8 1385.53   145.9 1385.54
  146.19    1385   148.3    1385  150.58    1385  155.04    1385  163.15    1385
  165.85    1385  182.05    1385  182.79    1385  187.34 1385.04  191.71 1385.07
  192.36 1385.05  193.59    1385  197.47 1384.84  200.34 1384.73  200.44 1384.73
  200.66 1384.74  201.86 1384.44  203.63    1384  205.62 1384.99  234.91 1377.67
     250 1377.37  265.09 1377.67  271.71 1379.32  285.77 1380.27  301.93 1384.48
  317.93  1384.8  322.53 1383.65  327.33 1384.85  339.62 1387.93   340.1 1387.92
  340.62 1387.91  350.96 1387.76  351.19 1387.76  351.46 1387.76  351.54 1387.26
  352.96 1387.34  398.55 1388.25  434.55 1387.53  441.55 1387.18  449.13 1385.29
  450.13    1385  451.06 1384.74  452.98 1384.21   453.4 1384.37  458.94    1385
  459.52    1385   461.4    1385   467.3    1385  470.17    1385  471.43    1385
  472.35 1384.98  474.64 1384.81  483.46 1384.33  486.98 1384.13   487.8 1384.13
     500 1384.07

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  205.62    .032  234.91    .028  265.09    .032  301.93    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        205.62  301.93           105.19     100    94.8              .1       .3
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
       0  191.71 1385.07        F
  398.53     500 1388.25        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 11300

INPUT
Description: Channel Station 50599.16
Station Elevation Data    num=      75
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1384.33  133.08 1383.32  133.64 1383.48  133.66 1383.49  136.17 1384.88
  136.26    1385   137.1    1385  138.54    1385  146.25    1385  156.58    1385
   164.1    1385   166.2 1385.06  166.52 1385.07  168.38 1385.01  180.63 1385.08
  182.83 1385.09  184.15  1385.1  184.47 1385.09  185.39 1385.07   188.4    1385
  191.36 1384.92  191.47 1384.92  191.57 1384.92  194.63    1385  196.33 1385.04
  197.52 1385.07  198.92 1385.11  199.12 1385.06  199.34    1385  201.62 1384.43
  203.34    1384  204.25 1385.25  234.91 1377.59     250 1377.29  265.09 1377.59
  291.49 1384.19  307.49 1384.51  308.61 1384.79  317.88 1384.72  318.36 1384.83
  331.15    1388  332.01 1387.99   345.4 1387.79  345.53 1387.79  345.91 1387.79
  345.99 1387.29  347.41 1387.37  393.24 1388.28  429.44 1387.57  436.47 1387.22
  443.58 1385.45  444.53 1385.16  444.94 1385.05  445.12    1385  445.24 1384.97
  446.37 1384.71   448.2 1384.28  448.22 1384.88  448.22    1385  449.97 1385.01
  460.47 1385.07  462.38 1385.08  463.65 1385.08  469.88 1385.11   470.3 1385.08
  471.27    1385  471.92 1384.95  483.04    1384  497.61 1384.12  497.84 1384.12
     498 1384.12  498.29 1384.12  498.97 1384.13   499.9 1384.13     500 1384.13

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  204.25    .032  234.91    .028  265.09    .032  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        204.25  291.49            95.44     100  104.32              .1       .3
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
       0  198.92 1385.11        F
   393.4     500 1388.29        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 11200

INPUT
Description: Channel Station 50699.16
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1383.81  107.76 1382.95   123.9    1383  124.01    1383  124.08 1383.94
  124.38 1383.95  126.32    1384  127.34  1384.4  129.21 1384.46  129.55 1384.45
```

133.39	1385	137.31	1385	142.96	1385	176.99	1384.57	178.74	1384.56
179.76	1384.56	180.6	1384.53	183.13	1384.41	189.17	1384.12	196.63	1384.43
200.54	1384.59	202.13	1384.19	202.9	1384	206.2	1384.69	234.91	1377.51
250	1377.21	265.09	1377.51	291.49	1384.11	307.49	1384.43	308.59	1384.7
310	1384.64	314.39	1384.67	326.95	1387.81	327.95	1387.79	339.62	1387.62
339.87	1387.62	340.12	1387.62	340.21	1387.12	341.62	1387.2	387.21	1388.11
423.21	1387.39	430.21	1387.04	436.39	1385.5	438.7	1385	441.72	1384.43
442	1384.38	442	1384.51	442.02	1385	449.37	1385	454.89	1385
456.86	1385	458.2	1385	465.35	1385	468.62	1384.74	475.76	1384.04
481.17	1384.01	482.53	1384.01	488.88	1384.02	492.3	1384.03	500	1384.07

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.2	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.2	291.49	96.62	100	103.41	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	142.96	1385	F
387.827	500	1388.12	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11100

INPUT
Description: Channel Station 50799.16
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.32	61.61	1382.81	118.8	1383	118.89	1383	118.95	1383.78
119.19	1383.79	127.62	1384	129.32	1384.66	129.33	1384.66	132.44	1385
134.01	1385	134.13	1385	135.62	1385.2	141.18	1386	149.69	1386
161	1386	162.27	1386	163.24	1386	170.91	1385.47	177.31	1385
177.99	1385	180.45	1384.8	182.32	1384.56	185.13	1384.45	192.96	1384.18
199.79	1384.43	200.8	1384.46	201.12	1384.38	202.63	1384	206	1384.66
234.91	1377.43	250	1377.13	265.09	1377.43	291.49	1384.03	307.49	1384.35
309.17	1384.77	313.48	1384.56	317.47	1384.61	329.07	1387.5	330.08	1387.48
342.48	1387.3	342.86	1387.3	342.98	1387.3	343.06	1386.8	344.48	1386.88
390.09	1387.79	426.11	1387.06	433	1386.72	433.11	1386.71	438.58	1385.35
442.12	1385	443.86	1384.67	444.49	1384.56	444.9	1384.48	444.91	1384.58
444.92	1385	454.13	1385	455.86	1385	456.74	1385	457.2	1385
458.84	1385	461.46	1384.85	475.69	1384.04	482.23	1384.02	486.94	1384
494.52	1383.97	497.08	1383.96	498.92	1383.96	500	1383.96		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206	291.49	100.08	100	100.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	163.24	1386	F
390	500	1387.79	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11000

INPUT
Description: Channel Station 50899.16
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.76	12.16	1382.66	113.95	1383	114.02	1383	114.06	1383.6
114.25	1383.61	129.63	1384	129.64	1384	129.74	1384	129.76	1384
129.86	1384.02	131.16	1384.19	137.28	1385	143.65	1385.84	144.83	1386
149.11	1386.57	152.37	1387	152.77	1387	153.26	1387	155.08	1387
156.92	1387	157.93	1387	161.01	1387	162.25	1387	166.56	1387
168.05	1387	171.04	1387	171.91	1387	173.08	1387	173.27	1387
173.8	1387	173.84	1387	173.93	1386.98	175.33	1386.68	175.91	1386.55
178.47	1386	180.29	1385.61	183.12	1385	183.46	1384.95	184.1	1384.87
190.73	1384.85	194.08	1384.8	194.7	1384.83	198.84	1384.87	200.86	1384.36
202.31	1384	204.14	1385.04	234.91	1377.35	250	1377.05	265.09	1377.35
291.49	1383.95	307.49	1384.27	308.6	1384.54	311.9	1384.82	324.41	1384.69
334.27	1387.16	345.93	1386.98	346.32	1386.98	346.43	1386.98	346.51	1386.48
347.93	1386.56	393.54	1387.47	429.56	1386.74	436.42	1386.4	436.57	1386.39
436.68	1386.37	441.84	1385.08	443.5	1385.04	443.73	1385	444	1384.98
448.49	1384.57	448.5	1384.64	448.51	1385	455.58	1385	460.72	1385
461.38	1385	463.49	1385	464.09	1384.98	471.24	1384.76	476.25	1384.26
478.35	1384.03	478.66	1384	479.01	1383.96	479.1	1383.96	485.64	1383.91
494.3	1383.83	500	1383.8						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	204.14	.032	234.91	.028	265.09	.032	291.49	.025

```
Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        204.14  291.49            104.31     100   94.91              .1       .3
Ineffective Flow      num=        2
   Sta L   Sta R    Elev  Permanent
       0  173.84    1387        F
  393.46     500 1387.48        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10900

INPUT
Description: Channel Station 50999.16
Station Elevation Data    num=      81
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.65   104.5    1383  104.55    1383  104.58 1383.41  104.71 1383.41
  115.21 1383.68  115.43 1383.68  115.77 1383.69  132.34 1384.97  132.82    1385
  132.91    1385  133.08    1385   137.6  1385.5  140.72  1385.7  144.31 1385.88
  145.38  1385.9  151.51    1386  151.55    1386  151.92    1386     161 1385.98
  167.99 1385.96  168.39 1385.96  173.26 1385.93  173.68 1385.94  176.52 1385.91
  177.42 1385.89  179.91 1385.77  183.94 1385.21  186.08 1385.17  187.88 1385.13
  191.87 1385.04   192.5 1385.03  192.81 1385.02  193.07 1385.03  196.83  1385.2
  197.19 1385.22  197.28 1385.19  198.06    1385  199.38 1384.67  202.02 1385.49
  234.91 1377.27     250 1376.97  265.09 1377.27  291.49 1383.87  307.49 1384.19
  312.09 1383.04  315.89 1383.99  317.12 1384.07  320.37 1384.08  331.58  1386.9
  332.57 1386.88  345.67 1386.69  345.72 1386.69  346.17 1386.69  346.26 1386.19
  347.68 1386.27  393.32 1387.19  429.38 1386.48  436.39 1386.13  442.54 1384.59
  447.43  1384.7  448.54 1384.64  448.55  1384.8  448.55    1385  449.16    1385
  459.54    1385  460.26    1385  460.47    1385  460.73    1385   462.9 1384.85
  464.75 1384.73  465.43 1384.68  465.47 1384.68  471.67 1384.24  473.21 1384.14
  474.82 1384.03  475.33    1384  475.75 1383.97  478.95 1383.76  487.38  1383.7
     500 1383.62

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  202.02    .032  234.91    .028  265.09    .032  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        202.02  291.49            102.12     100    97.9              .1       .3
Ineffective Flow      num=        2
   Sta L   Sta R    Elev  Permanent
       0  151.92    1386        F
  393.37     500 1387.19        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10800

INPUT
Description: Channel Station 51099.16
Station Elevation Data    num=      84
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.71   86.86    1383   86.89    1383    86.9 1383.22   86.97 1383.22
    92.7 1383.37   92.82 1383.37   93.01 1383.38  102.08 1384.07  108.82 1384.46
  120.69    1385  121.44    1385  126.09 1385.57  128.67    1386  136.85 1386.57
  139.78 1386.68  142.41  1386.7  143.88 1386.71  145.88 1386.69  149.87 1386.64
  152.35 1386.62  155.11  1386.6  158.85 1386.56  161.82 1386.53  170.88 1386.07
  171.19 1386.07  171.63    1386  172.06 1385.91  175.74 1385.15  179.43 1385.04
  181.67    1385  181.77    1385  182.06 1385.02  185.64  1385.2  186.37 1385.22
  196.16  1385.4   196.6 1385.28  197.74    1385  199.64 1384.53  201.74    1384
  201.84 1385.45  234.91 1377.19     250 1376.89  265.09 1377.19  291.49 1383.79
  307.49 1384.11  311.93    1383  326.21 1386.53  326.25 1386.53  327.22 1386.52
  327.38 1386.52  336.99 1386.38   337.1 1386.37  337.59 1386.37  337.67 1385.87
  339.04 1385.95  339.09 1385.96  384.79 1386.88  420.88 1386.17   427.9 1385.82
  435.26 1383.99  435.66    1384  435.72    1384  435.96 1384.04  436.03 1384.05
   436.2 1384.07  436.84 1384.17  440.59 1384.73  440.59 1384.89   440.6    1385
  440.65 1385.19  440.77  1385.6  442.39 1385.48  443.34 1385.41  448.79    1385
  448.89 1384.99  459.83    1384  460.93  1383.9  463.98 1383.62  466.52  1383.5
  471.08 1383.32  487.06 1383.38  497.37 1383.41     500 1383.42

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  201.84    .032  234.91    .028  265.09    .032  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        201.84  291.49             95.49     100   104.3              .3       .5
Ineffective Flow      num=        2
   Sta L   Sta R    Elev  Permanent
       0  143.88 1386.71        F
  292.39     500    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10700
```

INPUT
Description: Channel Station 51199.16
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.74	76.95	1383	76.96	1383	76.96	1383.07	76.98	1383.07
78.65	1383.11	78.68	1383.11	78.74	1383.11	81.35	1383.31	83.28	1383.42
87.78	1383.63	95.73	1384.11	95.8	1384.11	100	1384.37	104.79	1384.48
113.44	1384.56	119.97	1385	121.16	1385	133.27	1385.71	136.63	1385.57
140.11	1385.53	154.56	1385	155.31	1385	155.48	1385	156.28	1385
173.28	1384.46	175.69	1384.46	183	1384.5	193.17	1384.74	197.3	1384.82
197.84	1384.83	197.9	1384.83	197.95	1384.85	198.12	1384.81	204.31	1384.76
234.91	1377.11	250	1376.81	265.09	1377.11	291.49	1383.71	307.49	1384.03
308.93	1383.67	319.29	1386.26	320.29	1386.24	334.13	1386.04	334.42	1386.04
334.63	1386.04	334.71	1385.54	336.13	1385.62	381.71	1386.53	417.71	1385.81
424.71	1385.46	432.25	1383.58	434.3	1384	436	1384.5	436.63	1384.68
437.12	1384.83	437.13	1384.58	437.15	1384	440.71	1383.88	444.5	1383.74
447.02	1383.66	449.75	1383.56	451.51	1383.5	452.33	1383.47	459.57	1383.24
461.62	1383.2	466.68	1383.16	487.24	1383.28	493.43	1383.32	500	1383.35

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	204.31	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
204.31	291.49	49.1	49.1	49.1	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	197.95	1384.85	F
291.34	500	1383.67	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10650.9

INPUT
Description: Begin Channel Bottom Transition (Begin Flow Constriction)
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
206.72	1384.12	234.91	1377.07	250	1376.77	265.09	1377.07	291.49	1383.67
307.49	1383.99	311.67	1382.94	316.02	1384.03	318.08	1384.06	325.83	1386
333.77	1385.88	334.27	1385.88	334.35	1385.38	335.77	1385.46	381.35	1386.38
417.35	1385.66	424.35	1385.31	426.94	1384.66				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
206.72	.04	234.91	.028	265.09	.04	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.72	291.49	27.9	27.9	27.9	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10623.7

INPUT
Description: Full Riprap Section
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
206.86	1384.06	215.2	1378.58	234.96	1377.05	250	1376.75	265.09	1377.05
282.86	1378.42	291.49	1383.65	307.66	1383.97	311.88	1383.77	316.28	1384.11
318.36	1384.15	320.82	1384.34	326.19	1385.68	327.31	1385.88	333.35	1385.79
333.85	1385.79	333.93	1385.42	334.22	1385.43	334.72	1385.45	334.8	1385.33
335.35	1385.36	336.24	1385.39	380.77	1386.28	382.3	1386.27	416.64	1385.58
418.68	1385.49	423.62	1385.25	425.76	1384.82	428.37	1384.17		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
206.86	.04	291.49	.025	428.37	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.86	291.49	10	10	10	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
206.86	211	1384	F
289	428.37	1384	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10613.7

INPUT
Description: Upstream End of Wingwall

```
Station Elevation Data     num=       15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  206.91 1384.04  215.24 1377.43     250 1376.74  282.86 1377.39  291.49 1383.64
  320.92 1384.23  327.43 1385.85   333.5 1385.76     334 1385.76  334.08 1385.26
   335.5 1385.35  381.08 1386.26  417.08 1385.54  424.08 1385.19  428.85    1384

Manning's n Values         num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  206.91          206.91    .015  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.91  291.49             12.83   12.83   12.83             .1       .3
Ineffective Flow      num=        2
   Sta L   Sta R    Elev  Permanent
  206.91     216    1384        F
     284  428.85    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10600.87

INPUT
Description: Upstream Face of C7
Station Elevation Data     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
  222.25    1385  222.25 1376.73  277.75 1376.73  277.75    1385

Manning's n Values         num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  222.25          222.25    .015  277.75

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        222.25  277.75                61      61      61             .1       .3

CULVERT


RIVER: River
REACH: Ellsworth          RS: 10570

INPUT
Description:
Distance from Upstream XS =        8
Deck/Roadway Width        =       45
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*********************************************
       0  1387.5             500  1387.4

Upstream Bridge Cross Section Data
Station Elevation Data     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
  222.25    1385  222.25 1376.73  277.75 1376.73  277.75    1385

Manning's n Values         num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  222.25          222.25    .015  277.75

Bank Sta: Left   Right    Coeff Contr.   Expan.
        222.25  277.75             .1       .3

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*********************************************
       0  1387.5             500  1387.4

Downstream Bridge Cross Section Data
Station Elevation Data     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
  222.25    1385  222.25 1376.68  277.75 1376.68  277.75    1385

Manning's n Values         num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  222.25          222.25    .015  277.75

Bank Sta: Left   Right    Coeff Contr.   Expan.
        222.25  277.75             .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         =
```

```
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 #7          Box       7      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 0      61     .015     .015        1                  .4                 1
Number of Barrels =  5
Upstream   Elevation =  1376.73
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
  228.16  239.08     250  260.92  271.84
Downstream Elevation =  1376.68
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
  228.16  239.08     250  260.92  271.84

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10539.74

INPUT
Description: Downstream Face of C7
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
  222.25    1385  222.25 1376.68  277.75 1376.68  277.75    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  222.25          222.25    .015  277.75

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        222.25  277.75             11.24   11.24   11.24              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10528.5

INPUT
Description: Downstream End of Wingwall (Full Riprap Width)
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
  204.65 1384.03   204.8 1384.07  206.51 1384.07  217.14 1377.33     250 1376.67
  284.76 1377.36  293.49 1384.07  318.76 1384.58  320.77 1384.07  326.81 1385.58
  332.88 1385.49  333.38 1385.49  333.46 1384.99  334.88 1385.07  380.46 1385.99
  416.46 1385.27  423.46 1384.92   427.2 1383.98

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*******************************
  204.65     .04  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49               10      10      10              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  204.65     217    1384        F
     283   427.2    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10518.5

INPUT
Description: End Riprap Apron
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
  204.61 1384.03  204.75 1384.06  204.77 1384.06  206.51 1384.06  217.14 1378.34
  234.91 1376.96     250 1376.66  265.09 1376.96  284.76 1378.48  293.49 1384.06
   309.6 1384.39  314.24 1384.17  315.25 1384.25  316.44 1384.27   318.7 1384.44
  320.71 1384.18  324.72 1385.18  326.73 1385.55  332.79 1385.46  332.88 1385.46
  333.29 1385.46  333.37 1385.08  333.38 1385.09  333.47 1384.96  334.78 1385.04
  334.89 1385.04  380.26 1385.96   380.8 1385.95  416.17 1385.24  417.06 1385.21
  423.16  1384.9  424.11 1384.71  426.89 1384.01

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
  204.61     .04  217.14    .028  284.76     .04  293.49    .025  426.89    .032
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49            28.35   28.35   28.35             .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
  204.61     212    1384        F
     288  426.89    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10490.7

INPUT
Description: End Channel Bottom Transition (Fully Expanded Flow)
Station Elevation Data    num=       20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  204.51 1384.01  204.65 1384.04  206.51 1384.04  234.91 1376.94     250 1376.64
  265.09 1376.94  293.49 1384.04  309.49 1384.36  314.09 1383.21   315.1 1383.46
  316.28 1383.48   324.5 1385.49   332.6 1385.37   333.1 1385.37  333.19 1384.87
   334.6 1384.95  380.19 1385.87  416.19 1385.15  423.19  1384.8  425.95 1384.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
  204.51    .032  234.91    .028  265.09    .032  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49             90.7    90.7    90.7             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10400

INPUT
Description: Channel Station 51499.16
Station Elevation Data    num=       93
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.79   71.98 1383.33   73.15 1383.36   73.19 1383.36   73.22    1383
   73.23    1383   83.24    1383   91.46 1383.21   91.96 1383.22   94.57 1383.29
   98.08 1383.42   108.1 1384.29  109.05 1384.34  109.93  1384.4  110.73 1384.44
  111.41 1384.48  112.16 1384.52     113 1384.57  113.92 1384.62  114.67 1384.66
  115.23 1384.69  115.57 1384.71  118.87 1384.71  119.47 1384.78  120.88 1384.93
  121.48    1385  128.62 1385.82  131.35    1386   133.9 1386.17  138.29  1386.3
  138.57 1386.31  138.98 1386.31  139.23 1386.31  144.33 1386.35   145.2 1386.32
  151.21    1386   152.2    1386  152.78    1386  154.04    1386  160.54 1385.41
  162.17  1385.4  163.66 1385.19  164.32 1385.17  165.86 1385.16   167.4 1385.11
  167.72 1385.09  168.91    1385  169.17 1384.98  171.37  1384.1  171.42  1384.1
  173.12    1384  177.46 1383.73  177.48 1383.72  177.51 1383.72  190.55 1383.68
  196.24 1383.37  198.77 1383.24  199.33 1383.25  199.44 1383.25  200.88 1383.06
  204.51 1383.97  206.51 1383.97  234.91 1376.87     250 1376.57  265.09 1376.87
  293.49 1383.97  309.49 1384.29  310.48 1384.04  315.63 1385.33  316.64 1385.31
  332.23 1385.08  332.44 1385.08  332.52 1384.58  333.94 1384.67  379.53 1385.58
  415.53 1384.86  422.53 1384.51  424.39 1384.04  434.39    1385  434.75 1385.03
  435.34 1385.09   436.7 1385.03  437.74    1385  443.95 1384.74  453.85 1384.32
  456.78 1384.02     457    1384  457.24 1383.98   463.4 1383.37  474.21 1383.38
  486.25 1383.36  499.83 1383.58     500 1383.58

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  206.51    .032  234.91    .028  265.09    .032  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49            99.61     100  100.39             .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0  205.38 1384.25        F
  294.62     500 1384.25        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10300

INPUT
Description: Channel Station 51599.16
Station Elevation Data    num=       83
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1383.09    69.7 1383.61   71.84 1383.67   71.92 1383.67   71.98    1383
   71.99    1383   80.14    1383  102.88 1383.57  104.26 1383.61  111.47 1383.79
  116.91    1384  117.29    1384  117.93    1384  121.53    1384  131.79    1384
  136.34    1384   139.3    1384  148.58 1384.92  149.42    1385  149.75 1385.03
  149.91 1385.04     150 1385.04   156.2 1385.35  161.14    1385  162.36    1385
  168.56 1384.37  170.84 1384.14  172.23 1384.12  178.99 1383.96  179.38    1384
  180.08    1384  182.88    1384  184.91 1383.99  191.58 1383.95   200.3 1383.59
  201.01 1383.56  201.36 1383.64  202.77 1383.45  204.51 1383.89  206.51 1383.89
  234.91 1376.79     250 1376.49  265.09 1376.79  293.49 1383.89  309.49 1384.21
```

313.64	1383.17	314.83	1383.47	320.66	1384.92	321.66	1384.91	331.48	1384.76
331.74	1384.76	331.98	1384.76	332.06	1384.26	333.48	1384.34	379.06	1385.26
415.06	1384.53	422.06	1384.18	425.06	1383.68	429.72	1384.85	430.53	1384.7
432.27	1385	432.59	1385.02	435.03	1385.18	444.76	1385.08	448.85	1385.05
451.89	1385.03	451.95	1385.01	451.98	1385	453.42	1384.54	454.35	1384.24
456.83	1384.02	457.1	1384	457.31	1383.98	462.96	1383.48	471.84	1383.41
481.95	1383.36	493.77	1383.6	496.21	1383.66	496.46	1383.77	497.03	1384
498.63	1384.66	499.46	1385	500	1385.22				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	99.63	100	100.39	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.38	1384.17	F
294.62	500	1384.17	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10200

INPUT
Description: Channel Station 51699.16
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.37	68.27	1383.89	71.38	1383.97	71.49	1383.97	71.58	1383
71.59	1383	77.88	1383	115.15	1383.94	117.23	1384	118.1	1384.12
121.13	1384.35	127.54	1384.82	129.56	1384.84	136.77	1384.92	139.1	1384.87
151.1	1384.57	163.16	1384.13	164.66	1384.08	165.94	1384	166.05	1383.99
171.82	1383.93	177.72	1383.74	179.8	1383.67	182.43	1383.71	190.2	1383.83
192.94	1383.81	199.54	1383.79	200.29	1383.71	201.2	1383.62	202.07	1383.8
203.05	1383.44	204.51	1383.81	206.51	1383.81	234.91	1376.71	250	1376.41
265.09	1376.71	293.49	1383.81	309.49	1384.13	311.93	1383.52	316.54	1384.67
317.54	1384.66	331.94	1384.44	332.19	1384.44	332.44	1384.44	332.52	1383.94
333.94	1384.03	379.52	1384.94	415.52	1384.22	422.52	1383.87	422.58	1383.85
424.17	1383.59	426.99	1384.29	427.45	1384.27	433.12	1385	435.36	1385.25
435.58	1385.27	436.17	1385.26	437.25	1385.23	446.88	1385	449.7	1384.93
452.68	1384.86	454.68	1384.3	454.96	1384.22	457	1384.02	457.22	1384
457.71	1383.95	460.11	1383.74	463.67	1383.42	467.85	1383.38	481.44	1383.3
497.85	1383.58	497.94	1383.59	497.97	1383.6	498.05	1383.63	498.93	1384
499.69	1384.32	500	1384.45						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	103.09	100	96.83	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.38	1384.09	F
294.62	500	1384.09	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10100

INPUT
Description: Channel Station 51799.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.73	62.65	1384.19	66.84	1384.3	66.99	1384.3	67.11	1383
67.13	1383	71.38	1383	99.91	1383.72	102.23	1383.76	105.06	1383.81
108.52	1383.87	108.53	1383.87	114.89	1384	115.02	1384	116.23	1384
116.4	1384	118.96	1384	121.09	1384	124.92	1384	141.3	1384
144.15	1384	146.07	1384	149.94	1384	150.76	1384	153.91	1384
156.52	1384.01	157.22	1384.01	164.1	1384.03	166.92	1384.04	167.85	1384.05
170.17	1384	170.21	1384	170.37	1384	177.49	1383.83	180.28	1383.77
187.56	1383.72	192.57	1383.76	196.67	1383.68	198.33	1383.61	200.87	1383.49
202.2	1383.79	202.62	1383.26	204.51	1383.73	206.51	1383.73	234.91	1376.63
250	1376.33	265.09	1376.63	293.49	1383.73	309.49	1384.05	312.44	1383.31
316.47	1384.32	317.46	1384.31	328.43	1384.14	328.64	1384.14	329.14	1384.14
329.23	1383.64	330.61	1383.72	330.65	1383.73	376.33	1384.65	412.41	1383.93
419.43	1383.59	419.68	1383.52	423.75	1384	427.08	1384.51	430.22	1385
431.58	1385.22	432.47	1385.35	434.99	1385.25	439.11	1385	441.06	1385
444.57	1384.92	449.99	1384.81	451.46	1384.48	452.61	1384.24	454.24	1384.07
454.82	1384	459.14	1383.57	460.3	1383.45	461.6	1383.45	476.45	1383.43
479.58	1383.51	481.69	1383.57	492.73	1383.86	494.32	1383.9	494.34	1383.91
494.5	1383.98	494.55	1384	494.69	1384.06	496.14	1384.65	496.98	1385
498.32	1385.55	499.43	1386	500	1386.23				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

```
       0    .025  206.51    .032  234.91    .028  265.09    .032  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49             94.34     100   105.4              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0  205.26    1384        F
  294.43     500    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10000

INPUT
Description: Channel Station 51899.16
Station Elevation Data    num=      88
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1383.97   60.43 1384.43   65.43 1384.56   65.62 1384.56   65.76    1383
   65.78    1383   68.43    1383   86.04 1383.44   87.45 1383.47   89.17  1383.5
   91.28 1383.54   91.29 1383.54   96.74 1383.65   97.12 1383.66   98.44 1383.68
  101.22 1384.46  102.25  1384.5  104.85  1384.6  109.71 1384.79  115.05    1385
  147.49 1385.75  161.62 1385.78  164.92 1385.65  165.33 1385.63  171.42 1385.34
  173.09 1385.25  173.79 1385.22  174.25  1385.2  178.98    1385  180.52 1384.93
  183.17  1384.8  188.07 1384.91  191.95 1384.99  192.27    1385  195.02 1384.89
  195.65 1384.86  196.42 1384.65  198.65    1384  199.18 1383.95  204.38 1383.45
  204.39 1383.62  204.51 1383.65  206.51 1383.65  234.91 1376.55     250 1376.25
  265.09 1376.55  293.49 1383.65  309.49 1383.97  312.69 1383.17  316.12 1384.02
  316.22 1384.05  317.22 1384.03  328.01 1383.87  328.11 1383.87  328.51 1383.87
  328.59 1383.37  330.01 1383.45  375.66 1384.36  411.72 1383.64  418.73 1383.29
  421.73 1382.79  426.31 1383.93   426.4    1384  427.73 1384.35  430.23    1385
  431.53 1385.34  432.09 1385.48  433.62 1385.06   433.8    1385  433.92    1385
  448.43 1384.11  448.82 1384.09  449.28 1384.06  450.14    1384  456.05 1383.61
  456.38 1383.59  456.62 1383.58  457.07 1383.58  475.95 1383.61  490.75 1383.63
   495.4 1383.67  495.97 1383.68  496.19 1383.68  496.21 1383.68  496.37 1383.68
   496.7 1383.68  497.23 1383.69     500 1383.69

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  206.51    .032  234.91    .028  265.09    .032  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49             97.24     100  102.97              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0  161.62 1385.78        F
  319.78     500    1385        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9900

INPUT
Description: Channel Station 51999.16
Station Elevation Data    num=      95
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1384.18   65.94 1384.69   71.87 1384.84   72.09 1384.85   72.25    1383
   72.28    1383   73.19    1383   79.19 1383.15   79.67 1383.16   80.25 1383.17
   80.96 1383.18   80.99 1383.18   82.83 1383.22   82.95 1383.22    83.4 1383.23
   84.33 1383.49   84.68 1383.51   85.55 1383.54   87.17  1383.6   94.47 1383.89
    94.5 1383.89  109.34 1384.97  110.61 1385.05   112.8 1385.17  112.86 1385.17
  112.91 1385.44  112.97 1385.44  113.02 1385.72  113.24 1385.72  113.54 1385.72
  116.79 1385.78  122.75  1385.9  127.38    1386  136.65 1386.69  140.76    1387
  142.09    1387  148.68    1387  156.99 1386.54  163.65 1386.17  166.56    1386
  170.35 1385.78  174.54 1385.43  176.35 1385.38  182.35    1385  182.51    1385
  182.65    1385  182.98    1385  184.78    1385  187.61    1385  188.68    1385
  190.25 1384.97   190.4 1384.97  190.43 1384.97  194.94 1384.96  196.88 1384.48
  198.78    1384  199.97  1385.2  234.91 1376.47     250 1376.17  265.09 1376.47
  293.49 1383.57  309.49 1383.89  317.41 1381.91  325.94 1384.05  326.94 1384.04
  335.94  1383.9     336  1383.9  336.49  1383.9  336.57  1383.4  336.59  1383.4
  337.99 1383.48  338.09 1383.49  338.41 1383.49  383.73  1384.4  419.85 1383.69
  426.87 1383.34  429.88 1382.84  437.91 1385.33  438.36    1385  440.83 1385.65
  440.87 1385.66  440.91 1385.67  441.14 1385.66  442.07 1385.58  449.34    1385
  450.23 1384.96  457.28 1384.68  460.85  1384.4  462.69 1384.25  471.75 1384.27
  478.91 1384.29  485.54 1384.35  487.61  1384.4  489.49 1384.39     500 1384.35

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  199.97    .032  234.91    .028  265.09    .032  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        199.97  293.49            100.03     100  100.09              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0  148.68    1387        F
  316.49     500    1384        F

CROSS SECTION
```

RIVER: River
REACH: Ellsworth RS: 9800

INPUT
Description: Channel Station 52099.16
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.41	72.19	1384.97	73.37	1385	73.64	1385.68	73.83	1386
73.84	1386	73.85	1386	76.3	1386	79.2	1386	80.92	1386
84.55	1386	88.05	1386	89.48	1386	93.53	1386	100.69	1386.46
103.76	1386.37	103.86	1386.37	104.12	1386.38	108.12	1386.33	108.29	1386.34
108.41	1386.34	109.54	1386.36	112.08	1386.42	115.77	1386.45	121.18	1386.61
123.91	1386.69	129.62	1387	133.94	1387	133.97	1387	134.06	1387
134.2	1387	136.91	1387	137.01	1387	137.07	1387	137.1	1387
137.81	1387	141.61	1386.72	148.12	1386.35	152.47	1386	153.02	1385.97
160.6	1385.54	165.19	1385.17	166.52	1385.09	167.51	1385	176.21	1384.42
178.95	1384.26	181.78	1384	184.46	1383.8	185.14	1383.75	187.29	1383.6
194.74	1383.08	198.49	1383.07	200.62	1383.07	202.82	1383.06	204.51	1383.49
206.51	1383.49	234.91	1376.39	250	1376.09	265.09	1376.39	288.53	1382.25
302.39	1383.12	303.88	1383.7	319.88	1384.02	320.25	1384.11	328.37	1384.13
331.29	1384.37	331.46	1384.33	332.47	1384.31	332.79	1384.31	344.06	1384.14
344.11	1384.14	344.61	1384.14	344.69	1383.64	346.08	1383.72	346.12	1383.73
391.85	1384.65	427.97	1383.93	434.99	1383.59	438	1383.09	443.76	1384.52
445.5	1385	447.59	1385.52	448.33	1385.71	448.35	1385.24	448.37	1385
450.57	1385	453.27	1385	456.49	1385	458.23	1385.07	463.71	1385.28
465.9	1385.02	466.06	1385	466.34	1384.97	474.98	1384.08	489.44	1384.13
497.08	1384.12	500	1384.14						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	288.53	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	302.39	105.55	100	93.83	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.38	1383.77	F
294.62	500	1383.77	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9700

INPUT
Description: Channel Station 52199.16 (Riprap for Culvert C8)
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.71	4.24	1384.73	6.5	1384.74	10.16	1384.76	11.7	1384.77
12.99	1384.77	79.81	1382.48	80.24	1382.3	80.49	1382.21	80.87	1382.11
86.93	1382.2	89.09	1382.27	94.43	1382.41	111.9	1382.79	113.85	1382.84
122.12	1383	139.03	1383.43	155.62	1383.81	159.26	1383.91	164.19	1384
168.52	1384.76	170.17	1385	174.18	1385.5	180.42	1385	180.79	1385
189.01	1384.04	189.39	1384	189.44	1383.99	190.27	1383.9	190.58	1383.86
193.68	1383.65	199.66	1383.24	199.71	1383.24	200.59	1383.21	200.96	1383.2
203.44	1383.14	204.51	1383.41	206.51	1383.41	234.91	1376.31	250	1376.01
265.09	1376.31	293.49	1383.41	311.68	1383.77	316.28	1382.62	321.1	1383.82
321.91	1383.9	331.48	1383.55	339.55	1384.57	339.78	1384.51	340.78	1384.49
348.81	1384.37	349.1	1384.37	349.31	1384.37	349.39	1383.87	350.81	1383.96
396.39	1384.87	432.39	1384.15	439.39	1383.8	442.39	1383.3	450.39	1385.36
451.51	1385.55	459.66	1385.14	462.49	1385	464.8	1384.88	468.56	1384.67
470.97	1384.29	472.73	1384	473.73	1383.84	476.99	1383.32	484.12	1383.19
486.21	1383.17	492.57	1383.14	494.35	1383.13	495.95	1383.13	497.31	1383.12
499.57	1383.11	500	1383.11						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.04	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	99.48	100	100.56	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	174.18	1385.5	F
396.05	500	1384.86	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9600

INPUT
Description: Channel Station 52299.16 (Riprap for Culvert C8)
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.46	17.32	1381.87	78.1	1382.19	79.81	1382.25	83.97	1382.33

85.28	1382.35	99.52	1382.65	103.32	1382.8	108.8	1382.99	108.98	1383
110.25	1383.08	145.79	1384.19	146.46	1384	147.22	1384.4	151.27	1385
154	1385.4	158.04	1386	159.47	1386.17	160.25	1386.18	161.5	1386.19
166.9	1386.46	175.8	1386.29	177.03	1386.29	178.87	1386	181.33	1385.42
183.06	1385	187.07	1384.04	187.24	1384	187.61	1383.92	187.88	1383.86
189.26	1383.53	192.04	1384.22	194.04	1384.22	225.23	1376.42	250	1375.93
274.77	1376.42	305.97	1384.22	321.97	1384.54	322.62	1384.38	330.07	1384.4
331.75	1384.83	332.75	1384.81	343.8	1384.65	345.55	1384.62	345.93	1384.62
346.05	1384.62	346.12	1384.24	346.14	1384.12	347.21	1384.18	347.55	1384.2
393.15	1385.11	429.15	1384.39	436.15	1384.04	436.55	1383.94	437.29	1384
437.41	1384	439.04	1384.14	441.73	1384.36	445.59	1384.69	447.82	1384.88
447.84	1384.99	447.84	1385	447.93	1385.1	448.2	1385.38	449.7	1385.29
454.66	1385	460.61	1384.65	465.19	1384.38	465.7	1384.3	467.45	1384
470.52	1383.49	473.43	1383	475.54	1382.67	476.8	1382.46	479.91	1382.38
483.1	1382.29	488.37	1382.18	499.72	1382.63	500	1382.64		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	194.04	.04	305.97	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
194.04	305.97	96.99	100	104.66	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	166.9	1386.46	F
393.29	500	1385.12	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9500

INPUT
Description: Channel Station 52399.16
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1381.97	80.77	1382.4	84.43	1382.53	93.4	1382.71	96.22	1382.75
108.27	1383	110.33	1383	113.48	1383	114.79	1383	130.27	1383.64
134.27	1383.75	143.7	1384	144.79	1384.12	145.98	1384.36	148.68	1384.8
150.31	1385	154.16	1385.42	155.86	1385.91	156.18	1385.97	156.41	1386
160.64	1386.69	161.84	1386.71	169.2	1386.33	169.63	1386.3	170.08	1386.26
170.16	1386.24	171.11	1386	171.73	1385.85	172.59	1387.12	214.9	1376.55
250	1375.85	285.11	1376.55	316.31	1384.35	332.3	1384.67	334.52	1384.11
336.69	1384.66	338.2	1385.04	339.19	1385.02	348.51	1384.89	348.9	1384.89
348.98	1384.39	350.4	1384.47	396.04	1385.39	396.89	1385.37	432.09	1384.67
439.1	1384.32	440.77	1383.9	441.67	1384	443.04	1384	443.79	1384.02
449.54	1384.16	449.74	1384.41	450.25	1385	450.3	1385.01	450.56	1385.07
450.74	1385.11	451.78	1385.07	453.47	1385	457.52	1384.83	462.18	1384.63
463.24	1384.59	466.95	1384.42	467.62	1384.28	468.9	1384	471.69	1383.44
473.85	1383	475.73	1382.63	476.96	1382.39	483.67	1382.29	490.47	1382.22
498.33	1382.55	500	1382.61						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	172.59	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.59	316.31	100.07	100	100	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	161.84	1386.71	F
317.92	500	1384.75	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9400

INPUT
Description: Channel Station 52499.16
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.17	86.31	1382.63	92.07	1382.83	100.43	1383	101.61	1383
101.8	1383	102.28	1383	104.14	1383	105.62	1383	108.8	1383
110.05	1383	117.05	1383.3	123.74	1383.48	140.23	1384	140.35	1384
140.98	1384	140.99	1384	141.03	1384	141.05	1384	141.93	1384.14
144.61	1384.53	147.75	1385	153.04	1385.75	154.16	1385.89	154.82	1386
157.81	1386.6	159.57	1386.94	159.75	1386.97	159.96	1387	161.03	1387
166.29	1387	166.45	1386.97	167.55	1386.81	169.31	1386.37	170.78	1386
171.62	1387.29	214.9	1376.47	250	1375.77	285.11	1376.47	316.31	1384.27
332.31	1384.59	333.56	1384.27	338.31	1385.46	339.32	1385.45	353.6	1385.24
354	1385.24	354.08	1384.74	355.5	1384.82	401.14	1385.64	437.19	1385.02
444.2	1384.67	445.64	1384.31	446.99	1384	453.52	1383.5	453.72	1383.49
453.72	1383.62	453.73	1383.76	453.74	1384	453.75	1384.77	453.75	1385
453.76	1385.13	453.77	1386	453.81	1386	454.3	1386	458.48	1385.5
462.29	1385.04	462.48	1385.02	462.61	1385	465.6	1384.66	467.08	1384.48
471.16	1384	472.03	1383.91	472.57	1383.86	473.24	1383.75	477.49	1383
479.14	1382.72	480.15	1382.54	484.79	1382.47	492.7	1382.37	500	1382.49

```
Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  171.62    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        171.62  316.31             59.46   59.46   59.46              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  166.29    1387        F
  317.92     500 1384.67        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9340.54

INPUT
Description: Begin Channel Bottom Transition, Begin Flow Contraction
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  178.57  1385.5   214.9 1376.42     250 1375.72   285.1 1376.42  316.31 1384.22
  332.31 1384.54  338.48    1383  349.07 1385.62  356.53 1385.51  357.03 1385.51
  357.11 1385.01  358.53  1385.1  404.17 1385.79  440.22 1385.25  447.23  1384.9
   454.5 1383.09

Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
  178.57     .04   214.9    .028   285.1     .04  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        178.57  316.31             25.88   25.88   25.88              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9314.67

INPUT
Description: Full Riprap Section
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  176.55 1385.99  196.42 1378.08  213.91 1376.42     250  1375.7  285.09  1376.4
  303.15 1378.14   316.3  1384.2  332.49 1384.53  338.73  1384.1  346.91 1384.87
   347.5 1384.82  349.45 1385.31  351.58 1385.66     357 1385.58   357.5 1385.57
  357.54 1385.48  357.58  1385.4  358.11 1385.41  358.19 1385.08  359.02 1385.13
   359.6 1385.16  404.92 1385.84   405.2 1385.83  440.72 1385.31  441.68 1385.27
  447.68 1384.97  448.78 1384.77  456.13 1382.94

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************
  176.55     .04   316.3    .025  456.13    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.55   316.3                 10      10      10              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  176.55     198    1384        F
     303  456.13    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9304.67

INPUT
Description: Upstream End of Wing Wall
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  175.54 1386.23  195.68 1376.78     250 1375.69  303.14 1376.75  316.29 1384.19
  347.08 1384.81  347.68 1384.66  351.78 1385.69  357.78  1385.6  358.35  1385.6
  358.43  1385.1  359.85 1385.18  405.44 1385.86  441.45 1385.33  448.45 1384.98
  456.95 1382.86

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************
  175.54          175.54    .015  316.29    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.54  316.29             15.85   15.85   15.85              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  175.54     203    1384        F
     297  456.95    1384        F

CROSS SECTION
```

```
RIVER: River
REACH: Ellsworth          RS: 9288.82

INPUT
Description: Upstream Face of C9
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
   210.5    1385   210.5 1375.68   289.5 1375.68   289.5    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   210.5           210.5    .015   289.5

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         210.5   289.5               81      81      81              .3       .5

CULVERT


RIVER: River
REACH: Ellsworth          RS: 9248

INPUT
Description:
Distance from Upstream XS =      12
Deck/Roadway Width        =      57
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0  1385.6             500  1385.6

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
   210.5    1385   210.5 1375.68   289.5 1375.68   289.5    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   210.5           210.5    .015   289.5

Bank Sta: Left   Right    Coeff Contr.   Expan.
         210.5   289.5             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0  1385.6             500  1385.6

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
   210.5    1385   210.5 1375.61   289.5 1375.61   289.5    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   210.5           210.5    .015   289.5

Bank Sta: Left   Right    Coeff Contr.   Expan.
         210.5   289.5             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
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 #9          Box       8      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      81     .015     .015          1                  .4                  1
Number of Barrels =  6
Upstream   Elevation =  1375.68
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.    Sta.
   217.5   230.5   243.5   256.5   269.5   282.5
Downstream Elevation =  1375.61
Centerline Stations
```

```
    Sta.    Sta.    Sta.    Sta.    Sta.    Sta.
   217.5   230.5   243.5   256.5   269.5   282.5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9207.65

INPUT
Description: Downstream Face of C9
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
   210.5    1385   210.5 1375.61   289.5 1375.61   289.5    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
   210.5           210.5    .015   289.5

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         210.5   289.5             14.17   14.17   14.17              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9193.48

INPUT
Description: Downstream End of Wingwall
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  171.54 1387.15  195.96 1376.68     250  1375.6  303.42 1376.67  316.32  1384.1
  340.41 1384.58  341.93  1384.2  348.82 1385.95  354.99 1385.86  355.49 1385.86
  355.57 1385.36  356.99 1385.44   402.6 1386.12  438.62 1385.58  445.63 1385.23
  448.29 1384.56

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*******************************
  171.54     .04  316.32    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        171.54  316.32                10      10      10              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  171.54     203    1384        F
     297  448.29    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9183.48

INPUT
Description: End Full Riprap Section
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  172.19 1386.98  196.41 1377.65  214.01 1376.31     250 1375.59  285.12  1376.3
  303.42 1377.71  316.32 1384.09  332.08 1384.41  335.21 1384.26  340.54 1384.67
  342.06 1384.48  344.83 1385.18  348.99 1385.96  353.71 1385.89   354.2 1385.88
  354.28 1385.76  355.19 1385.76  355.68 1385.77  355.69 1385.77  355.77 1385.39
   357.2 1385.46  400.57 1386.12  403.05 1386.14  436.03 1385.63  439.25 1385.56
  442.92 1385.37   446.3 1385.03  448.98 1384.36

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
  172.19     .04  196.41    .028  303.42     .04  316.32    .025  448.98    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        172.19  316.32             29.74   29.74   29.74              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  172.19     198    1384        F
     302  448.98    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9154.01

INPUT
Description: End Channel Bottom Transition
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  174.14 1386.46  214.91 1376.27     250 1375.57  285.12 1376.27  316.32 1384.07
  332.32 1384.39   335.5  1383.6  345.27 1386.04  354.29 1385.91  354.79 1385.91
```

```
  354.87 1385.41  356.29 1385.49  401.88 1386.23  437.88 1385.65  444.88  1385.3
  451.03 1383.76

Manning's n Values         num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
  174.14    .032  214.91    .028  285.12    .032  316.32    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.14  316.32             11.01   11.01   11.01             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9143

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0 1382.79   20.06 1382.85   42.22 1382.91   65.35 1382.97   81.36 1383.01
   87.73 1383.03   87.75 1383.03   87.85 1383.03   88.06 1383.03  109.74 1383.94
  112.07 1384.03  112.12 1384.03  112.19 1384.03  118.92 1384.35  120.98 1384.45
  122.74 1384.54  133.85 1385.03   137.3 1385.19  155.57 1386.03  167.18  1386.2
  168.86 1386.27  169.27 1386.17  169.81 1386.03  173.46 1385.12  173.81 1385.03
  174.28 1384.91  177.66 1384.07  177.82 1384.03  178.47 1384.03  179.11 1384.03
  182.09 1384.46   214.9 1376.26     250 1375.56  285.11 1376.26  317.92 1384.46
     318 1384.03  322.04 1384.03  334.25 1384.03  337.35 1384.03  337.41    1384
  337.49  1383.9  338.14 1383.03  339.02 1382.83  339.28 1382.77   339.4 1382.74
   339.4 1382.94  339.41 1383.03  339.42 1383.87  339.42 1384.03  339.42 1384.26
  339.44 1385.03  339.44 1385.06  339.45 1385.58  339.45 1386.03  340.41  1386.1
  340.57 1386.11  340.63 1386.12  340.66 1386.12  340.68 1386.12   340.7 1386.12
  340.71 1386.12  340.74 1386.12  340.82 1386.12   341.1 1386.12   345.3 1386.06
  347.07 1386.03  350.68  1385.8  356.24  1385.4  380.62 1385.94   384.8 1386.03
  388.54  1386.1  403.26  1386.4  417.21 1386.12  421.87 1386.03  422.69 1386.01
  439.29 1385.68  444.02 1385.31  447.51 1385.03  448.27 1384.84  451.51 1384.03
   453.4 1383.68   455.1 1383.37  455.38 1383.31  455.39  1383.5  455.42 1384.03
  456.16 1384.23  456.85 1384.42  457.21 1384.51  458.36 1384.81  464.35 1384.52
  474.47 1384.03  474.77 1384.02  474.85 1384.01  476.47 1383.71  480.08 1383.03
  480.86 1382.88  484.24 1382.22  488.27 1382.21  493.06 1382.26     500 1382.51

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  182.09    .032   214.9    .028  285.11    .032  317.92    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92               43      43      43             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.46        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9100

INPUT
Description: Channel Station 52799.16
Station Elevation Data    num=      64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0 1382.76   20.06 1382.82   42.22 1382.88   65.35 1382.94   81.36 1382.98
   87.73     1383   87.75     1383   87.85     1383   88.06     1383  109.74 1383.91
  112.07     1384  112.12     1384  112.19     1384  118.92 1384.32  120.98 1384.42
  122.74 1384.51  133.85     1385   137.3 1385.16  155.57     1386  167.18 1386.17
  168.86 1386.24  169.27 1386.14  169.81     1386  173.46 1385.09  173.81     1385
  174.28 1384.88  174.47 1386.33  214.89 1376.23     250 1375.53   285.1 1376.23
   316.3 1384.03  332.31 1384.35  332.71 1384.25  339.68 1386.12  340.27 1386.11
  340.68  1386.1  355.92 1385.88  356.23 1385.88  356.31 1385.38  357.73 1385.46
  403.34 1386.38  439.36 1385.66  446.37 1385.31  452.48 1383.78   453.4 1383.65
   455.1 1383.34  455.38 1383.28  455.39 1383.47  455.42     1384  456.16  1384.2
  456.85 1384.39  457.21 1384.48  458.36 1384.78  464.35 1384.49  474.47     1384
  474.77 1383.99  474.85 1383.98  476.47 1383.68  480.08     1383  480.86 1382.85
  484.24 1382.19  488.27 1382.18  493.06 1382.23     500 1382.48

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  174.47    .032  214.89    .028   285.1    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.47   316.3            100.01     100  100.01             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.46        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9000
```

INPUT
Description: Channel Station 52899.16
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.76	13.8	1382.79	30.65	1382.84	56.31	1382.9	74.16	1382.95
74.62	1382.95	94.01	1383	94.09	1383	94.38	1383	94.6	1383
94.78	1383	107.72	1383.58	108.37	1383.61	117.36	1383.93	117.49	1383.94
119.31	1384	124.44	1384.18	128.22	1384.32	133.02	1384.49	146.94	1384.99
146.99	1385	147.12	1385	167.8	1385.74	168.93	1385.79	170.18	1385.83
170.6	1385.72	173.49	1385	175.24	1386.06	214.89	1376.15	250	1375.45
285.1	1376.15	316.31	1383.95	332.31	1384.27	336.85	1383.13	349	1386.16
350	1386.14	359.16	1386.01	359.34	1386.01	359.66	1386.01	359.74	1385.51
361.16	1385.59	406.77	1386.5	442.79	1385.78	449.79	1385.43	455.08	1384.11
455.71	1384	458.62	1383.57	458.98	1383.52	458.99	1383.69	459	1384
459.88	1384.4	460.39	1384.63	461.19	1385	461.24	1385.02	461.48	1385.11
461.7	1385.09	463.14	1385	468.36	1384.6	476.82	1384	477.22	1383.97
477.31	1383.97	478	1383.87	483.95	1383	484.15	1382.98	485.84	1382.76
488.65	1382.78	495.75	1382.75	500	1382.79				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	175.24	.032	214.89	.028	285.1	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.24	316.31	100.08	100	100.06	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
317.92	500	1384.35	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8900

INPUT
Description: Channel Station 52999.16
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.74	9.21	1382.77	25.76	1382.81	27.52	1382.81	101.37	1383
101.97	1383	102.09	1383	102.53	1383	113.45	1383.59	122.89	1384
126.41	1384.13	129.8	1384.26	136.84	1384.52	143.74	1384.78	145.04	1384.83
146.17	1384.87	149.48	1385	159.45	1385.39	166.77	1385.68	168.43	1385.75
169.94	1385.81	170.26	1385.73	170.49	1385.67	173.16	1385	173.17	1385
175.21	1385.99	214.9	1376.07	250	1375.37	285.11	1376.07	316.31	1383.87
332.31	1384.19	336.49	1383.14	348.56	1386.17	349.55	1386.16	362.58	1385.96
362.76	1385.96	363.08	1385.96	363.16	1385.46	364.58	1385.54	410.19	1386.45
446.21	1385.73	453.22	1385.38	457.5	1384.31	460.16	1384	462.18	1383.8
462.58	1383.76	462.59	1383.96	462.59	1384	462.65	1384.48	462.68	1384.77
462.71	1385	463.6	1385.26	464.01	1385.38	464.32	1385.46	464.5	1385.51
464.59	1385.53	465.05	1385.65	467.59	1385.51	476.64	1385	481.62	1384.73
484.4	1384.59	485.17	1384.95	485.27	1385	485.95	1385.31	486.23	1385.44
487.42	1386	488.51	1386.5	489.62	1387	491.48	1387.84	491.83	1388
492.09	1388.12	494.03	1389	495.75	1389.78	496.23	1390	497.13	1390.41
498.44	1391	498.78	1391.16	498.89	1391.2	498.92	1391.22	499.42	1391.56
499.9	1391.61	500	1391.59						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	175.21	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.21	316.31	105.14	100	94.38	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
317.92	500	1384.27	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8800

INPUT
Description: Channel Station 53099.16 (Riprap for Culvert C10)
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.73	28.22	1382.8	38.26	1382.82	75.35	1382.88	82.2	1382.91
82.75	1382.91	104.71	1383	105.1	1383	105.46	1383	105.51	1383
105.81	1383	126.42	1383.96	127.24	1384	129.3	1384.1	149.61	1385
163.73	1385.49	169.76	1385.73	170.74	1385.49	172.7	1385	173.84	1384.72
175.44	1385.85	214.9	1375.99	250	1375.29	315.92	1376.32	316.02	1383.14
329.51	1383.41	348.57	1385.97	348.61	1385.97	349.56	1385.96	362.37	1385.77
362.83	1385.77	362.91	1385.27	364.33	1385.35	409.96	1386.27	446	1385.55
453.01	1385.2	457.2	1384.16	461.52	1384	462.34	1384	462.34	1384.01
462.45	1385	463.47	1385.19	463.86	1385.27	464.62	1385.4	467.9	1385.32
480.48	1385	484.2	1384.91	484.78	1384.9	484.96	1384.98	485	1385
485.67	1385.3	487.21	1386	488.44	1386.56	489.41	1387	491.34	1387.88
491.62	1388	492.16	1388.25	493.82	1389	494.65	1389.38	496.01	1390

```
  497.03 1390.47  497.12 1390.51  497.43 1390.52     500 1390.55

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .025  175.44     .04  316.02    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.44  316.02            105.5     100   95.16              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.19       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 8700

INPUT
Description: Channel Station 53199.16
Station Elevation Data    num=      74
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1382.65   25.38  1382.7   31.79 1382.73   33.53 1382.72   72.55 1382.88
    74.9 1382.89   95.76 1382.98   95.78 1382.98    95.9 1382.98   95.94 1382.98
  101.59    1383  116.75 1383.62  123.08 1383.86  127.22    1384  128.36    1384
  139.32 1384.32  142.15 1384.45  148.86 1384.66  152.03  1384.8  157.46    1385
  164.16    1385  164.42 1384.99  166.65 1385.03  171.39 1385.07  171.89 1385.14
  172.92 1384.88  175.47 1384.24  176.45    1384  177.65 1385.22   214.9 1375.91
     250 1375.21  285.11 1375.91  316.31 1383.71   332.3 1384.03  333.59 1383.71
  341.62  1385.7  342.63 1385.68  354.97  1385.5  355.37  1385.5  355.47  1385.5
  355.55    1385  356.97 1385.09  402.64    1386   438.7 1385.29  445.71 1384.94
  448.75 1384.18  452.93  1384.4  455.02 1384.24  455.09 1384.24  455.13 1384.23
  455.16 1384.23  455.23 1384.22  455.33 1384.22  455.94 1384.17  455.97 1384.19
  457.22    1385  457.96 1385.47  458.02 1385.51   458.9 1385.49  478.28 1385.03
   479.6 1385.59  480.58    1386  482.88 1386.97  482.95    1387  483.03 1387.03
   485.3    1388  486.05 1388.32   487.6    1389  489.34 1389.78  489.82    1390
     490 1390.08  490.79 1390.45  496.03 1390.75     500 1390.98

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  177.65    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        177.65  316.31             90.15     100  108.77              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.11       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 8600

INPUT
Description: Channel Station 53299.16
Station Elevation Data    num=      81
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0  1382.6     1.7  1382.6    4.13 1382.59   38.99 1382.73   44.05 1382.74
   62.55 1382.82   62.75 1382.83   63.62 1382.83   63.92 1382.84   70.26 1382.86
   73.79 1382.88   74.76 1382.89  103.36    1383   104.4    1383  104.74    1383
  107.65    1383  108.48    1383  108.65    1383  111.93 1383.14  135.96    1384
  139.51 1384.16  148.23 1384.57  157.25    1385  159.12  1385.2  169.18 1385.77
   169.2 1385.78  172.11 1385.05   172.3    1385  172.52 1384.94  173.06 1386.29
  214.89 1375.83     250 1375.13   285.1 1375.83   316.3 1383.63   332.3 1383.95
  333.88 1383.55  341.22 1385.39  342.22 1385.37   353.4 1385.21  353.66 1385.21
  353.74 1384.71  355.16 1384.79  400.75  1385.7  436.76 1384.98  443.76 1384.63
   446.8 1383.87  448.38    1384  452.95 1384.39  453.76 1384.45  453.79 1384.56
  453.89    1385  453.97 1385.01  455.14  1385.2  455.71 1385.26  455.76 1385.27
  455.84 1385.31  456.95 1385.29  472.91    1385  474.45 1384.97  475.48 1384.95
  475.57 1384.99   475.6    1385  476.37 1385.32  478.01    1386  478.68 1386.27
  479.92 1386.75  480.15 1386.83  480.71    1387  480.72    1387  480.76 1387.01
  481.04 1387.14  482.76 1387.87  483.05    1388  483.17 1388.06  485.26    1389
   487.3 1389.93  487.45    1390   488.3 1390.39  488.49 1390.48  492.08 1390.63
     500 1390.99

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  173.06    .032  214.89    .028   285.1    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        173.06   316.3            100.12     100  100.04              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.03       F

CROSS SECTION


RIVER: River
```

REACH: Ellsworth RS: 8500

INPUT
Description: Channel Station 53399.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.55	1.46	1382.55	9.96	1382.57	26.64	1382.64	27.06	1382.65
28.82	1382.66	29.42	1382.67	35.13	1382.69	42.99	1382.74	45.14	1382.75
100.22	1382.97	100.6	1382.97	104.1	1382.98	104.33	1382.98	105.27	1382.99
109.08	1383	109.28	1383	110.72	1383	110.77	1383	110.82	1383
110.89	1383	111.11	1383	137.07	1383.8	143.34	1384	164.65	1384.87
167.38	1385	168.23	1385	169.97	1385	171.93	1385	172.66	1384.82
172.79	1384.79	173.59	1384.59	173.99	1384.48	175.93	1384	178.15	1384.93
214.89	1375.75	250	1375.05	285.1	1375.75	316.3	1383.55	332.31	1383.87
335.45	1383.08	343.56	1385.11	344.56	1385.1	355.25	1384.94	355.49	1384.94
355.75	1384.94	355.83	1384.44	357.25	1384.52	402.84	1385.43	438.85	1384.71
445.85	1384.36	447.88	1383.85	449.16	1384	450.27	1384.11	451.95	1384.28
455.98	1384.69	455.98	1384.77	455.99	1385	456.13	1385.11	456.36	1385.3
456.51	1385.42	456.6	1385.49	456.6	1385.5	456.61	1385.5	456.62	1385.51
456.63	1385.52	456.64	1385.53	456.96	1385.77	464.04	1385.48	474.17	1385.07
475.85	1385	475.89	1385	475.9	1385	475.92	1385	475.98	1385
476.02	1385	476.04	1384.99	477.27	1385.46	478.34	1385.86	478.71	1386
480.67	1386.75	481.26	1386.97	481.34	1387	481.43	1387.04	483.93	1388
485.67	1388.69	486.45	1389	486.78	1389.13	489.02	1390	489.08	1390.04
489.16	1390.08	495.05	1390.38	500	1390.62				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	178.15	.032	214.89	.028	285.1	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
178.15	316.3	101.68	100	98.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
317.92	500	1383.95	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8400

INPUT
Description: Channel Station 53499.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.53	10.66	1382.59	14.06	1382.61	62.22	1382.8	64.52	1382.79
67.57	1382.8	69.85	1382.8	79.25	1382.88	117.05	1383	118.84	1383
138.29	1383.6	151.51	1384	154.37	1384.16	169.41	1385	171.02	1385
171.29	1385	171.83	1384.88	173.39	1384.54	174.18	1384.34	175.53	1384
177.71	1383.78	178.76	1384.7	214.9	1375.67	250	1374.97	285.11	1375.67
316.31	1383.47	332.31	1383.79	334.99	1383.12	342.11	1384.9	343.11	1384.88
357.32	1384.67	357.66	1384.67	357.75	1384.17	359.16	1384.26	404.75	1385.17
440.75	1384.45	447.75	1384.1	452.04	1383.02	457.07	1384.67	457.9	1384.92
457.98	1384.87	458.67	1384.48	464.79	1384.4	477.9	1384.22	479.46	1384.87
479.78	1385	480.22	1385.23	481.75	1386	482.62	1386.4	483.9	1387
485.84	1387.89	486.07	1388	486.23	1388.07	488.25	1389	488.71	1389.21
490.2	1389.9	491.21	1389.94	492.77	1390	499.73	1390.3	500	1390.31

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	178.76	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
178.76	316.31	108.13	100	92.32	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
317.92	500	1383.87	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8300

INPUT
Description: Channel Station 53599.16
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.56	9.64	1382.6	14.37	1382.59	16.96	1382.6	21.81	1382.58
41.62	1382.77	77.96	1382.88	82.55	1382.89	100.75	1382.97	106.95	1382.99
107.07	1382.99	107.22	1382.99	108.91	1383	139.73	1383.93	141.56	1383.98
142.11	1384	142.73	1384.03	143.02	1384.04	169.8	1384.87	172.01	1384.8
174.29	1384.23	174.62	1384.15	175.22	1384	177.38	1384.97	177.39	1384.97
214.9	1375.59	250	1374.89	285.11	1375.59	316.31	1383.39	332.31	1383.71
335.73	1382.85	342.59	1384.57	343.97	1384.55	352.67	1384.43	352.89	1384.43
352.97	1383.93	354.39	1384.01	400.15	1384.93	435.28	1384.24	436.28	1384.22
436.33	1384.22	443.31	1383.87	444.22	1383.65	445	1384	447.52	1384
452.38	1384.79	453.55	1385	453.75	1385.05	453.9	1385.1	453.95	1385.11
455.95	1385.09	464.76	1385	468.14	1384.85	475.98	1384.45	476.92	1384.88

477.17	1385	478.88	1385.79	479.33	1386	479.63	1386.14	481.47	1387
481.83	1387.17	483.61	1388	484.51	1388.42	485.75	1389	487.6	1389.86
487.72	1389.92	487.8	1389.92	490.58	1390	497.13	1390.2	500	1390.28

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	177.39	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
177.38	316.31	91.63	100	109.15	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8200

INPUT
Description: Channel Station 53699.16
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.53	16.6	1382.68	44.71	1382.77	48.23	1382.78	62.1	1382.84
66.81	1382.86	69.01	1382.83	71.78	1382.82	76.63	1382.85	79.43	1382.86
84.77	1382.89	86.78	1382.92	97.76	1383	100.06	1383	103.05	1383
111.4	1383	112.3	1383	114.18	1383	125.17	1383.25	149.39	1383.86
151.24	1384	153.99	1384.32	159.18	1385	164.96	1385.35	167.96	1385.53
168.52	1385.56	169.41	1385.52	169.43	1385.52	169.57	1385.49	171.51	1385
172.54	1384.74	175.51	1384	176.25	1385.17	214.9	1375.51	250	1374.81
285.11	1375.51	316.31	1383.31	332.3	1383.63	332.45	1383.59	334.84	1384.33
335.84	1384.31	348.06	1384.14	348.19	1384.14	348.28	1383.64	349.69	1383.72
395.28	1384.63	431.28	1383.91	438.28	1383.56	441.28	1383.06	449.11	1385.04
449.68	1385	450.13	1385.14	450.48	1385.25	456.88	1385.13	464.14	1385
468.28	1384.92	470.4	1384.88	471.78	1384.86	471.84	1384.89	472.11	1385
472.55	1385.19	474.46	1386	474.77	1386.13	476.81	1387	477.79	1387.42
479.15	1388	480.02	1388.37	481.49	1389	482.9	1389.6	483.82	1390
484.31	1390.21	484.7	1390.38	488.03	1390.48	496.03	1390.71	496.79	1390.37
497.61	1390	497.95	1389.85	499.84	1389	500	1388.93		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	176.25	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.25	316.31	96	100	103.91	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8100

INPUT
Description: Channel Station 53799.16
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.61	15.18	1382.65	17.69	1382.66	27.6	1382.7	30.95	1382.72
35.27	1382.67	40.72	1382.64	43.98	1382.66	50.14	1382.69	53.57	1382.71
58.77	1382.79	87.48	1383	87.79	1383	88.19	1383	90.55	1383
91.99	1383	92.18	1383	92.67	1383	97.27	1383	97.34	1383
98	1383	112.84	1383.11	121.66	1383.18	124.9	1383.2	126.47	1383.21
127.9	1383.23	128.46	1383.21	129.11	1383.21	133.63	1383.41	142.21	1383.67
149.25	1383.88	152.38	1383.96	153.86	1384	155.37	1384	160.03	1384
160.47	1383.23	160.6	1383	161.58	1383	161.88	1383	162.22	1383.13
164.54	1384	165.16	1384.27	166.86	1385	167.11	1385.11	167.18	1385.15
168.81	1385.18	169.8	1385.2	170.24	1385.09	170.61	1385	173.81	1384.2
174.61	1384	175.32	1385.32	214.89	1375.43	250	1374.73	285.1	1375.43
316.3	1383.23	332.3	1383.55	336.11	1382.6	342.44	1384.18	343.44	1384.16
351.66	1384.04	352.01	1384.04	352.09	1383.54	353.51	1383.63	399.16	1384.54
434.05	1383.84	435.2	1383.82	441.76	1383.49	442.21	1383.47	445.22	1382.97
453.1	1385.35	453.22	1385	453.58	1385.09	454.86	1385.43	464.32	1385.35
474.74	1385.26	476.24	1385.88	476.52	1386	476.95	1386.18	478.91	1387
481.17	1387.95	481.3	1388	481.49	1388.08	483.69	1389	484.66	1389.41
486.07	1390	487.24	1390.49	487.49	1390.6	487.62	1390.65	488.81	1390.69
498.92	1391	498.94	1391	498.96	1391	498.99	1391	499.3	1391.01
499.32	1391	499.33	1391	499.5	1390.92	500	1390.7		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	175.32	.032	214.89	.028	285.1	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.32	316.3	100.26	100	100.05	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8000

INPUT

Description: Channel Station 53899.16
Station Elevation Data num= 115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.5	.9	1382.49	9.29	1382.45	10.91	1382.46	20.74	1382.51
22.19	1382.52	30.85	1382.66	42.55	1382.74	78.74	1383.4	84.65	1383.5
100	1383.62	102.05	1383.63	104.63	1383.64	107.99	1383.65	112.52	1383.66
113.57	1383.66	117.65	1383.98	117.87	1384	117.9	1384	118.11	1384
123.83	1384.35	124.86	1384.4	125.72	1384.45	126.45	1384.49	127.07	1384.52
127.61	1384.55	128.07	1384.58	134.7	1384.94	135.44	1384.94	135.75	1384.94
135.98	1384.94	142.58	1384.93	143.88	1384.91	145.62	1384.88	148.07	1384.83
150.36	1384.81	152.9	1384.76	154.44	1384.73	155.49	1384.68	160.41	1384.5
161.5	1384.5	163.1	1384.49	163.45	1384.49	163.92	1384.49	164.05	1384.49
166.9	1384.48	172.52	1384.13	172.87	1384.22	173	1384.14	173.22	1384.01
173.25	1384	173.25	1383.84	173.28	1383.23	173.43	1383.2	174.33	1383
176.05	1383	177.89	1383	180.78	1383	181.15	1383	181.99	1383.15
183.7	1383.15	214.9	1375.35	250	1374.65	285.11	1375.35	316.3	1383.15
332.3	1383.47	334.67	1382.88	337.55	1384.03	338.52	1384.14	338.86	1384.15
339.34	1384.27	340.1	1384.46	340.73	1384.45	341.1	1384.45	344.34	1384.4
346.1	1384.37	353.41	1384.27	356.72	1384.22	356.87	1384.22	357.22	1384.22
357.28	1383.87	357.3	1383.72	358.3	1383.78	358.72	1383.8	369.93	1384.03
404.37	1384.72	407.57	1384.65	428.93	1384.23	438.92	1384.03	440.41	1384
446.9	1383.68	447.42	1383.65	450.16	1383.2	450.43	1383.15	451.16	1383.37
458.32	1385.48	460.43	1385.75	477.43	1385.46	479.59	1385.43	479.73	1385.48
479.93	1385.57	480.96	1386	482.33	1386.57	483.36	1387	485.12	1387.72
485.8	1388	486.18	1388.15	488.26	1389	489.34	1389.44	490.73	1390
491.57	1390.34	492.42	1390.68	494.76	1390.8	498.47	1391	500	1391.06

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	183.7	.032	214.9	.028	285.11	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
183.7	316.3	105.08	100	94.7	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7900

INPUT
Description: Channel Station 53999.16
Station Elevation Data num= 162

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.05	.35	1383.06	3.85	1383.12	5.97	1383.16	9.87	1383.22
11	1383.24	13.78	1383.28	16.49	1383.39	16.72	1383.4	16.92	1383.41
17.08	1383.41	17.25	1383.42	17.44	1383.43	17.65	1383.44	21.86	1383.6
22.35	1383.63	23.09	1383.66	24.22	1383.71	25.37	1383.76	26.42	1383.81
27.81	1383.87	28.4	1383.9	29.39	1383.95	30.58	1384	30.84	1384.01
32.15	1384.07	35.13	1384.21	36.44	1384.27	37.08	1384.3	37.41	1384.31
37.69	1384.32	37.92	1384.34	38.13	1384.34	38.36	1384.36	38.59	1384.37
40.73	1384.47	45.63	1384.49	46.3	1384.48	47.17	1384.47	48.35	1384.46
53.06	1384.45	54.73	1384.41	58.68	1384.4	59.75	1384.39	61.9	1384.39
63.73	1384.47	65.68	1384.57	67.35	1384.49	72.21	1384.62	72.29	1384.62
72.39	1384.62	75.71	1384.64	78.83	1384.76	81.86	1384.82	84.13	1384.47
84.58	1384.36	85.14	1384.24	85.67	1384.15	86.41	1384	86.43	1384
87.06	1383.87	87.37	1383.8	87.69	1383.74	89.04	1383.56	89.85	1383.28
90.63	1383	90.72	1382.97	90.8	1382.94	92.36	1382.39	93.46	1382
93.85	1381.86	94.21	1381.74	95.14	1381.4	96.24	1381	96.38	1380.95
96.49	1380.91	97.5	1380.53	98.66	1380.09	98.75	1380.05	98.88	1380
100.04	1379.55	101.44	1379	101.64	1378.92	102.07	1378.75	103.21	1378.29
103.95	1378	104.86	1377.64	106.49	1377	106.64	1376.94	107.02	1376.79
108.23	1376.31	109.02	1376	109.75	1375.71	110.78	1375.32	111.01	1375.22
111.13	1375.17	111.29	1375.11	111.34	1375.09	111.49	1375.03	111.56	1375
111.65	1374.97	111.78	1374.92	112.2	1374.78	112.48	1374.68	112.63	1374.63
112.87	1374.54	118.11	1374.46	120.15	1374.38	121.57	1374.33	123.04	1374.27
124.52	1374.16	128.39	1374.04	130.35	1373.98	134.44	1374.03	170.6	1383.07
182.09	1383.47	183.7	1383.07	214.9	1375.27	250	1374.57	285.11	1375.27
316.31	1383.07	332.31	1383.39	332.76	1383.5	340.82	1383.41	346.04	1383.61
350	1384.6	351	1384.58	359.51	1384.46	359.95	1384.46	360.01	1384.46
360.1	1383.96	361.51	1384.04	407.1	1384.95	441.42	1384.26	443.1	1384.23
449.84	1383.89	450.1	1383.88	453.1	1383.38	453.37	1383.47	460.98	1386
461.17	1385.6	462.76	1386	462.79	1386.01	462.89	1386.04	463.35	1386.03
464.07	1386.01	464.49	1386	466.22	1385.95	481.73	1385.44	482.67	1385.84
483.03	1386	484.13	1386.48	485.35	1387	487.35	1387.87	487.66	1388
489.3	1388.7	489.99	1389	490.49	1389.22	492.32	1390	492.64	1390.14
494.31	1390.85	500	1390.94						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	183.7	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	316.31	100.63	100	99.55	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	182.09	1383.47	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7800

INPUT
Description: Channel Station 54099.16
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380.73	.85	1380.4	1.92	1380	2.32	1379.85	2.72	1379.7
4.57	1379	5.27	1378.74	7.1	1378	7.25	1377.94	9.22	1377.08
9.4	1377.01	9.41	1377	9.44	1376.99	11.62	1376	12.73	1375.5
13.83	1375	15	1374.47	15.96	1374.04	16.04	1374	16.11	1373.97
16.32	1373.87	16.37	1373.85	16.64	1373.83	16.69	1373.83	17.79	1373.76
18.07	1373.74	18.52	1373.7	21.73	1373.44	22.88	1373.34	25.68	1373.11
26.39	1373.06	27.11	1373	28.08	1372.92	32.59	1372.58	38.44	1372.58
48.39	1372.65	53.68	1372.67	60.39	1372.64	64.23	1372.53	66.31	1372.5
72.97	1372.35	80.91	1372.29	81.47	1372.31	81.66	1372.31	87.94	1372.44
91.95	1372.48	92.42	1372.48	95.78	1372.5	99.3	1372.54	104.06	1372.64
109.66	1372.83	111.62	1372.9	112	1372.92	112.97	1372.97	113.55	1373
114.19	1373.04	114.57	1373.05	114.81	1373.06	115.01	1373.07	115.2	1373.07
122.03	1373.16	122.71	1373.17	125.13	1373.27	125.48	1373.28	129.7	1373.44
131.18	1373.82	131.88	1374	132.53	1373.47	170.6	1382.99	182.09	1383.39
183.7	1382.99	214.9	1375.19	250	1374.49	285.11	1375.19	316.31	1382.99
332.3	1383.31	333.53	1383.61	335.95	1383.59	341.4	1384.96	342.4	1384.94
357.66	1384.72	357.83	1384.72	357.91	1384.22	359.33	1384.3	404.91	1385.22
440.91	1384.5	447.91	1384.15	450.91	1383.65	458.83	1385.93	459.03	1385.54
460.85	1386	461.39	1386.13	461.64	1386.2	461.67	1386.04	461.67	1386
467.27	1385.83	480.34	1385.42	481.04	1385.74	481.61	1386	483.13	1386.69
483.82	1387	484.16	1387.15	486.04	1388	486.88	1388.38	488.26	1389
489.13	1389.39	490.49	1390	491.84	1390.61	492.34	1390.83	492.72	1391
492.73	1391.01	492.76	1391.02	493.99	1391.05	496.37	1391.12	497.12	1391.15
497.43	1391.15	497.58	1391.16	499.15	1391.2	500	1391.18		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	183.7	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	316.31	92.33	100	107.1	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	182.09	1383.39	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7700

INPUT
Description: Channel Station 54199.16
Station Elevation Data num= 185

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1372.14	2.15	1372.22	2.76	1372.25	3.08	1372.26	3.19	1372.26
10.97	1372.58	17.96	1372.69	20.02	1372.75	20.38	1372.76	20.73	1372.77
21.03	1372.78	21.26	1372.79	21.9	1372.8	24.47	1372.87	29.54	1373
31.08	1373.04	31.84	1373.06	38	1373.21	44.74	1373.36	51.14	1373.51
55.57	1373.5	58.84	1373.59	59.24	1373.6	59.97	1373.63	61.3	1373.67
63.02	1373.73	66.15	1373.86	67.42	1373.89	69.54	1373.95	69.56	1373.96
69.65	1374	69.81	1374.07	70.36	1374.29	70.57	1374.36	70.99	1374.52
71	1374.52	71.25	1374.59	71.81	1374.79	72.31	1375	72.34	1375.01
72.96	1375.28	73.65	1375.57	74.38	1375.87	74.68	1376	76.08	1376.59
77.06	1377	77.81	1377.31	79.43	1378	79.55	1378.05	79.87	1378.19
81.36	1378.81	81.8	1379	83.08	1379.54	84.16	1380	84.7	1380.23
85.37	1380.51	86.53	1381	87.07	1381.23	87.33	1381.33	88.08	1381.62
89.12	1382	90.21	1382.38	90.92	1382.39	91.36	1382.37	92.88	1382.34
101.22	1382.63	104.15	1382.63	108.37	1382.7	114.59	1382.76	119.75	1382.76
122.48	1382.91	123.65	1382.95	125.01	1383	125.58	1383	125.96	1383
126.63	1383	127.13	1382.21	127.25	1382	127.36	1381.66	127.65	1381
128.27	1380.05	128.33	1380.02	128.39	1380	128.43	1380	128.57	1380
128.62	1380	128.85	1380	130.13	1379.12	130.26	1379	130.39	1378.91
130.79	1378.64	130.93	1378.81	131.08	1379	131.52	1379.53	131.9	1380
132.71	1380.98	132.73	1381	132.9	1381	132.97	1381	133.88	1381.27
135.02	1381.61	135.35	1381.71	135.86	1381.86	136.33	1382	137.66	1382.19
138.41	1382.29	138.63	1382.32	138.8	1382.34	138.93	1382.35	140.34	1382.61
141.88	1382.69	146.72	1382.89	146.87	1382.88	146.88	1382.88	146.89	1382.88
146.94	1382.88	147.04	1382.88	151.84	1382.57	152.03	1382.59	153.57	1382.84
155.45	1382.84	156.47	1382.76	158.65	1382.66	160.66	1382.56	161.37	1382.52
161.68	1382.5	161.85	1382.54	163.47	1382.81	170.09	1382.98	171.05	1383
171.09	1383	176.07	1383.12	176.56	1383.13	176.77	1383.14	176.8	1383.13
177.33	1383	178.49	1383	178.96	1383	180.48	1383	181.94	1383
182.09	1383.31	182.83	1383.12	214.89	1375.11	250	1374.41	285.1	1375.11
316.3	1382.91	332.3	1383.23	334.74	1383.84	344.55	1383.63	346.65	1383.74
352.32	1385.14	353.33	1385.13	362.51	1384.99	362.58	1384.99	363.01	1384.99
363.09	1384.49	364.51	1384.58	410.2	1385.5	446.29	1384.78	453.3	1384.43
456.31	1383.93	464.13	1386.22	464.46	1386	464.69	1386.06	465.9	1386.36
468.66	1386.26	476.04	1386	481.96	1385.79	485.51	1385.66	485.91	1385.82
486.33	1386	487.34	1386.41	488.77	1387	490.64	1387.77	491.2	1388
492.46	1388.52	493.64	1389	493.91	1389.11	495.94	1389.95	496.07	1390
496.09	1390.01	498.24	1390.91	498.93	1390.95	499.85	1391	500	1391.01

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

```
*****************************************************************************
       0    .025  182.83    .032  214.89    .028   285.1    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09   316.3           100.03     100  100.01              .1       .3
Ineffective Flow     num=        1
   Sta L   Sta R    Elev  Permanent
       0  182.09 1383.31        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7600

INPUT
Description: Channel Station 54299.16
Station Elevation Data    num=     110
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1377.48     .06  1377.5     .54 1377.67    1.49    1378    1.78  1378.1
    2.06  1378.2    3.27 1378.62    4.34    1379    4.73 1379.14    5.11 1379.27
    6.21 1379.66    7.18    1380    7.39 1380.07     7.5 1380.11    8.42 1380.44
    8.59  1380.5    9.57 1380.85    9.78 1380.92      10    1381   11.36 1381.47
    11.4 1381.49   11.43  1381.5   15.35 1381.95   15.78    1382   17.05 1382.04
   23.14  1382.3   23.76 1382.28   25.38 1382.27   34.32 1382.16   36.51 1382.14
   36.77 1382.13   37.03 1382.12   37.21 1382.11   37.27 1382.11   37.31 1382.11
   37.32  1382.1   37.34 1382.11   39.55 1382.25   39.63 1382.26   39.69 1382.26
   39.74 1382.27   43.15 1382.53   45.69  1382.5   47.82  1382.5   54.62 1382.49
   57.32 1382.54   59.03 1382.58   64.12 1382.51   86.54 1382.36   88.34 1382.37
   89.96 1382.42  108.31 1382.84   108.8 1382.83  109.11 1382.83  109.32 1382.83
  110.64 1382.83   122.8 1382.69  127.02 1382.77  129.12 1382.79  131.38 1382.73
  135.04 1382.82  138.32  1382.9  140.16 1382.91  140.22 1382.91  140.29 1382.91
   140.9 1382.91  148.98 1382.94  177.07 1382.98  177.09 1382.99   177.1 1382.99
  179.28    1383  180.25    1383  182.09 1383.23  183.03 1382.99  214.89 1375.03
     250 1374.33  285.11 1375.03  316.31 1382.83  332.31 1383.15  335.26 1383.89
  339.39 1383.84   349.2 1384.08  354.73 1385.47  355.73 1385.45  369.36 1385.25
   369.8 1385.25  369.86 1385.25  369.95 1384.75  371.37 1384.83  417.06 1385.75
  453.14 1385.04  460.16 1384.69  463.16 1384.19  470.21 1385.95  470.29    1386
  470.61 1386.08  471.92 1386.39  473.75 1386.21  475.33    1386  491.52 1385.71
  492.67 1385.69  492.69  1385.7  493.15 1385.89  493.43    1386  493.51 1386.03
  495.86    1387  497.92 1387.85  498.29    1388  498.41 1388.05     500 1388.71

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  183.03    .032  214.89    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  316.31           102.51     100   99.47              .1       .3
Ineffective Flow     num=        1
   Sta L   Sta R    Elev  Permanent
       0  182.09 1383.23        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7500

INPUT
Description: Channel Station 54399.16
Station Elevation Data    num=     111
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1380.03     1.4 1380.27    4.97 1380.58     5.7 1380.63    5.92 1380.65
    6.14 1380.66    6.34 1380.67    6.51 1380.67    8.56 1380.75     8.7 1380.75
    8.88 1380.77    9.12 1380.78    9.44 1380.81     9.9 1380.84   10.22 1380.86
   10.78 1380.89    11.3 1380.91   11.86 1380.95   12.17 1380.95   12.37 1380.95
    12.7 1380.95   12.83 1380.96   13.28 1380.97   14.01    1381    14.1    1381
   15.12 1381.06   15.16 1381.04   15.25 1381.07   15.56  1381.1   18.55  1381.5
    21.1 1381.72   21.52 1381.74   23.18 1381.92    25.1    1382    25.2    1382
   25.46    1382   25.89 1382.02   26.08 1382.02   26.57 1382.03   28.72 1382.11
   36.79 1382.23   40.64 1382.38   42.65 1382.44   45.83 1382.53   48.72 1382.59
   51.83 1382.65   52.12 1382.65   52.37 1382.65   56.27 1382.63   59.43 1382.61
   60.45 1382.57   60.81 1382.57   64.88  1382.5    66.1 1382.55   70.33 1382.76
   70.61 1382.76   70.74 1382.76   70.78 1382.76   71.42 1382.77   72.48 1382.77
   90.56 1382.85  107.26    1383  108.28    1383  110.16    1383  113.01    1383
  115.21    1383  118.02    1383  160.59 1383.46  163.95 1383.49  173.67 1383.68
   173.9 1383.62  176.44    1383  177.15    1383  179.32    1383  179.87  1383.7
   214.9 1374.95     250 1374.25  285.11 1374.95  316.31 1382.75  341.91 1383.26
  343.99 1383.78  355.17 1384.19  358.82 1384.24  364.51 1385.66  365.51 1385.65
  375.76  1385.5  375.99  1385.5  376.07    1385  377.49 1385.08   423.1    1386
  459.12 1385.28  466.13 1384.93  469.13 1384.43   474.2  1385.7   475.2    1386
  475.45 1386.06  475.87 1386.15   476.6 1386.32  476.64 1386.03  476.64    1386
  477.45    1386  477.49    1386  477.58 1386.01  477.61 1386.01  477.93 1386.01
  478.24    1386  485.15 1385.89  498.62 1385.68  499.14 1385.91  499.34    1386
     500 1386.29

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  179.87    .032   214.9    .028  285.11    .032  316.31    .025

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

```
        179.87  316.31           109.18     100   89.79              .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  182.09 1383.15       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7400

INPUT
Description: Channel Station 54499.16
Station Elevation Data    num=      72
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0  1382.6    9.77 1382.72   13.13 1382.74   17.85 1382.76   23.01 1382.76
   89.47    1383   94.94    1383   95.78    1383   98.56  . 1383   99.16    1383
  100.22    1383  100.77    1383   102.3    1383  102.81    1383  107.85    1383
  172.56  1383.7  172.64  1383.7  173.33  1383.7   173.6 1383.63  175.35  1383.2
  176.16    1383  176.56    1383  176.74    1383   177.3    1383  179.49 1383.72
   186.5 1381.97   214.9 1374.87     250 1374.17  285.11 1374.87  316.31 1382.67
  337.57 1383.09  340.41  1383.8  352.65 1384.13  353.28 1384.29  359.91 1385.93
  360.44 1385.92  360.92 1385.91  363.47 1385.87  365.96 1385.84  369.81 1385.78
  373.72 1385.72  373.94 1385.72  374.22 1385.72  374.26 1385.44   374.3 1385.22
  374.92 1385.26  375.72  1385.3  391.16 1385.61  421.44  1386.2  446.78 1385.69
  457.54 1385.48  458.02 1385.45  464.56 1385.13  464.62 1385.11  465.21 1384.96
  465.86  1385.1  472.28    1386  473.12 1386.12  474.17 1386.26   474.9 1386.14
   475.7    1386  475.91 1385.96  476.03 1385.94  476.08 1385.93  495.52 1385.71
  497.12 1385.69   497.2 1385.73  497.76    1386   499.8 1386.97  499.86    1387
  499.92 1387.03     500 1387.07

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025   186.5    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        179.49  316.31            96.46     100  105.69              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7300

INPUT
Description: Channel Station 54599.16
Station Elevation Data    num=      68
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1382.83   22.92    1383   37.95    1383   41.79    1383   54.51    1383
   61.12    1383   65.23    1383  134.87 1383.53  139.54 1383.58  143.95 1383.59
  174.22 1383.37  174.84 1383.37  174.87 1383.36  174.89 1383.36  174.94 1383.34
  175.79 1383.13  176.29    1383  179.55 1382.67  180.46  1383.4   214.9 1374.79
     250 1374.09  285.11 1374.79   316.3 1382.59  332.31 1382.91  336.55 1383.97
  350.17 1384.13  357.22 1386.14  358.18 1386.12  366.84 1385.99  367.31 1385.99
  367.34 1385.99  367.42 1385.49  368.75 1385.57  368.84 1385.58  414.44 1386.48
  450.45 1385.76  457.45 1385.41  458.88 1385.05  464.65 1385.99  465.07    1386
  465.52 1386.06  466.36 1386.18  466.36 1386.15  466.37    1386  466.43    1386
   466.7    1386  467.34    1386  467.61    1386  467.68    1386  467.89 1385.98
   468.7  1385.9  469.35 1385.83  473.93 1385.79  487.54 1385.69  490.41 1385.67
  490.44 1385.69  490.58 1385.76  491.07    1386  492.89  1386.9   493.1    1387
  493.17 1387.03  495.12    1388     496 1388.43  497.15    1389  498.54 1389.69
  499.17    1390  499.55 1390.19     500 1390.41

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  180.46    .032   214.9    .028  285.11    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        180.46   316.3            97.94     100  102.45              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7200

INPUT
Description: Channel Station 54699.16
Station Elevation Data    num=      62
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1382.88   19.55 1382.99   20.34 1382.99    21.9    1383   21.94    1383
    22.1    1383    23.7    1383   25.22    1383   28.87    1383   30.26    1383
   31.18    1383   84.85 1383.22   95.92 1383.26  173.68 1383.51  173.69 1383.51
   173.7 1383.51  173.72  1383.5  173.84 1383.47  175.73    1383  176.76  1382.9
  179.59 1383.53  214.89 1374.71     250 1374.01   285.1 1374.71   316.3 1382.51
  332.31 1382.83  338.41 1384.35  344.44 1384.54   350.6 1386.49   351.6 1386.48
  366.42 1386.26  366.51 1386.26  366.92 1386.26     367 1385.76  368.42 1385.84
     414 1386.75     450 1386.03     457 1385.68  458.03 1385.43  463.37    1386
  464.32  1386.1  464.37  1386.1   464.7  1386.1  465.88 1386.01   468.5 1386.06
  470.48 1386.03  472.75    1386  481.32 1385.84  488.98 1385.69  489.34 1385.85
```

489.68	1386	491.17	1386.67	491.91	1387	493.81	1387.86	494.12	1388		
494.79	1388.31	496.26	1389	497.58	1389.62	498.39	1390	498.61	1390.1		
499.36	1390.45	500	1390.76								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	179.59	.032	214.89	.028	285.1	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
179.59	316.3	100.01	100	100.03	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7100

INPUT
Description: Channel Station 54799.16
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.09	5.3	1383.11	6.86	1383.12	44.84	1383.2	85.12	1383.33
104.93	1383.38	172.78	1383.66	172.8	1383.65	172.81	1383.65	172.85	1383.64
174.46	1383.24	175.41	1383	179.05	1383.59	214.89	1374.63	250	1373.93
285.1	1374.63	316.3	1382.43	332.31	1382.75	338.62	1384.33	347.63	1384.28
357.11	1386.65	358.11	1386.64	366.4	1386.51	366.82	1386.51	366.9	1386.51
366.99	1386.01	368.4	1386.1	413.99	1387.01	449.99	1386.29	456.99	1385.94
458.4	1385.59	462.37	1386	462.71	1386	462.79	1386	462.86	1386
462.87	1386	463.18	1386.03	463.23	1386.02	463.41	1386	464.12	1386
464.76	1386	465.61	1386.05	467.31	1386.16	468.27	1386.2	469.08	1386.19
479.62	1386	488.69	1385.85	488.89	1385.84	488.93	1385.86	489.23	1386
489.75	1386.25	491.32	1387	492.68	1387.65	493.42	1388	493.92	1388.24
495.53	1389	496.84	1389.62	497.64	1390	498.32	1390.32	499.76	1391
500	1391.11								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	179.05	.032	214.89	.028	285.1	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
179.05	316.3	95.01	100	105.49	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7000

INPUT
Description: Channel Station 54899.16
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.25	90.86	1383.7	150.14	1384	156.45	1384.05	160.42	1384.09
170.6	1384.18	170.66	1384.16	170.76	1384.14	170.91	1384.1	171.31	1384
176.47	1384.15	214.9	1374.55	250	1373.85	285.11	1374.55	316.31	1382.35
332.31	1382.67	339.42	1384.45	345.06	1384.36	353.7	1387.02	354.7	1387
369.03	1386.79	369.18	1386.79	369.53	1386.79	369.62	1386.29	371.04	1386.37
416.69	1387.29	449.99	1386.63	452.75	1386.58	459.76	1386.23	461.62	1385.76
461.64	1385.99	464.71	1385.94	465.34	1385.98	465.77	1386	468.8	1386.18
469.62	1386.23	471.16	1386.32	475.9	1386.27	491.5	1386.06	492.07	1386.33
492.99	1386.75	493.52	1387	493.96	1387.2	495.72	1388	497.66	1388.88
497.93	1389	499.34	1389.64	500	1389.94				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	176.47	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.47	316.31	103.4	100	95.97	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6900

INPUT
Description: Channel Station 54999.16
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.25	60.93	1383.57	64.02	1383.58	96.55	1383.71	102.73	1383.73
107.83	1383.75	116.1	1383.79	159.31	1383.98	160.59	1383.98	162.37	1383.98
163.38	1383.99	165.62	1383.99	168.48	1384	169.27	1384	169.91	1384
170.28	1384	170.65	1384.01	170.66	1384.01	170.68	1384	176.67	1384.02
214.9	1374.47	250	1373.77	285.11	1374.47	316.31	1382.27	338.97	1382.72
346.41	1384.58	355.77	1384.54	366.35	1387.18	367.36	1387.17	375.77	1387.04
375.96	1387.04	376.27	1387.04	376.35	1386.54	377.77	1386.63	423.41	1387.54
459.45	1386.83	466.45	1386.48	469.09	1385.82	469.64	1385.89	469.88	1385.87
470.06	1385.89	471.67	1386	472.38	1386.04	477.37	1386.34	497.43	1386.38

```
  497.83 1386.38  497.89 1386.41  499.21    1387  499.41 1387.09     500 1387.35

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  176.67    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.67  316.31           100.01     100  100.11              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6800

INPUT
Description: Channel Station 55099.16
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1383.01   16.02 1383.06   16.44 1383.06   17.11 1383.06   25.11  1383.1
   32.55 1383.13   57.06 1383.24   82.58 1383.38  163.85 1383.96  170.75 1383.88
  171.38 1383.72  171.69 1383.65  172.61 1383.42  174.29    1383   176.8 1383.91
   214.9 1374.39     250 1373.69  285.11 1374.39  316.31 1382.19  342.65 1382.71
  350.24 1384.61   353.2  1384.6  361.18 1387.44  361.39 1387.52  362.38  1387.5
  377.09 1387.28  377.11 1387.28  377.59 1387.28  377.67 1386.78  379.04 1386.86
  379.09 1386.86  424.68 1387.77  460.69 1387.05  467.69  1386.7  470.98 1385.88
  471.03 1385.85  472.23 1385.94  472.96    1386  475.85 1386.22  478.91 1386.44
  498.69 1386.45  499.11 1386.45  499.14 1386.46     500 1386.82

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025   176.8    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         176.8  316.31           103.39     100   95.64              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6700

INPUT
Description:
Station Elevation Data    num=      80
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.77   29.21 1382.96   30.49 1382.96   31.83 1382.96   33.28 1382.97
   36.08 1382.98   41.52 1383.01   42.65    1383   44.43    1383    47.4    1383
   48.62    1383   49.71    1383   50.18 1383.01   60.16  1383.1   71.16 1383.21
   79.19 1383.31   79.42 1383.31   85.11 1383.32   86.23 1383.33  111.03 1383.47
  113.86 1383.48  136.97 1383.61  145.08 1383.65  151.55 1383.73  165.73 1383.82
  168.33 1383.93  169.61 1383.98  169.74 1383.99  169.97    1384  170.11    1384
  170.15    1384  170.18    1384  170.22    1384  170.23    1384  170.62  1383.9
   171.4 1383.71     172 1383.56  172.32 1383.48  172.46 1383.44  172.57 1383.41
   172.8 1383.36   173.6 1383.16  174.23    1383  174.79 1382.86  175.19 1382.76
  176.11 1382.53  176.16 1383.99   214.9 1374.31     250 1373.61  285.11 1374.31
  316.31 1382.11  337.18 1382.53  346.46  1384.9  353.75 1384.69  365.63 1387.67
  365.72 1387.67  366.63 1387.65  374.63 1387.53  374.68 1387.53  375.13 1387.53
  375.22 1387.03  376.63 1387.12  422.23 1388.03  458.24  1387.3  465.24 1386.95
  469.08 1385.99  469.18    1386  469.19    1386  469.36 1385.96  469.45 1385.96
  469.83 1385.99  469.95    1386  470.24 1386.02  477.02 1386.52  494.37  1386.5
  497.24 1386.49  497.74  1386.7  498.45    1387  499.81 1387.58     500 1387.66

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  176.16    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.16  316.31            12.38   12.38   12.38              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6687.62

INPUT
Description: Begin Channel Bottom Transition (Begin Flow Contraction)
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  178.89  1383.3  214.89  1374.3     250  1373.6   285.1  1374.3   316.3  1382.1
  342.65 1382.62  351.11 1384.74   354.9 1384.63  367.05 1387.68  374.32 1387.57
  374.82 1387.57   374.9 1387.07  376.32 1387.15  421.92 1388.06  457.93 1387.34
  464.93 1386.98  468.75 1386.03

Manning's n Values         num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
  178.89     .04  214.89    .028   285.1     .04   316.3    .025
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        178.89   316.3             14.9    14.9    14.9             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6675.17*

INPUT
Description: Upatream End of Riprap
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  176.57 1383.87  202.74 1375.76  213.75 1374.31     250 1373.59   285.1 1374.29
  295.63 1375.71   316.3 1382.09  342.61 1382.61  347.57 1383.28  351.06 1384.15
  354.84 1384.57  366.98 1387.61   367.7 1387.69  373.71  1387.6  374.23  1387.6
  374.29  1387.6  374.37 1387.35  374.73 1387.36  374.81 1387.11  375.79 1387.17
  376.23 1387.18  421.45 1388.09  421.76 1388.09  457.53 1387.37  457.71 1387.37
  464.54 1387.02   464.7 1386.99  468.52 1386.05

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*****************************
  176.57     .04   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.57   316.3              10      10      10             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  176.57     203    1382       F
     297  468.52    1382       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6662.73

INPUT
Description: Upstream End of Wing Wall
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  174.26 1384.44  201.25 1374.55     250 1373.58  295.63 1374.49  316.31 1382.08
  347.53  1382.7  367.62 1387.72  373.62 1387.63   374.2 1387.63  374.28 1387.13
   375.7 1387.21  421.29 1388.12  457.31  1387.4  464.31 1387.05  468.28 1386.06

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************
  174.26          174.26    .015  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.26  316.31             15.93   15.93   15.93             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  174.26     210    1382       F
     291  468.28    1382       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6646.88

INPUT
Description: Upstream Face of C11
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
     217  1385.5     217 1373.56     283 1373.56     283  1385.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************
     217             217    .015     283

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           217     283               61      61      61             .3       .5

CULVERT


RIVER: River
REACH: Ellsworth          RS: 6615

INPUT
Description:
Distance from Upstream XS =      6.5
Deck/Roadway Width        =       48
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=       2
```

```
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       01384.186             5001387.795

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
     217  1385.5     217 1373.56     283 1373.56     283  1385.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
     217             217    .015     283

Bank Sta: Left   Right    Coeff Contr.   Expan.
           217     283             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       01384.186             5001387.795

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
     217  1385.5     217 1373.47     283 1373.47     283  1385.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
     217             217    .015     283

Bank Sta: Left   Right    Coeff Contr.   Expan.
           217     283             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
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 #11        Box       8      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      61     .015     .015        1                  .4                 1
Number of Barrels =  5
Upstream   Elevation =  1373.57
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
     224     237     250     263     276
Downstream Elevation =  1373.46
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
     224     237     250     263     276

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6585.95

INPUT
Description: Downstream Face of C11
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
     217  1385.5     217 1373.47     283 1373.47     283  1385.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
     217             217    .015     283

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           217     283             14.26   14.26   14.26             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6571.49

INPUT
Description: Downstream End of Wing Wall
Station Elevation Data    num=      17
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  174.66 1384.21  204.82 1374.36     250 1373.45   299.2 1374.44  324.89  1384.1
  340.89 1384.42  343.64 1385.11  357.22 1385.11  368.81 1387.98  374.72 1387.89
  375.29 1387.89  375.37 1387.39   376.7 1387.47  422.43 1388.39  458.48 1387.67
  465.49 1387.33  469.29 1386.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  174.66          174.66     .04  324.89    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.66  324.89                 10      10      10             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  174.66     210    1384        F
     291  469.29    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6559.04*

INPUT
Description: Downstream End of Riprap
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  174.93 1384.13  204.98 1375.46  214.79 1374.14     250 1373.44  285.42 1374.14
  298.77 1375.93  324.23 1383.92  340.03 1384.23  340.43 1384.29  343.22 1384.98
  344.08 1385.09  356.59 1385.15  356.97 1385.19  367.99 1387.95   368.7 1388.03
  374.68 1387.94  375.26 1387.93  375.34 1387.68  376.49 1387.71  376.69 1387.71
     377 1387.72  378.48 1387.52  422.99 1388.42  423.62 1388.42  459.27 1387.71
  459.49  1387.7   466.2 1387.37  466.59 1387.32  470.44 1386.35

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************
  174.93     .04  214.79    .028  285.42     .04  324.23    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.93  324.23                14.9    14.9    14.9             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  174.93     204    1384        F
     296  470.44    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6546.60

INPUT
Description: End Channel Bottom Transition (Fully Expanded Flow)
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  175.19 1384.05  214.91 1374.12     250 1373.42  285.11 1374.12  323.57 1383.73
  339.57 1384.05  343.67 1385.08  356.33 1385.18  367.87 1388.09  376.48 1387.96
  376.99 1387.96  378.49 1387.54  424.19 1388.46  460.28 1387.75   467.3  1387.4
  471.59 1386.33

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************
  175.19    .032  214.91    .028  285.11    .032  323.57    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.19  323.57                19.6    19.6    19.6             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6527

INPUT
Description:
Station Elevation Data    num=      76
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1383.56  110.59 1384.04  113.65 1384.04  123.88 1384.04  124.04 1384.04
  124.12 1384.04  124.18 1384.04  124.72 1384.04   127.4 1384.04   130.2 1384.06
  142.56  1384.1  165.74 1384.19  168.53  1384.2  168.74 1384.15  169.16 1384.04
  169.46 1383.97  173.15 1383.04  175.55 1382.44  176.09 1383.79  182.09 1382.29
   214.9 1374.09     250 1373.39  285.11 1374.09  317.92 1382.29  318.88 1382.04
  330.19 1382.04  334.12 1382.04  339.78 1382.04   343.7 1382.04  348.17 1382.04
  349.34 1382.34  352.04 1383.04   355.9    1384  356.07 1384.04  356.23 1384.08
  356.25 1384.08  360.19 1385.04  360.21 1385.04  360.22 1385.05  360.29 1385.06
  360.41 1385.09  360.42 1385.36  360.43 1386.04  360.46 1386.15  360.59 1387.04
  362.65 1387.56  364.55 1388.04  364.86 1388.08  365.89 1388.22  366.73 1388.33
  371.49 1388.23  376.35 1388.14  381.39 1388.04  381.45 1387.72  381.46 1387.62
```

385.56	1387.71	388.79	1387.79	399.73	1388.04	400.95	1388.06	428.69	1388.62
435.72	1388.48	438.97	1388.42	457.14	1388.06	457.97	1388.04	458.19	1388.04
458.31	1388.04	464.86	1387.91	469.67	1387.45	471.71	1387.26	473.98	1387.04
474.56	1386.9	476.39	1386.44	478.69	1386.56	482.55	1386.76	495.51	1386.81
500	1386.82								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.09	317.92	27	27	27	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6500

INPUT
Description: Channel Station 55399.16
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.52	110.59	1384	113.65	1384	123.88	1384	124.04	1384
124.12	1384	124.18	1384	124.72	1384	127.4	1384	130.2	1384.02
142.56	1384.06	165.74	1384.15	168.53	1384.16	168.74	1384.11	169.16	1384
169.46	1383.93	173.15	1383	174.47	1384.16	214.9	1374.05	250	1373.35
285.11	1374.05	324.05	1383.79	340.05	1384.11	343.72	1385.03	356.65	1385.07
365.73	1388.31	366.73	1388.3	381.25	1388.09	381.41	1388.09	381.76	1388.09
381.84	1387.59	383.27	1387.67	429.14	1388.59	465.37	1387.88	472.41	1387.53
476.92	1386.41	478.69	1386.52	482.55	1386.72	495.51	1386.77	500	1386.78

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
174.47	324.05	92.36	100	109.95	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6400

INPUT
Description: Channel Station 55499.16
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.37	29.72	1383.5	35.39	1383.52	132.05	1384	134.8	1384
136.42	1384	139.22	1384	140.89	1384	143.15	1384	143.9	1384
146.31	1384	147.5	1384	148.24	1384	149.32	1384	149.82	1384
150.4	1384	157.69	1384.04	168.19	1384.1	168.35	1384.06	168.61	1384
169.44	1383.79	172.59	1383	174	1384.14	214.89	1373.91	250	1373.21
285.11	1373.91	325.27	1383.95	341.27	1384.27	344.19	1385.01	375.3	1385.26
388.18	1388.37	389.21	1388.35	398.91	1388.21	399.11	1388.21	399.42	1388.21
399.5	1387.71	400.95	1387.79	447.46	1388.71	484.18	1387.98	491.33	1387.63
495.15	1386.7	496.7	1387	496.8	1387	496.85	1387	496.94	1387
497.86	1387.01	499.18	1387.03	500	1387.04				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
174	325.27	89.93	100	111.65	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6300

INPUT
Description: Channel Station 55599.16
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.48	63.98	1383.8	106.21	1384	110.96	1384	114.55	1384
131.6	1384.11	134.86	1384.14	142.15	1384.18	165.85	1384.38	166.61	1384.39
166.66	1384.38	166.8	1384.34	168.15	1384	172.01	1383.03	172.14	1383
172.17	1384.46	214.9	1373.77	250	1373.07	285.11	1373.77	328.6	1384.65
344.6	1384.97	347.74	1385.75	402	1386.29	410.45	1388.35	411.47	1388.34
427.25	1388.1	427.67	1388.1	427.77	1388.1	427.85	1387.6	429.33	1387.69
476.85	1388.57	514.38	1387.83	521.68	1387.47	523.31	1387.08	523.38	1387.06

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        172.17   328.6             95.01     100  105.75             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6200

INPUT
Description: Channel Station 55699.16
Station Elevation Data    num=     173
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1383.55   91.55    1384   94.94 1384.02   98.15 1384.05  164.96 1384.64
  165.46 1384.52  166.01 1384.38  167.52    1384  169.15 1383.59  170.58 1384.71
   214.9 1373.63     250 1372.93  285.11 1373.63  331.63 1385.27  347.63 1385.59
  351.26 1386.49  352.07    1385  352.71 1385.16  356.07    1386  357.88 1386.45
  358.52 1386.61   358.6 1386.23   358.8    1386  359.06    1386  359.11 1385.94
  359.12 1385.94  359.39 1385.99  359.42    1386  359.66 1386.04  359.89 1386.09
  360.04 1386.11  360.23 1386.15  360.36 1386.17  360.43 1386.19  360.51 1386.19
  360.59 1386.17  360.69 1386.19  360.78 1386.15  360.94 1386.08  360.99 1386.06
  361.15    1386  361.21 1385.97  361.22 1385.97  361.51 1385.85  361.54 1385.82
  361.71 1385.74  361.79 1385.67  361.89 1385.63  361.92 1385.61  362.03  1385.5
  362.07 1385.48   362.1 1385.46  362.13 1385.44  362.28 1385.28  362.32 1385.24
  362.52 1385.01  362.53 1385.01  363.67 1385.33  363.77 1385.29  363.85 1385.27
  364.11 1385.32  364.87  1385.5  365.32 1385.58  365.75 1385.68  367.14    1386
  368.28 1386.09  368.55 1386.05  368.58 1386.04  369.04 1386.03  369.12 1386.04
   374.2 1386.14  376.81  1386.2  379.56 1386.66  384.49  1386.8  384.89 1386.81
  385.67 1386.83  389.56 1386.76  392.65 1386.73  393.99 1386.72  397.58 1386.76
  397.72 1386.76  400.73  1386.8  400.93 1386.81  409.75 1386.47  409.88 1386.48
  411.12 1386.41  411.61 1386.44  411.63 1386.44  411.66 1386.44  411.69 1386.44
  411.72 1386.44  411.75 1386.45  411.78 1386.45  411.92 1386.46  412.15 1386.46
  412.59 1386.47  415.44  1386.3  415.82 1386.31  416.54 1386.38  416.63 1386.39
   417.1 1386.36  420.52    1386  424.56 1385.66  424.59 1385.65  424.61 1385.65
  424.64 1385.64  424.67 1385.63   424.7 1385.62  424.74  1385.6  424.78 1385.59
  424.82 1385.58  424.87 1385.56  424.91 1385.55  424.97 1385.53  425.43 1385.47
  427.53 1385.21  428.34 1385.13  428.96    1385   429.8    1385  430.09 1384.97
  431.52 1384.74  431.92  1384.8  432.05 1384.82  432.24 1384.84  432.49 1384.88
  432.81 1384.92  433.39    1385  433.43 1385.01  433.45 1385.01  433.91 1385.07
  434.35 1385.13  434.65 1385.17  437.19 1385.52  438.16 1385.65  439.97 1385.89
  440.77    1386  442.51 1386.24  444.47  1386.5  446.39 1386.76  448.14    1387
  451.43 1387.48  454.78 1387.96  455.81  1387.9  456.08 1387.88  456.71 1387.84
  457.43 1387.79  459.44 1387.67  464.81 1387.32  465.55 1387.33  465.65 1387.33
  465.71 1387.34  466.45 1387.35  466.47 1387.35  466.51 1387.35  466.55 1387.35
   466.6 1387.35  466.64 1387.35  466.67 1387.36  466.69 1387.36  466.74 1387.36
  466.82 1387.36  466.94 1387.36  467.15 1387.36   467.5 1387.37  486.44 1387.74
  488.23 1387.78  490.22 1387.82  492.45 1387.86  494.94 1387.91  497.41 1387.96
  499.69    1388  499.73    1388     500 1388.01

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.58  331.63             89.55     100  112.01             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6100

INPUT
Description: Channel Station 55799.16
Station Elevation Data    num=      86
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1383.59   82.13    1384  127.02 1384.24  165.47 1384.45  165.56 1384.43
  165.64  1384.4  165.89 1384.34   166.3 1384.24  167.25    1384  168.95 1383.57
  170.94 1384.48   214.9 1373.49     250 1372.79   285.1 1373.49  331.47 1385.08
  347.47  1385.4  350.86 1386.25  352.83    1385   353.8 1385.24  354.83  1385.5
  356.84    1386  357.44 1386.15  357.77 1386.23  358.03  1386.3  358.11 1386.32
  359.48 1386.33  375.69  1386.5   380.5 1386.76  380.58 1386.76  380.75 1386.75
  386.04 1386.54  387.17 1386.46  388.61 1386.34   390.9 1386.15  391.94 1386.06
  392.71    1386  392.75    1386  392.87 1385.99  393.07 1385.99  393.42    1386
  395.03 1386.04  398.03 1386.11  415.59 1386.65  416.61 1386.87  417.31    1387
  417.83 1387.12     418 1387.16  418.27 1387.12  418.94 1387.01  419.04    1387
  419.08 1386.99  420.97 1386.71  424.51 1386.74  425.18 1386.74  425.99 1386.74
  451.35    1387  456.73 1386.39  458.65 1386.28  463.29 1386.04   463.4 1386.04
  464.11    1386  472.96 1385.44   474.9 1385.31  477.66 1385.25  479.14 1385.42
  479.74 1385.34  480.55 1385.36  482.36 1385.56  483.92 1385.51  484.19  1385.4
  484.62 1385.24  484.94 1385.09  485.14    1385  485.14 1384.72  485.14 1384.58
  485.57 1384.63  486.17 1384.69  486.35 1384.71  489.16    1385  491.63 1385.26
  493.09 1385.41  496.06 1385.72  497.57 1385.87   498.8    1386  499.69 1386.09
     500 1386.13

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .032   214.9    .028   285.1    .032

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

```
        170.94  331.47            89.86     100  110.57              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6000

INPUT
Description: Channel Station 55899.16
Station Elevation Data    num=      37
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  1383.6   79.15     1384  160.87 1384.42  164.86 1384.44  164.99  1384.4
  165.11 1384.37  165.75 1384.21  170.44 1384.47  214.89 1373.35     250 1372.65
   285.1 1373.35  329.24 1384.39  345.24 1384.71   348.4  1385.5  349.31    1384
  352.78 1384.87  353.32     1385  353.57 1385.06  355.34 1385.51  369.13 1385.81
  376.55    1386     377     1386  378.38 1386.09   378.9 1386.13  379.06 1386.14
  393.66 1386.29  397.21 1386.33   399.7 1386.35  406.47 1386.41  452.27 1386.92
  457.22 1386.93  487.79     1387  489.27    1387  494.74    1387  496.07    1387
  497.58    1387     500     1387

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .032  214.89    .028   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.44  329.24            93.44     100  106.76              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 5900

INPUT
Description: Channel Station 55999.16
Station Elevation Data    num=      59
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1383.59   25.64 1383.72   58.28 1383.87   78.75 1383.97    84.8    1384
   93.86 1384.04  115.63 1384.15  155.47 1384.34  159.16 1384.35  160.69 1384.36
  161.52 1384.36  162.31 1384.37  164.28 1384.38  164.36 1384.36  164.44 1384.34
  164.72 1384.27  165.15 1384.16  165.78    1384  170.11 1384.41  214.89 1373.21
     250 1372.51  285.11 1373.21  330.96 1384.68  346.96    1385  351.07 1386.03
  353.38 1384.95  353.57     1385  353.81 1385.06  355.39 1385.46  357.57    1386
  357.94 1386.08  358.18 1386.14  358.33 1386.14  358.43 1386.14  358.54 1386.14
  358.69 1386.14  359.07 1386.14  360.99 1386.13  362.88 1386.13  364.09 1386.14
  364.98 1386.14  366.17 1386.14  366.69 1386.14  367.76 1386.14  368.52 1386.14
  377.89 1386.14  381.11 1386.14  383.25 1386.14  403.59 1386.24  405.81 1386.25
  409.17 1386.26  418.09 1386.32  480.91 1386.46  481.26 1386.46  481.77 1386.47
  481.94 1386.47  481.99 1386.47  483.09 1386.47     500 1386.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.11  330.96            93.19     100  106.49              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 5800

INPUT
Description: Channel Station 56099.16
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1383.54   34.88 1383.67  110.24 1383.97  113.15 1383.98  118.47    1384
  143.99 1384.11  158.55 1384.18  164.47  1384.2  164.68 1384.15  165.17 1384.03
  165.29    1384  166.23 1383.76  166.65 1383.66  169.28    1383  170.23 1384.24
  214.89 1373.07     250 1372.37  285.11 1373.07  332.74 1384.98  348.74  1385.3
  352.08 1386.14  354.11 1384.96  354.27    1385  354.43 1385.04  354.92 1385.16
  358.28    1386  358.43 1386.04  358.83 1386.14  380.65 1386.14   381.9 1386.14
  382.06 1386.14  382.39 1386.14  382.87 1386.14   383.3 1386.14  383.59 1386.14
  391.32 1386.14  394.62 1386.14  395.33 1386.14  397.72 1386.14  398.92 1386.14
  404.84 1386.14  406.43 1386.14  406.96 1386.14  410.84 1386.14  412.16 1386.14
  437.89 1386.14  454.26 1386.14   458.7 1386.14  464.08 1386.14  475.33 1386.14
  479.87 1386.14  483.47 1386.14  486.34 1386.14  495.15 1386.19     500 1386.21

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.23  332.74            88.19     100  110.63              .1       .3

CROSS SECTION
```

RIVER: River
REACH: Ellsworth RS: 5700

INPUT
Description: Channel Station 56199.16
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.36	8.49	1383.39	18.98	1383.42	60.55	1383.56	68.48	1383.59
79.49	1383.63	157.81	1383.89	165.51	1383.91	165.62	1383.91	165.74	1383.91
165.84	1383.91	165.89	1383.91	165.96	1383.91	166.27	1383.84	166.44	1383.79
166.79	1383.71	167.59	1383.51	169.6	1383	170.85	1383.94	214.9	1372.93
250	1372.23	285.1	1372.93	329.51	1384.03	345.51	1384.35	352.64	1386.14
353.94	1384.57	355.67	1385	356.5	1385.2	359.6	1385.98	360.19	1385.98
367.16	1385.96	370.03	1385.96	371.29	1385.92	371.4	1385.92	372.11	1385.93
391.65	1385.88	392.9	1385.89	393.85	1385.9	393.92	1385.9	394.44	1385.9
422.08	1385.84	422.77	1385.85	427.96	1385.88	446.81	1385.86	466.25	1385.91
466.5	1385.91	467.71	1385.92	469.85	1385.93	473.13	1385.95	475.6	1385.96
476.25	1385.96	482.85	1386	483.17	1386	486.08	1386.02	500	1386.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.85	329.51	93.95	100	105.17	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5600

INPUT
Description: Channel Station 56299.16
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.09	8.65	1383.12	18.96	1383.16	78.36	1383.36	104.34	1383.47
120.76	1383.53	132.85	1383.57	163.38	1383.68	163.42	1383.68	163.44	1383.68
163.65	1383.68	164.95	1383.69	165.47	1383.69	165.63	1383.65	165.79	1383.61
166.64	1383.4	168.23	1383	171.26	1383.7	214.89	1372.79	250	1372.09
285.1	1372.79	327.36	1383.36	343.36	1383.68	348.56	1384.98	350.07	1383.67
351.41	1384	353.24	1384.46	355.4	1385	355.85	1385.11	355.98	1385.14
362.11	1385.07	376.49	1385	381.77	1384.95	381.83	1384.95	382.07	1384.95
399.96	1384.82	400.46	1384.82	401.28	1384.82	425.74	1384.75	431.73	1384.75
433.31	1384.75	438.85	1384.76	440.73	1384.76	443.2	1384.77	444.93	1384.78
446.04	1384.78	446.2	1384.78	448.24	1384.79	448.83	1384.79	449.26	1384.79
450.85	1384.79	452.7	1384.79	455.48	1384.8	460	1384.81	460.29	1384.81
460.53	1384.81	460.85	1384.81	461.83	1384.82	463.48	1384.82	465.79	1384.82
468.83	1384.84	470.49	1384.84	471.42	1384.84	476.78	1384.84	477.96	1384.85
478.19	1384.85	479.86	1384.85	487.69	1384.86	491.71	1384.88	493.42	1384.89
495.22	1384.89	497.22	1384.89	500	1384.9				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.26	327.36	93.4	100	105.25	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5500

INPUT
Description: Channel Station 56399.16
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.82	5.38	1382.83	10.81	1382.85	22.39	1382.89	41.87	1382.96
55.9	1383	61.61	1383.02	89.13	1383.11	101.81	1383.15	117.17	1383.2
164.92	1383.36	166.33	1383.36	166.34	1383.36	166.35	1383.36	166.38	1383.35
166.42	1383.34	167.77	1383	170.7	1382.27	171.17	1382.15	171.76	1382
172.02	1383.37	214.89	1372.65	250	1371.95	285.1	1372.65	326.09	1382.9
342.09	1383.22	345.54	1384.08	348.06	1383	352.05	1383.99	352.08	1384
352.54	1384.11	352.63	1384.14	353.64	1384.14	354.27	1384.14	362.77	1384.11
363.48	1384.11	364.64	1384.11	381.19	1384.07	399.11	1384.04	399.72	1384.04
401.32	1384.04	401.36	1384.04	401.73	1384.04	404.49	1384.04	405.67	1384.03
411.27	1384.03	412.76	1384.03	421.8	1384.02	422.45	1384.02	422.51	1384.02
423.59	1384.02	425.37	1384.02	426.56	1384.02	438.02	1384.01	438.08	1384.01
443.83	1384	447.36	1383.99	472.19	1383.93	472.35	1383.94	472.43	1383.94
500	1384.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

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

	172.02	326.09		91.63		100	106.73			.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5400

INPUT
Description: Channel Station 56499.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.56	18.84	1382.6	25.21	1382.61	37.36	1382.64	49.24	1382.68
66.78	1382.74	79.25	1382.76	92.76	1382.81	103.04	1382.84	107.19	1382.85
118.51	1382.89	140.17	1382.95	145.5	1382.96	147.02	1382.96	147.71	1382.97
148.19	1382.97	149.79	1382.97	152.9	1382.97	158.82	1382.98	163.81	1382.99
165.79	1382.99	167.02	1383	169.87	1382.29	170.38	1382.16	171.02	1382
172.24	1381.69	172.97	1383	214.89	1372.51	250	1371.81	285.1	1372.51
323.48	1382.11	339.48	1382.43	342.31	1383.14	344.03	1381.87	344.54	1382
346.8	1382.57	348.54	1383	348.58	1383.01	349.09	1383.14	352.61	1383.14
356.15	1383.14	359.95	1383.2	368.32	1383.14	370.21	1383.14	376.98	1383.14
382.39	1383.14	392.18	1383.14	392.39	1383.14	392.84	1383.14	398.31	1383.21
398.38	1383.21	399.72	1383.19	400.34	1383.19	425.75	1383.35	443.74	1383.42
446.47	1383.41	454.28	1383.39	455.74	1383.39	456.52	1383.4	500	1383.59

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.97	323.48	100.13	100	100.03	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5300

INPUT
Description: Channel Station 56599.16
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.15	26.95	1382.21	30.68	1382.22	33.51	1382.23	53.63	1382.27
57.26	1382.29	96.45	1382.4	107.57	1382.43	127.17	1382.5	131.25	1382.51
163.84	1382.63	163.88	1382.63	164.49	1382.63	165.18	1382.63	168.31	1382.64
168.75	1382.53	169.22	1382.42	170.73	1382.04	170.88	1382	172.8	1381.52
173.77	1382.66	214.9	1372.37	250	1371.67	285.11	1372.37	323.92	1382.08
339.92	1382.4	342.8	1383.12	345.47	1382	348.11	1382.66	349.48	1383
349.59	1383.03	350.01	1383.13	350.82	1383.13	352.66	1383.14	353.62	1383.14
354.35	1383.14	355	1383.14	385.12	1383.14	390.23	1383.14	403.44	1383.14
411.01	1383.14	416.83	1383.14	454.88	1383.14	457.55	1383.14	462.88	1383.14
463.02	1383.14	471.4	1383.18	472.2	1383.19	500	1383.38		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.77	323.92	92.52	100	106.5	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5200

INPUT
Description: Channel Station 56699.16
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1381.79	17.24	1381.82	21.82	1381.82	35.11	1381.84	36.31	1381.84
46.66	1381.86	52.58	1381.88	64.9	1381.9	65.79	1381.9	85.31	1381.94
85.93	1381.94	105.15	1381.98	109.71	1381.98	110.49	1381.98	120.5	1382
124.14	1382.01	124.63	1382.01	142.22	1382.03	142.98	1382.03	145.88	1382.04
156.81	1382.05	160.07	1382.06	165.02	1382.07	168.14	1382.07	169.8	1382.07
169.85	1382.06	170.09	1382	170.15	1381.98	170.43	1381.91	174.08	1381
175.54	1382.07	214.9	1372.23	250	1371.53	285.1	1372.23	322.93	1381.69
338.93	1382.01	342.38	1382.87	345.74	1382	348.13	1382.6	349.64	1382.97
349.97	1382.99	350.06	1383	350.17	1383.01	352.62	1383.14	353.43	1383.14
354.56	1383.14	358.42	1383.09	364.77	1383.09	372.85	1383.05	388.23	1383.05
394.69	1383.04	417.15	1383.02	433.74	1383.02	443.16	1383.02	449.88	1383.03
470.56	1383.17	500	1383.26						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.54	322.93	96.11	100	103.33	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5100

INPUT
Description: Channel Station 56799.16
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1381.34	3.51	1381.34	8.95	1381.35	13.81	1381.35	18.07	1381.36
20.5	1381.36	25.53	1381.37	31.08	1381.38	39.19	1381.4	45.43	1381.41
53.63	1381.43	169.96	1381.45	170.27	1381.45	171.97	1381.46	172.11	1381.42
172.25	1381.39	173.32	1381.12	177.41	1381.47	214.9	1372.09	250	1371.39
285.1	1372.09	317.08	1380.09	333.08	1380.41	338.18	1381.68	338.56	1380
339.07	1380.13	342.58	1381	343.16	1381.14	346.48	1381.97	346.81	1381.98
347.32	1382	347.49	1382.01	351.09	1382.14	353.25	1382.14	355.11	1382.14
367.84	1382.14	378.56	1382.14	386.94	1382.14	387.16	1382.14	394.4	1382.14
394.84	1382.14	395.49	1382.14	397.36	1382.14	399.92	1382.14	400.99	1382.14
404.1	1382.14	404.44	1382.14	404.47	1382.14	409.92	1382.14	410.61	1382.14
410.93	1382.14	412.21	1382.14	423.31	1382.14	430.35	1382.14	437.78	1382.14
438.42	1382.16	452.89	1382.69	500	1382.82				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
177.41	317.08	95.3	100	103.78	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5000

INPUT
Description: Channel Station 56899.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380.92	35.37	1381	35.83	1381	37.76	1381	43.1	1381.01
44.64	1381.01	81.88	1381.08	98.76	1381.1	116.89	1381.13	124.7	1381.14
151.85	1381.19	167.76	1381.21	172.23	1381.22	172.35	1381.19	172.47	1381.17
172.78	1381.09	173.13	1381	177.92	1381.2	214.89	1371.95	250	1371.25
285.11	1371.95	320.4	1380.78	336.4	1381.1	340.03	1382.01	342.15	1380.78
343.04	1381	343.72	1381.17	347.05	1382	347.27	1382.05	347.4	1382.09
349.38	1382.11	351.77	1382.14	353.03	1382.14	353.53	1382.14	353.68	1382.14
353.8	1382.14	356.81	1382.14	425.11	1382.14	425.61	1382.14	427.58	1382.14
429.04	1382.14	429.71	1382.14	433.01	1382.14	436.87	1382.14	437.87	1382.14
439.9	1382.14	440.86	1382.14	442.03	1382.14	442.73	1382.14	444.89	1382.14
445.71	1382.14	448.63	1382.14	452.63	1382.14	452.68	1382.14	454.18	1382.14
461.26	1382.14	461.78	1382.14	465.42	1382.27	486.12	1382.32	500	1383.08

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
177.92	320.4	95.36	100	103.76	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4900

INPUT
Description: Channel Station 56999.16
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380.47	8.31	1380.48	18.12	1380.53	48.52	1380.7	52.32	1380.71
77.64	1380.89	79.83	1380.9	81.3	1380.9	82.19	1380.91	98.6	1381
107.91	1381	140.38	1381	145.37	1380.99	145.89	1380.99	164.07	1380.93
172.94	1380.86	173.54	1380.72	173.91	1380.62	174.88	1380.38	176.4	1380
178.6	1380.89	214.89	1371.81	250	1371.11	285.11	1371.81	320.97	1380.78
336.97	1381.1	340.83	1382.06	341.78	1380.58	343.45	1381	345.05	1381.4
347.46	1382	347.69	1382.06	348.01	1382.14	348.02	1382.14	355.01	1382.14
358.67	1382.14	363.6	1382.14	363.94	1382.14	368.57	1382.14	388.1	1382.14
391.75	1382.14	393.81	1382.14	394.85	1382.14	431.66	1382.62	433.07	1382.64
435.19	1382.65	437.71	1382.68	439.67	1382.71	439.94	1382.72	445.71	1382.81
447.36	1382.81	448.88	1382.84	449.83	1382.86	450.07	1382.86	450.33	1382.86
451.74	1382.87	453.23	1382.89	453.4	1382.89	453.45	1382.89	455.21	1382.9
455.36	1382.9	455.59	1382.9	455.92	1382.9	456.33	1382.91	456.82	1382.91
457.39	1382.91	458.46	1382.92	460.03	1382.92	462.13	1382.93	462.42	1382.93
464.09	1382.94	465.32	1382.94	467.21	1382.93	467.52	1382.93	467.96	1382.93
468.78	1382.94	469.37	1382.94	470.32	1382.94	471.63	1382.93	473.27	1382.93
474.37	1382.92	475.78	1382.92	476.46	1382.93	476.87	1382.93	492.14	1382.28
500	1381.93								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
178.6	320.97	95.44	100	104.05	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4800

INPUT
Description: Channel Station 57099.16
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380	12.31	1380.04	25.86	1380.07	34.25	1380.1	36.72	1380.11
47.97	1380.15	57.65	1380.17	69.68	1380.19	79.08	1380.21	86.04	1380.23
90.44	1380.23	95.46	1380.25	132.38	1380.33	140.92	1380.35	169.24	1380.46
170.88	1380.47	173.73	1380.48	174.08	1380.39	174.48	1380.29	175.62	1380
179.59	1380.5	214.9	1371.67	250	1370.97	285.1	1371.67	317.7	1379.82
333.7	1380.14	337.42	1381.07	339.82	1380	343.32	1380.87	343.83	1381
344.06	1381.06	346.4	1381.64	348.61	1381.82	351	1382	352.22	1382.09
352.81	1382.14	353.46	1382.14	354.11	1382.14	356.23	1382.09	360.08	1382.03
361.45	1382	361.48	1382	366.83	1381.9	367.85	1381.88	377.32	1381.72
377.5	1381.72	380.39	1381.68	385.67	1381.61	387.3	1381.58	390.64	1381.54
393.27	1381.5	414.17	1381.21	419.55	1381.14	421.81	1381.13	422.45	1381.13
431.67	1381.11	459.7	1381.09	460	1381.09	460.58	1381.09	462.31	1381.09
467.68	1381.37	472.59	1381.15	500	1381.23				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
179.59	317.7	90.21	100	108.18	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4700

INPUT
Description: Channel Station 57199.16
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379.42	9.78	1379.41	14.7	1379.42	18.07	1379.43	19.72	1379.44
22.89	1379.44	22.98	1379.44	23.16	1379.44	23.44	1379.44	24.15	1379.44
28.91	1379.45	30.09	1379.45	31.69	1379.46	32.75	1379.46	33.27	1379.46
39.81	1379.47	45.34	1379.48	48.93	1379.5	53.56	1379.5	57.1	1379.51
64.48	1379.53	71.43	1379.56	83.77	1379.6	92.68	1379.64	98.64	1379.66
117.27	1379.71	123.51	1379.73	160.35	1379.81	173.73	1379.87	174.42	1379.87
174.99	1379.87	175.23	1379.87	175.7	1379.88	177.72	1379.68	181.77	1379.81
184.5	1379.13	214.89	1371.53	250	1370.83	285.1	1371.53	317.5	1379.63
333.5	1379.95	334.5	1380.2	335.73	1379	336.02	1379	336.54	1379
338.38	1379.46	340.54	1380	341.12	1380.15	341.29	1380.19	345.32	1380.15
345.69	1380.15	346.1	1380.15	346.18	1380.15	353.95	1380.34	354.7	1380.34
362.31	1380.51	368.29	1380.6	368.51	1380.6	374.66	1380.68	375.17	1380.67
375.77	1380.67	376.46	1380.66	377.23	1380.66	378.48	1380.67	379.03	1380.67
395.6	1380.73	397.74	1380.74	398.36	1380.73	404.76	1380.69	418.15	1380.61
428.81	1380.57	429.94	1380.57	430.86	1380.56	439.69	1380.54	441.97	1380.53
443.11	1380.53	446.36	1380.52	452.24	1380.54	486.83	1380.62	500	1380.65

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
181.77	317.5	26	26	26	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4674

INPUT
Description: Channel Station 57235.16,
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379.21	3.49	1379.19	8.98	1379.19	15.78	1379.19	25.7	1379.19
38.27	1379.19	66.99	1379.19	77.24	1379.19	77.38	1379.19	77.66	1379.19
84.65	1379.19	84.96	1379.19	93.13	1379.19	99.34	1379.19	105.16	1379.21
107.26	1379.22	127.27	1379.29	141.21	1379.34	156.55	1379.41	163.8	1379.44
172.59	1379.48	174.27	1379.49	177.18	1379.51	177.45	1379.44	177.79	1379.36
178.46	1379.19	178.68	1379.19	178.69	1379.19	179.9	1379.19	182.09	1379.72
214.9	1371.52	250	1370.82	285.11	1371.52	317.92	1379.72	336.87	1379.19

342.35	1379.19	342.46	1379.19	343.64	1379.19	346.97	1379.19	348.01	1379.43
348.48	1379.55	348.97	1379.67	352.45	1379.72	353.09	1379.72	353.71	1379.73
354.27	1379.73	356.24	1379.75	371.26	1379.89	372.47	1379.9	373.51	1379.91
379.82	1379.95	388.24	1380.03	400.2	1380.12	409.75	1380.19	414.54	1380.21
416.17	1380.21	417.04	1380.21	423.45	1380.23	428.91	1380.23	431.09	1380.23
432.77	1380.23	434.89	1380.23	439.96	1380.24	443.45	1380.25	500	1380.38

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	10	10	10	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4664

INPUT
Description: Channel Station 57235.16,
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379.21	3.49	1379.19	8.98	1379.19	15.78	1379.19	25.7	1379.19
38.27	1379.19	66.99	1379.19	77.24	1379.19	77.38	1379.19	77.66	1379.19
84.65	1379.19	84.96	1379.19	93.13	1379.19	99.34	1379.19	105.16	1379.21
107.26	1379.22	127.27	1379.29	141.21	1379.34	156.55	1379.41	163.8	1379.44
172.59	1379.48	174.27	1379.49	177.18	1379.51	177.45	1379.44	177.79	1379.36
178.46	1379.19	178.68	1379.19	178.69	1379.19	179.9	1379.19	182.09	1379.71
214.9	1371.51	250	1370.8	285.11	1371.51	317.92	1379.71	336.87	1379.19
342.35	1379.19	342.46	1379.19	343.64	1379.19	346.97	1379.19	348.01	1379.43
348.48	1379.55	348.97	1379.67	352.45	1379.72	353.09	1379.72	353.71	1379.73
354.27	1379.73	356.24	1379.75	371.26	1379.89	372.47	1379.9	373.51	1379.91
379.82	1379.95	388.24	1380.03	400.2	1380.12	409.75	1380.19	414.54	1380.21
416.17	1380.21	417.04	1380.21	423.45	1380.23	428.91	1380.23	431.09	1380.23
432.77	1380.23	434.89	1380.23	439.96	1380.24	443.45	1380.25	500	1380.38

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	64	64	64	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4600

INPUT
Description: Channel Station 57299.16
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379.02	3.49	1379	8.98	1379	15.78	1379	25.7	1379
38.27	1379	66.99	1379	77.24	1379	77.38	1379	77.66	1379
84.65	1379	84.96	1379	93.13	1379	99.34	1379	105.16	1379.02
107.26	1379.03	127.27	1379.1	141.21	1379.15	156.55	1379.22	163.8	1379.25
172.59	1379.29	174.27	1379.3	177.18	1379.32	177.45	1379.25	177.79	1379.17
178.46	1379	178.68	1379	178.69	1379	179.77	1379.31	180.49	1379.49
182.49	1379.49	214.9	1371.39	250	1370.69	285.11	1371.39	317.5	1379.49
333.5	1379.81	335.73	1379.26	336.87	1379	342.35	1379	342.46	1379
343.64	1379	346.97	1379	348.01	1379.24	348.48	1379.36	348.97	1379.48
352.45	1379.53	353.09	1379.53	353.71	1379.54	354.27	1379.54	356.24	1379.56
371.26	1379.7	372.47	1379.71	373.51	1379.72	379.82	1379.76	388.24	1379.84
400.2	1379.93	409.75	1380	414.54	1380.02	416.17	1380.02	417.04	1380.02
423.45	1380.04	428.91	1380.04	431.09	1380.04	432.77	1380.04	434.89	1380.04
439.96	1380.05	443.45	1380.06	500	1380.19				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	94.44	100	105.1	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4500

INPUT
Description: Channel Station 57399.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379	1.17	1379	4.22	1379	7.96	1379	12.6	1379
16.85	1379	22.46	1379	24.03	1379	24.85	1379	81.21	1379

82.63	1379	85.52	1379	86.89	1379	91.23	1379	92.69	1379
94.42	1379	100.28	1379	102.15	1379	104.07	1379	111.42	1379
113.2	1379	115.08	1379	123.92	1379	141.52	1379	141.99	1379
148.17	1379	154.85	1379.02	156.59	1379.02	161.4	1379.04	170.98	1379.07
176.51	1379.1	176.69	1379.06	176.85	1379.02	176.92	1379	177.96	1379
179.06	1379	179.52	1379	179.56	1379.12	180.49	1379.35	182.49	1379.35
214.9	1371.25	250	1370.55	285.1	1371.25	317.5	1379.35	333.5	1379.67
335.97	1379.06	344.66	1379	344.85	1379.05	345.05	1379.1	345.15	1379.12
345.25	1379.15	352.88	1379.15	356.18	1379.15	396.06	1379.45	397.22	1379.45
438.99	1379.67	440.03	1379.7	440.18	1379.71	479.62	1379.59	500	1379.63

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	95.83	100	103.83	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4400

INPUT
Description: Channel Station 57499.16
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.83	13.52	1378.85	15.02	1378.84	17.97	1378.84	23.91	1378.85
32.96	1378.86	39.59	1378.86	43.68	1378.86	45.55	1378.86	47.07	1378.86
52.03	1378.86	60.3	1378.85	93.1	1378.77	104.59	1378.76	115.02	1378.73
127.72	1378.72	130.02	1378.72	145.2	1378.71	147.47	1378.7	150.27	1378.7
153.75	1378.69	157.87	1378.69	177.62	1378.68	178.36	1378.68	180.49	1379.21
182.49	1379.21	214.89	1371.11	250	1370.41	285.1	1371.11	317.5	1379.21
333.5	1379.53	335.97	1378.92	340.12	1378.92	340.23	1378.92	340.41	1378.93
340.63	1378.93	340.94	1378.94	341.42	1378.96	342.64	1379	344.13	1379.05
344.77	1379.07	346.72	1379.14	353.73	1379.14	358.48	1379.14	359.26	1379.14
361.35	1379.14	369.89	1379.14	369.91	1379.14	371.14	1379.14	372.97	1379.14
381.55	1379.14	381.62	1379.14	383.44	1379.14	385.74	1379.14	386.29	1379.14
386.79	1379.14	388.69	1379.14	400.14	1379.14	407.35	1379.14	407.64	1379.14
407.73	1379.14	442.08	1379.31	444.24	1379.38	444.56	1379.4	500	1379.22

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	92.56	100	107.14	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4300

INPUT
Description: Channel Station 57599.16
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.49	9.73	1378.45	17.93	1378.45	32.84	1378.45	38.33	1378.44
39.89	1378.44	43.03	1378.44	47.78	1378.44	51.22	1378.44	53.34	1378.44
61.2	1378.43	61.97	1378.43	64.46	1378.42	68.59	1378.42	155.71	1378.18
159.63	1378.18	176.97	1378.19	180.49	1379.07	182.5	1379.07	214.9	1370.97
250	1370.27	285.11	1370.97	317.51	1379.07	333.5	1379.39	337.6	1378.37
338.35	1378.29	338.7	1378.38	400.76	1378.9	404.41	1378.93	409.79	1379
411.37	1379.01	450.61	1379.14	451.71	1379.14	463.64	1378.97	464.14	1379.04
467.57	1379.02	500	1378.91						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.5	317.51	95.8	100	103.64	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4200

INPUT
Description: Channel Station 57699.16
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.19	16.62	1378.16	60.41	1378	60.6	1378	60.78	1378
63.96	1378	68.23	1378	70.62	1378	78.96	1378	80.64	1378
122.89	1378	148.17	1378	166.86	1378.04	171.26	1378.04	176.95	1378.05
180.49	1378.93	182.49	1378.93	214.9	1370.83	250	1370.13	285.1	1370.83

317.5	1378.93	333.51	1379.25	338.26	1378.07	338.53	1378	338.55	1378.01
338.79	1378.07	343.26	1378.12	348.39	1378.18	400.24	1378.77	424.47	1379
429.78	1379.03	447.63	1379.14	447.75	1379.14	447.78	1379.14	450.42	1379.14
450.6	1379.14	451	1379.14	453.19	1379.14	453.35	1379.14	453.43	1379.14
453.48	1379.14	453.54	1379.14	453.91	1379.13	457.12	1379.1	457.15	1379.1
457.18	1379.09	500	1378.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	96.42	100	103.62	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4100

INPUT
Description: Channel Station 57799.16
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.85	9.32	1377.83	11.94	1377.83	60.17	1377.8	76.76	1377.76
108.16	1377.7	132.78	1377.64	175.42	1377.52	180.49	1378.79	182.49	1378.79
214.89	1370.69	250	1369.99	285.1	1370.69	317.51	1378.79	333.5	1379.11
337.69	1378.07	339.56	1378	339.79	1378.06	339.88	1378.08	344.34	1378.09
351.71	1378.1	352.57	1378.1	353.56	1378.09	386.76	1378.11	387.68	1378.11
396.18	1378.14	405.22	1378.33	405.52	1378.33	405.97	1378.34	406.53	1378.36
407.21	1378.37	408.07	1378.4	409	1378.42	410	1378.44	425.8	1378.78
426.64	1378.79	428.14	1378.83	432	1378.9	437.09	1379	438.41	1379.02
441.45	1379.03	447.89	1379.08	452.56	1379.14	452.91	1379.14	453.1	1379.14
458.49	1379.14	460.14	1379.04	460.21	1379.04	460.29	1379.04	461.01	1379.03
500	1378.64								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.51	95.47	100	103.98	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4000

INPUT
Description: Channel Station 57899.16
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.44	23.38	1377.39	32.92	1377.4	149.14	1377.3	175.32	1377.36
180.49	1378.65	182.5	1378.65	214.9	1370.55	250	1369.85	285.11	1370.55
317.51	1378.65	333.51	1378.97	339.28	1377.53	339.69	1377.54	339.7	1377.54
339.71	1377.54	339.72	1377.54	339.73	1377.54	339.75	1377.54	339.83	1377.54
383.47	1377.8	413.92	1378	414.16	1378	414.21	1378	414.24	1378
430.64	1378.1	436.23	1378.14	437.54	1378.14	438.33	1378.14	439.24	1378.14
439.93	1378.14	440.5	1378.14	442.35	1378.14	447.23	1378.14	448.99	1378.14
450.24	1378.14	458.73	1378.27	468.19	1378.58	469.66	1378.58	500	1378.51

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.5	317.51	94.83	100	104.71	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3900

INPUT
Description: Channel Station 57999.16
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.05	18.61	1377	21.25	1377	36.09	1377	59.28	1377
71.99	1377	74.71	1377	75.24	1377	98.14	1377.04	103.85	1377.05
117.01	1377.08	120.93	1377.09	146.77	1377.16	151.23	1377.17	174.52	1377.23
175.39	1377.24	180.49	1378.51	182.5	1378.51	214.9	1370.41	250	1369.71
285.11	1370.41	317.51	1378.51	333.51	1378.83	340.29	1377.14	340.51	1377.14
347.5	1377.14	348.65	1377.14	348.76	1377.14	348.87	1377.14	349.09	1377.14
349.2	1377.14	355.4	1377.14	371.86	1377.26	372.15	1377.26	372.97	1377.27
373.95	1377.28	375.48	1377.29	376.74	1377.29	401.4	1377.47	406.22	1377.51
408.76	1377.53	411.32	1377.55	413.86	1377.57	416.32	1377.59	436.72	1377.7
438.48	1377.72	451.01	1377.83	454.84	1377.86	461.25	1377.89	463.28	1377.9

468.79	1377.94	468.89	1377.94	470.59	1377.96	472.02	1377.96	474.04	1377.97
474.6	1377.97	477.22	1377.98	479.17	1377.98	480.43	1377.98	481.53	1377.99
481.62	1377.99	481.71	1377.99	482.23	1377.99	482.27	1377.99	500	1377.95

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.5	317.51	95.3	100	104.2	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3800

INPUT
Description: Channel Station 58099.16
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377	24.89	1377	32.75	1377	42.32	1377	53.22	1377
61.1	1377	72	1377	72.32	1377	72.69	1377	73.09	1377
73.54	1377	80.53	1377	80.88	1377	81.28	1377	81.74	1377
82.28	1377	82.92	1377	83.68	1377	86.61	1377	95.49	1377
101.29	1377	105.03	1377	115.15	1377	116.25	1377	116.61	1377
125.21	1377	125.37	1377	126.29	1377	126.48	1377	126.91	1377
132.29	1377.01	133.06	1377.01	134.88	1377.01	142.13	1377.03	149.63	1377.05
155.02	1377.06	159.03	1377.08	171.39	1377.11	172.57	1377.11	175.48	1377.12
180.49	1378.37	182.49	1378.37	214.89	1370.27	250	1369.57	285.1	1370.27
317.5	1378.37	333.5	1378.69	340.05	1377.06	347.08	1377.05	355.41	1377.05
365.69	1377.04	402.98	1377.07	408.94	1377.06	417.7	1377.14	424.21	1377.14
430.86	1377.14	457.42	1377.14	460.1	1377.14	460.38	1377.14	463.65	1377.1
475.33	1377	478.11	1376.97	499.46	1376.74	499.95	1376.77	500	1376.77

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	92.84	100	106.52	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3700

INPUT
Description: Channel Station 58199.16
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.95	46.01	1377	55.64	1377	62.08	1377	70.95	1377.73
73.94	1378	77.08	1378.94	77.29	1379	78.48	1379.35	80.69	1380
81.51	1380.23	84.15	1381	87.3	1381.87	87.74	1382	88.2	1382.12
91.21	1383	92.6	1383	94.02	1383	104.27	1383.54	105.64	1383.64
107.63	1383.79	110.49	1384	111.38	1384	111.84	1384	118.76	1384.12
128.05	1384.24	141.8	1384.6	143.7	1384.63	144.87	1384.61	145.41	1384.48
147.33	1384	147.47	1383.97	156.49	1384.73	175.56	1377	180.49	1378.23
182.49	1378.23	214.89	1370.13	250	1369.43	285.1	1370.13	317.51	1378.23
333.5	1378.55	339.72	1377	340.2	1377	341.29	1377.27	344.18	1378
346.65	1378.62	348.17	1379	349.08	1379.23	351.27	1379.77	359.44	1379.24
363.17	1379	377.5	1378.12	379.28	1378	380.39	1378	380.73	1378
380.93	1378	389.6	1377.64	401.41	1377	401.87	1377	402.78	1377
403.49	1377	404.22	1377	404.99	1377	407.06	1377	407.81	1377
417.66	1376.62	420.92	1376.58	422.16	1376.58	424.38	1376.55	441.91	1376.35
443.17	1376.33	451.11	1376.18	453.75	1376.14	455.11	1376.14	474.29	1376.14
483.73	1376.14	485.86	1376.14	487.87	1376.14	489.38	1376.14	491.13	1376.14
493.47	1376.14	493.49	1376.14	493.6	1376.14	500	1376.14		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.51	94.33	100	105.12	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3600

INPUT
Description: Channel Station 58299.16
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.68	25.83	1376.77	39.85	1376.79	40.55	1376.79	47.71	1376.82
62.77	1376.87	69.83	1376.88	90.68	1376.98	95.81	1377	97.33	1377.64

98.05	1378	99.02	1378.48	100.15	1378.96	100.25	1379	102.31	1379.97
102.38	1380	103.58	1380.65	104.38	1381	106.09	1382	106.1	1382
108.17	1383	109.82	1383.79	110.11	1383.87	110.25	1384	110.46	1384
110.83	1384	116.14	1384	122.67	1384	129.17	1384.09	134.72	1384.04
135.44	1384.02	137.34	1384	138.92	1383.83	139.61	1383.83	141.88	1383.52
143.99	1383.57	146.33	1383.73	147.6	1383.69	148.75	1383.4	150.36	1383
150.49	1382.97	150.93	1382.86	152.89	1382.37	154.36	1382	166.8	1382.03
176.87	1377.19	180.49	1378.09	182.49	1378.09	214.89	1369.99	250	1369.29
285.1	1369.99	317.51	1378.09	333.51	1378.41	340.59	1376.64	341.63	1377
342.76	1377.28	342.84	1377.3	342.87	1377.3	355.43	1377	357.64	1376.95
363.98	1376.88	376.81	1376.7	392.91	1376.29	398.18	1376.18	400.84	1376.13
405.28	1376	406.39	1376	411.65	1376	440.7	1376	452.63	1376
460.64	1376	499.85	1375.45	500	1375.45				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.51	94	95.35	97.2	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3505.64

INPUT
Description: Channel Station 58393.52
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.37	4.43	1376.37	13.11	1376.41	20.11	1376.44	24.24	1376.46
52.75	1376.5	72.81	1376.53	87.01	1376.58	103.15	1376.65	114.23	1376.66
121.42	1376.66	165.68	1376.85	167.32	1376.86	172.89	1376.88	173.83	1376.65
174.38	1376.51	175.5	1376.23	176.43	1376	177.23	1376	178.47	1376
179.06	1376	182.09	1378.08	214.9	1369.88	250	1369.17	285.11	1369.88
317.92	1378.08	325.97	1376	326.49	1376	327.19	1376	338.22	1376
340.56	1376.59	342.17	1377	342.52	1377.09	343.01	1377.22	348.96	1377.1
353.24	1377	353.41	1377	359.52	1376.87	361.23	1376.83	363.36	1376.79
398.74	1376	399.48	1376	400.36	1376	400.88	1376	401.59	1376
401.85	1376	407.79	1376	409.61	1376	500	1376		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.013	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	31.99	31.99	31.99	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3473.65

INPUT
Description: Channel Station 58425.51, bend or earth channel section
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.33	4.43	1376.33	13.11	1376.37	20.11	1376.4	24.24	1376.42
52.75	1376.46	72.81	1376.49	87.01	1376.54	103.15	1376.61	114.23	1376.62
121.42	1376.62	165.68	1376.81	167.32	1376.82	172.89	1376.84	173.83	1376.61
174.38	1376.47	175.5	1376.19	176.43	1375.96	177.23	1375.96	178.47	1375.96
179.06	1375.96	182.09	1378.04	214.9	1369.84	250	1369.13	285.11	1369.84
317.92	1378.04	325.97	1375.96	326.49	1375.96	327.19	1375.96	338.22	1375.96
340.56	1376.55	342.17	1376.96	342.52	1377.05	343.01	1377.18	348.96	1377.06
353.24	1376.96	353.41	1376.96	359.52	1376.83	361.23	1376.79	363.36	1376.75
398.74	1375.96	399.48	1375.96	400.36	1375.96	400.88	1375.96	401.59	1375.96
401.85	1375.96	407.79	1375.96	409.61	1375.96	500	1375.96		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.013	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	.01	.01	.01	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3473.64

INPUT
Description: Channel Station 58425.52, begin 12' concrete apron
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.33	4.43	1376.33	13.11	1376.37	20.11	1376.4	24.24	1376.42
52.75	1376.46	72.81	1376.49	87.01	1376.54	103.15	1376.61	114.23	1376.62

```
  121.42 1376.62  165.68 1376.81  167.32 1376.82  172.89 1376.84  173.83 1376.61
  174.38 1376.47   175.5 1376.19  176.43 1375.96  177.23 1375.96  178.47 1375.96
  179.06 1375.96  182.09 1378.04     215 1379.53     215 1369.13     250 1369.13
     285 1369.13     285 1379.53  317.92 1378.04  325.97 1375.96  326.49 1375.96
  327.19 1375.96  338.22 1375.96  340.56 1376.55  342.17 1376.96  342.52 1377.05
  343.01 1377.18  348.96 1377.06  353.24 1376.96  353.41 1376.96  359.52 1376.83
  361.23 1376.79  363.36 1376.75  398.74 1375.96  399.48 1375.96  400.36 1375.96
  400.88 1375.96  401.59 1375.96  401.85 1375.96  407.79 1375.96  409.61 1375.96
     500 1375.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .032     215    .013     285    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           215     285                12      12      12              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3461.64

INPUT
Description: Channel Station 58437.52, end of 12' concrete apron
Station Elevation Data    num=      51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1376.33    4.43 1376.33   13.11 1376.37   20.11  1376.4   24.24 1376.42
   52.75 1376.46   72.81 1376.49   87.01 1376.54  103.15 1376.61  114.23 1376.62
  121.42 1376.62  165.68 1376.81  167.32 1376.82  172.89 1376.84  173.83 1376.61
  174.38 1376.47   175.5 1376.19  176.43 1375.96  177.23 1375.96  178.47 1375.96
  179.06 1375.96  182.09 1378.04     215 1379.53     215 1369.13     250 1369.13
     285 1369.13     285 1379.53  317.92 1378.04  325.97 1375.96  326.49 1375.96
  327.19 1375.96  338.22 1375.96  340.56 1376.55  342.17 1376.96  342.52 1377.05
  343.01 1377.18  348.96 1377.06  353.24 1376.96  353.41 1376.96  359.52 1376.83
  361.23 1376.79  363.36 1376.75  398.74 1375.96  399.48 1375.96  400.36 1375.96
  400.88 1375.96  401.59 1375.96  401.85 1375.96  407.79 1375.96  409.61 1375.96
     500 1375.96

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************
       0    .032  182.09    .032     215    .013     285    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           215     285                .01     .01     .01              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3461.63

INPUT
Description: Channel Station 58437.53, front of drop stucture, ele increase 1'
Station Elevation Data    num=      51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1376.33    4.43 1376.33   13.11 1376.37   20.11  1376.4   24.24 1376.42
   52.75 1376.46   72.81 1376.49   87.01 1376.54  103.15 1376.61  114.23 1376.62
  121.42 1376.62  165.68 1376.81  167.32 1376.82  172.89 1376.84  173.83 1376.61
  174.38 1376.47   175.5 1376.19  176.43 1375.96  177.23 1375.96  178.47 1375.96
  179.06 1375.96  182.09 1378.04     215 1379.53     215 1370.13     250 1370.13
     285 1370.13     285 1379.53  317.92 1378.04  325.97 1375.96  326.49 1375.96
  327.19 1375.96  338.22 1375.96  340.56 1376.55  342.17 1376.96  342.52 1377.05
  343.01 1377.18  348.96 1377.06  353.24 1376.96  353.41 1376.96  359.52 1376.83
  361.23 1376.79  363.36 1376.75  398.74 1375.96  399.48 1375.96  400.36 1375.96
  400.88 1375.96  401.59 1375.96  401.85 1375.96  407.79 1375.96  409.61 1375.96
     500 1375.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .032     215    .013     285    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           215     285                  1       1       1              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3460.63

INPUT
Description: Channel Station 58438.53, top of drop stucture, ele increase 1'
Station Elevation Data    num=      51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1376.33    4.43 1376.33   13.11 1376.37   20.11  1376.4   24.24 1376.42
   52.75 1376.46   72.81 1376.49   87.01 1376.54  103.15 1376.61  114.23 1376.62
  121.42 1376.62  165.68 1376.81  167.32 1376.82  172.89 1376.84  173.83 1376.61
  174.38 1376.47   175.5 1376.19  176.43 1375.96  177.23 1375.96  178.47 1375.96
```

179.06	1375.96	182.09	1378.04	215	1379.53	215	1371.13	250	1371.13
285	1371.13	285	1379.53	317.92	1378.04	325.97	1375.96	326.49	1375.96
327.19	1375.96	338.22	1375.96	340.56	1376.55	342.17	1376.96	342.52	1377.05
343.01	1377.18	348.96	1377.06	353.24	1376.96	353.41	1376.96	359.52	1376.83
361.23	1376.79	363.36	1376.75	398.74	1375.96	399.48	1375.96	400.36	1375.96
400.88	1375.96	401.59	1375.96	401.85	1375.96	407.79	1375.96	409.61	1375.96
500	1375.96								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	215	.013	285	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215	285	16	16	16	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3444.63

INPUT
Description: Channel Station 58454.53, End of drop strucute, dumped riprap behaind the walls
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.09	2.06	1375.09	16.08	1375.14	18.16	1375.16	20.94	1375.18
55.62	1375.42	63.61	1375.47	88.37	1375.67	101.38	1375.74	119.94	1375.86
127.46	1375.92	151.04	1376.07	152.05	1376.08	153.67	1376.09	170.29	1376.15
172.9	1376.17	174.73	1376.19	174.96	1376.13	175.13	1376.09	177.8	1375.82
182.09	1372.04	215	1371.52	215	1363.13	250	1363.13	285	1363.13
285	1371.52	317.92	1372.04	326.43	1375.09	346.18	1375.09	347.13	1375.09
347.72	1375.09	349.31	1375.49	351.73	1376.09	352.38	1376.25	353.12	1376.44
354.7	1376.83	382.13	1376.36	398.27	1376.09	398.42	1376.09	398.54	1376.09
399.9	1376.09	400.61	1376.09	402.01	1376.09	403.06	1376.09	432.92	1376.09
434.87	1376.09	438.19	1376.09	441.3	1376.09	443.94	1376.09	500	1376.09

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.032	182.09	.04	215	.013	285	.04	326.43	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	.1	.1	.1	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3444.62

INPUT
Description: Channel Station 58454.54, dumped riprap on bottom
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.09	2.06	1375.09	16.08	1375.14	18.16	1375.16	20.94	1375.18
55.62	1375.42	63.61	1375.47	88.37	1375.67	101.38	1375.74	119.94	1375.86
127.46	1375.92	151.04	1376.07	152.05	1376.08	153.67	1376.09	170.29	1376.15
172.9	1376.17	174.73	1376.19	174.96	1376.13	175.13	1376.09	177.8	1375.82
182.09	1372.04	215	1371.52	215	1363.13	250	1363.13	285	1363.13
285	1371.52	317.92	1372.04	326.43	1375.09	346.18	1375.09	347.13	1375.09
347.72	1375.09	349.31	1375.49	351.73	1376.09	352.38	1376.25	353.12	1376.44
354.7	1376.83	382.13	1376.36	398.27	1376.09	398.42	1376.09	398.54	1376.09
399.9	1376.09	400.61	1376.09	402.01	1376.09	403.06	1376.09	432.92	1376.09
434.87	1376.09	438.19	1376.09	441.3	1376.09	443.94	1376.09	500	1376.09

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	182.09	.04	326.43	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	11.71	11.71	11.71	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3432.91

INPUT
Description: Channel Station 58466.24, end of vertical walls, dumped riprap on bottom
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.09	2.06	1375.09	16.08	1375.14	18.16	1375.16	20.94	1375.18
55.62	1375.42	63.61	1375.47	88.37	1375.67	101.38	1375.74	119.94	1375.86
127.46	1375.92	151.04	1376.07	152.05	1376.08	153.67	1376.09	170.29	1376.15
172.9	1376.17	174.73	1376.19	174.96	1376.13	175.13	1376.09	177.8	1375.82
182.09	1372.04	215	1371.52	215	1363.13	250	1363.13	285	1363.13
285	1371.52	317.92	1372.04	326.43	1375.09	346.18	1375.09	347.13	1375.09

384.99	1376	390.71	1376	392.3	1376	397.65	1376	401.91	1376
405.23	1376	407.68	1376	410.07	1376	410.89	1376	431.81	1376
441.31	1376	448.72	1376	455.74	1376	462.59	1376	464.35	1376
481.01	1376	483.71	1376	487.95	1376	491.53	1376	494.33	1376
500	1376								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.032	171.05	.04	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.05	332.76	113.64	100	82.22	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3200

INPUT
Description: Channel Station 58699.16 Type "B" Bank Protection on Left Bank.
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1364.33	.2	1364.33	1.53	1364.33	2.68	1364.33	4.17	1364.32
5.31	1364.32	6.19	1364.32	6.89	1364.32	11.66	1364.32	12.04	1364.31
12.22	1364.31	17.97	1364.2	21.05	1364.2	26.72	1364.16	27.89	1364.15
28.02	1364.14	28.13	1364.14	28.22	1364.14	29.4	1364.13	32.66	1364.01
32.88	1364	33.82	1363.97	34.51	1363.94	34.78	1363.93	34.93	1363.93
35.19	1363.92	35.51	1363.91	39.4	1363.82	43.51	1363.77	46.03	1363.75
52.42	1363.68	56.64	1363.64	58.67	1363.62	63.42	1363.45	64.43	1363.43
69.36	1363.57	72.13	1363.72	75.28	1363.77	78.31	1363.73	81.96	1363.68
83.44	1363.73	83.53	1363.74	83.69	1363.75	83.95	1363.77	84.58	1363.81
84.7	1363.82	86	1363.91	87.48	1364	88.26	1364.05	89.52	1364.13
90.34	1364.17	90.96	1364.2	91.48	1364.22	94.23	1364.31	96.27	1364.3
100.35	1364.3	105.22	1364.34	107.68	1364.35	108.36	1364.36	112.06	1364.43
116.59	1364.47	122.64	1364.06	160.6	1373.55	173.7	1373.55	214.9	1363.25
250	1362.55	285.11	1363.25	330.12	1374.51	346.12	1374.83	351.25	1376.11
353.13	1376.38	364	1376.46	371.8	1376.42	375.08	1376.44	385.5	1376.39
391.16	1376.36	394.63	1376.34	408.83	1376.27	410.62	1376.27	411.59	1376.28
413.48	1376.31	416.83	1376.35	425.66	1376.29	430.89	1376.25	434.85	1376.25
435.08	1376.25	435.87	1376.26	437.18	1376.29	438.89	1376.31	441.69	1376.31
445.95	1376.28	452.51	1376.2	456.91	1376.17	460.97	1376.12	463.19	1376.09
463.56	1376.11	464.23	1376.14	465.17	1376.17	465.78	1376.2	466.14	1376.21
466.25	1376.22	466.39	1376.22	466.58	1376.23	466.79	1376.24	467.21	1376.25
467.81	1376.28	474.61	1376.22	476.21	1376.24	480.67	1376.34	485.95	1376.47
493.77	1376.42	500	1376.52						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.032	173.7	.04	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.7	330.12	120.07	100	75.53	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	181.6	1375	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3100

INPUT
Description: Channel Station 58799.16, Type "B" bank protection across entire channel.
Station Elevation Data num= 124

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.54	6.68	1376.53	11.28	1376.57	22.18	1376.61	31.18	1376.66
37.78	1376.74	46.13	1376.39	48.25	1376.4	48.37	1376.41	50.34	1376.33
52.84	1376.37	56.98	1376.77	58.88	1376.89	58.89	1376.89	58.93	1376.89
58.96	1376.89	59.87	1376.8	60.14	1376.77	60.61	1376.72	63.04	1376.48
64.23	1376.35	65.95	1376.18	67.74	1376	69.81	1375.79	71.91	1375.58
72.81	1375.49	74.4	1375.31	77.86	1375.22	81.26	1375.14	86.71	1375.04
87.94	1375	89.57	1374.95	91.18	1374.9	91.84	1374.87	93.82	1374.81
95.02	1374.78	104.22	1374.2	105.66	1374.18	106.03	1374.16	106.45	1374.13
106.76	1374.11	107.14	1374.08	107.56	1374.06	108.03	1374.02	108.21	1374.02
108.44	1374.01	108.53	1374	108.56	1374	108.71	1373.99	108.77	1374
108.79	1373.99	109.12	1373.89	109.65	1373.74	112.2	1373	113.16	1372.7
114.99	1372.18	115.6	1372	117.16	1371.52	118.69	1371.07	118.86	1371.01
118.9	1371	119.59	1370.62	120.6	1370	121.87	1369.18	122.16	1369
122.96	1368.48	122.98	1368.47	123.42	1368.27	123.66	1368.14	123.76	1368.1
124.01	1368	124.18	1367.93	124.75	1367.71	125.22	1367.65	125.41	1367.63
126	1367.56	126.23	1367.53	127.24	1367.4	127.49	1367.37	127.54	1367.36
127.6	1367.36	127.67	1367.35	127.8	1367.33	127.87	1367.33	128.22	1367.3
128.44	1367.28	129.09	1367.24	129.35	1367.22	130.38	1367.17	130.61	1367.15
131.22	1367	131.71	1366.92	133.86	1366.49	134.31	1366.46	134.8	1366.58
136.49	1367	138.33	1367.75	160.6	1373.32	173.7	1373.32	214.9	1363.02
250	1362.32	285.11	1363.02	334.51	1375.37	350.51	1375.69	355.73	1376.99
364.16	1378	366.81	1378	368.93	1377.59	372.96	1377	373.29	1377
373.97	1377	375.97	1377.11	393.5	1378	397.07	1378	402.6	1378

347.72	1375.09	349.31	1375.49	351.73	1376.09	352.38	1376.25	353.12	1376.44
354.7	1376.83	382.13	1376.36	398.27	1376.09	398.42	1376.09	398.54	1376.09
399.9	1376.09	400.61	1376.09	402.01	1376.09	403.06	1376.09	432.92	1376.09
434.87	1376.09	438.19	1376.09	441.3	1376.09	443.94	1376.09	500	1376.09

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	182.09	.04	317.92	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	7.83	7.83	7.83	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3425.08

INPUT
Description: Channel Station 58474.07, end of dumped riprap on bottom
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.09	2.06	1375.09	16.08	1375.14	18.16	1375.16	20.94	1375.18
55.62	1375.42	63.61	1375.47	88.37	1375.67	101.38	1375.74	119.94	1375.86
127.46	1375.92	151.04	1376.07	152.05	1376.08	153.67	1376.09	170.29	1376.15
172.9	1376.17	174.73	1376.19	174.96	1376.13	175.13	1376.09	177.8	1375.82
182.09	1372.04	215	1363.13	250	1363.13	285	1363.13	317.92	1372.04
326.43	1375.09	346.18	1375.09	347.13	1375.09	347.72	1375.09	349.31	1375.49
351.73	1376.09	352.38	1376.25	353.12	1376.44	354.7	1376.83	382.13	1376.36
398.27	1376.09	398.42	1376.09	398.54	1376.09	399.9	1376.09	400.61	1376.09
402.01	1376.09	403.06	1376.09	432.92	1376.09	434.87	1376.09	438.19	1376.09
441.3	1376.09	443.94	1376.09	500	1376.09				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	177.8	.04	326.43	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
177.8	326.43	25.08	25.08	25.08	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3400

INPUT
Description: Channel Station 58499.16, Type "B" Bank Protection on Left Bank.
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375	2.06	1375	16.08	1375.05	18.16	1375.07	20.94	1375.09
55.62	1375.33	63.61	1375.38	88.37	1375.58	101.38	1375.65	119.94	1375.77
127.46	1375.83	151.04	1375.98	152.05	1375.99	153.67	1376	165.68	1376.02
214.9	1363.72	250	1363.02	285.11	1363.72	333.63	1375.85	349.63	1376.17
352.2	1376.81	352.38	1376.16	353.12	1376.35	354.7	1376.74	382.13	1376.27
398.27	1376	398.42	1376	398.54	1376	399.9	1376	400.61	1376
402.01	1376	403.06	1376	432.92	1376	434.87	1376	438.19	1376
441.3	1376	443.94	1376	500	1376				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.032	165.68	.04	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
165.68	333.63	127.83	100	65.35	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3300

INPUT
Description: Channel Station 58599.16 Type "B" Bank Protection on Left Bank.
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1373.46	2.16	1373.47	6.4	1373.37	6.63	1373.36	6.92	1373.37
8.1	1373.37	29.41	1373.24	29.5	1373.24	29.57	1373.24	29.59	1373.24
29.64	1373.23	29.7	1373.23	29.9	1373.21	32.28	1373	32.38	1372.99
33.18	1372.92	34.58	1372.8	37.48	1372.86	42.22	1372.93	43.52	1373
44.47	1373.04	45.34	1373.07	45.73	1373.08	46.09	1373.1	47.94	1373.22
52.11	1373.26	55.2	1373.37	72.66	1373.62	85.62	1373.91	86.87	1373.92
90.76	1373.92	93.19	1373.94	104.08	1374	104.75	1374	104.76	1374
110.69	1374.04	114.09	1374.06	115.23	1374.06	117.09	1374.08	117.31	1374.08
117.41	1374.08	117.47	1374.08	119.14	1374.09	122.4	1374.1	122.43	1374.1
124.23	1374.11	125.48	1374.1	134.66	1374.09	140	1374.1	147.57	1374.1
157.04	1374.05	160.78	1374.05	171.05	1374.24	172.62	1374.05	214.9	1363.49
250	1362.78	285.11	1363.49	332.76	1375.4	348.76	1375.72	350.93	1376.26
356.76	1376.16	361.17	1376.12	373.59	1376.05	375.13	1376.03	380.65	1376

```
   433.6     1378   434.4     1378  434.81     1378  450.49     1378  467.02     1378
  481.71     1378  484.28 1377.93  486.27 1377.88     500 1377.54

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
       0     .032   173.7     .04  334.51     .032

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
         173.7  334.51            134.22     100   55.34              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
       0  170.74 1374.94        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3000

INPUT
Description: Channel Station 58899.16
Station Elevation Data     num=      100
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
*****************************************************************************************
       0 1375.61   28.99 1375.63   35.95 1375.22   39.34 1375.32   40.38 1375.36
    40.6 1375.37   40.85 1375.38   41.11 1375.39   41.32  1375.4   41.59 1375.41
   41.95 1375.43   42.45 1375.44   43.21 1375.47   44.47 1375.52      47 1375.62
    54.7 1375.92   56.89    1376   58.75 1376.07   60.42 1376.14   66.41 1376.37
   68.26 1376.44   69.32 1376.48   71.04 1376.54   74.65 1376.51   84.39 1376.46
   87.38 1376.48   90.52 1376.39   93.18 1376.38  103.89 1376.06  104.68 1376.05
  105.46    1376   110.5  1375.7  113.87 1375.51   116.2 1375.25  118.16 1375.05
   118.6    1375  119.01 1374.96  119.03 1374.95  119.06 1374.96  119.65    1375
  120.79 1375.04  124.48 1375.34   124.6 1375.33  124.67 1375.32   124.8 1375.31
  125.01  1375.3  125.46 1375.27  127.43 1375.13  128.88 1375.02   129.1    1375
  130.77 1374.88  132.36 1374.76   133.6 1374.67  134.59  1374.6  139.49 1374.24
  141.92 1374.52  142.84  1374.5  143.25 1374.44  144.02 1374.32  144.74 1374.23
  145.43 1374.05   145.6    1374  145.62    1374  146.81 1373.68  149.23 1373.06
  149.45    1373  152.65 1372.16  153.27    1372  154.41 1371.68  154.71 1371.59
   160.6 1373.06   173.7 1373.06  214.89 1362.76     250 1362.06  285.11 1362.76
   335.4 1375.33  335.92 1375.46  351.92 1375.78  365.14 1379.09  370.27    1379
  371.34 1378.18  371.57    1378  372.94    1378  384.58    1378  390.51    1378
  417.32    1378  437.33    1378  439.15    1378  439.82    1378  448.67    1378
  451.51    1378  461.98 1377.76  473.85    1378  479.66    1378  489.29    1378
  495.55 1377.73  498.61  1377.6  498.63  1377.6  499.39  1377.6     500  1377.6

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
       0     .032  214.89    .028  285.11     .032

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
         173.7  335.92            100.02     100  100.15              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2900

INPUT
Description: Channel Station 58999.16
Station Elevation Data     num=      132
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
*****************************************************************************************
       0 1375.05   29.35 1375.19   30.43 1375.22   30.52 1375.22   30.64 1375.22
   30.75 1375.22   30.87 1375.23   30.99 1375.23   31.11 1375.23   31.24 1375.23
   31.36 1375.23   31.49 1375.24   31.61 1375.24   31.74 1375.24   31.87 1375.24
      32 1375.24   32.14 1375.24   44.49 1375.25   47.26 1375.09   48.68 1375.13
   51.01 1375.08   57.86 1375.11    64.8 1375.44   67.72 1375.64   68.92 1375.72
    70.4 1375.83   71.04 1375.87   71.84 1375.93    72.9    1376   72.93    1376
   73.05 1376.01   85.74 1376.88    94.7 1376.43  101.19 1376.09  102.04    1376
  102.08    1376  102.62 1375.95  102.73 1375.94  102.95 1375.92  112.56 1375.06
  112.78 1375.04  113.25 1375.05  114.55 1375.03  116.56 1375.02  119.45    1375
  119.81    1375  119.88    1375  119.89    1375   119.9    1375  123.68    1375
  123.77    1375  123.87    1375  124.95 1374.97  129.92 1374.94  133.13 1374.92
  134.01 1374.92  134.83 1374.89  143.67 1374.49  144.88 1374.44  147.99  1374.3
  148.57 1374.09  148.81    1374  150.54 1373.36   151.5    1373  154.04 1372.06
   154.2    1372   154.3 1371.96  156.91    1371  157.53 1370.77  158.19 1370.53
  159.13  1370.5  161.27 1370.22   171.7 1372.83   173.7 1372.83   214.9 1362.53
     250 1361.83  285.11 1362.53  330.94 1373.99  346.94 1374.31  367.32  1379.4
   367.7 1379.38  368.57 1379.31  368.82 1379.32   369.7 1379.26  380.13 1379.44
  380.83 1379.46  381.73 1379.49     387 1379.54  388.63 1379.52  389.72 1379.54
  390.53 1379.53  390.69 1379.53   395.7 1379.72  395.87 1379.72  398.55    1380
  401.95    1380  402.54    1380  402.83    1380  403.39    1380  413.43 1380.32
   414.5 1380.32  416.76 1380.32  418.46 1380.47  421.16 1380.46  421.69 1380.56
  422.08 1380.63   422.1 1380.64  422.14 1380.64  422.19 1380.65  424.64 1380.64
  424.72 1380.64  424.87 1380.64   425.1 1380.63  425.38 1380.62  425.65 1380.62
  426.16 1380.62  427.63 1380.62  429.64 1380.61  431.01  1380.6  432.39  1380.6
  433.73 1380.28  437.29 1380.01  445.08 1379.08  452.36  1378.2   459.2 1377.38
  465.63 1376.61  467.44 1376.65  481.46 1377.77  483.38  1377.7  490.96 1377.61
  493.63 1377.56     500 1377.63

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
```

```
**********************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        173.7  330.94            100.01     100  100.06              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  181.48    1374        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2800

INPUT
Description: Channel Station 59099.16
Station Elevation Data    num=      98
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1374.57    46.7  1374.8   57.55 1374.93   57.97 1374.95   58.56 1374.96
   62.19    1375    70.2 1375.23   75.09 1375.38   83.12 1375.84   84.46 1375.91
   85.91    1376   86.94 1376.06   94.66 1376.52   96.91 1376.31   99.27 1376.09
  100.19    1376  100.74 1375.95  102.88 1375.74  104.19 1375.62  107.24 1375.33
  116.87 1375.19  123.45 1375.13  140.47 1375.11     141 1375.11  141.15  1375.1
  141.19  1375.1  141.28  1375.1  141.44 1375.09  141.62 1375.09   142.1 1375.07
  144.25    1375  144.47 1374.99  151.61 1374.29  153.99    1374  154.15    1374
  154.23    1374  154.27    1374  159.62 1373.27  159.63 1373.27   159.7 1373.26
   159.8 1373.25  159.93 1373.24  161.61    1373  161.63    1373  161.65    1373
  161.66    1373  161.67    1373  161.69    1373     162 1372.95  162.77 1372.83
  163.61 1372.69  170.91 1372.48  173.46  1372.4  173.66 1372.45  174.39 1372.63
  181.13 1370.74  214.89  1362.3     250  1361.6  285.11  1362.3  329.06 1373.29
  350.74 1373.72  372.06 1379.05  372.11  1378.9   372.2  1378.9  372.36 1378.94
   372.5 1378.93  372.52 1378.93  372.63 1378.93   372.7 1378.93  372.73 1378.93
  372.79 1378.93  372.85 1378.93  373.14 1378.97  373.18    1379  373.51 1379.23
  374.36 1379.79  374.54  1379.8  374.67 1379.81  374.98 1379.85  380.67    1380
  389.68 1380.29  398.07 1380.55  400.93 1380.33   402.6 1380.13  404.16 1379.95
  405.63 1379.77     407 1379.61  407.39 1379.62  410.39 1379.86  417.53 1379.61
  445.58 1379.26  455.44 1379.08  480.06 1379.35  480.08 1379.35  480.08 1378.92
  480.09 1378.48  484.82 1378.23     500 1377.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.39  329.06            100.01     100  100.06              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2700

INPUT
Description: Channel Station 59199.16
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1374.09   23.12  1374.2    65.9 1374.74   67.56 1374.82   69.86 1374.82
   72.22 1374.85   74.79 1374.92   75.51 1374.93   76.31 1374.93   78.48 1374.93
   78.64 1374.94   78.83 1374.95   79.54    1375   85.57 1375.39   95.23    1376
   97.53 1376.15   98.85 1376.23   99.35 1376.17   100.3 1376.05  100.75    1376
  106.39 1375.32  107.17 1375.22  109.03    1375     110 1374.88   112.4 1374.59
  116.24 1374.46  119.01 1374.38  120.53 1374.33  121.11 1374.31  121.89 1374.27
  122.77 1374.24  124.21 1374.19  126.91 1374.09  129.09 1374.01  129.25    1374
  129.61 1373.99  130.01 1373.97  130.02 1373.97  130.21 1373.96  135.52 1373.51
  136.88 1373.39   143.7    1373  143.74    1373  143.78    1373  143.83    1373
   144.6 1372.95  146.75  1372.8  147.67 1372.75  148.13 1372.72  149.62 1372.66
  152.29 1372.58  152.96 1372.62  163.36 1372.96  164.46    1373  164.58    1373
  165.28 1373.03  169.96 1373.18  170.46 1373.18   214.9 1362.07     250 1361.37
  285.11 1362.07  299.01 1362.97   338.5 1372.84   354.5 1373.16  386.23 1381.09
  386.64 1380.99  386.74 1380.99  387.18 1380.99  387.73 1380.99   388.3 1380.99
  388.86 1380.99  389.38 1380.98  389.69 1380.98  389.83 1380.98  390.34 1380.98
  391.16 1380.98  391.27 1380.98  393.17 1380.97  393.35 1380.97   394.3 1380.97
  396.04 1380.96  396.57 1380.97   396.9 1380.95   400.2  1380.9  417.26 1380.59
  423.97 1380.67  423.97 1380.55  423.98 1380.43  431.36 1380.03  455.79 1378.55
  456.49  1378.5  463.08 1378.01  463.09 1378.35  463.09 1378.68   463.1 1378.68
  471.48 1378.51  476.39 1378.21  487.34 1378.27  497.41 1377.73     500 1377.72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.46   338.5                 46      46      46              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2654.00*
```

INPUT
Description: Begin Flow Contraction at 2:1
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
86.36	1373.25	97.92	1373.3	119.31	1373.57	120.14	1373.61	121.29	1373.61
122.47	1373.63	123.76	1373.67	124.12	1373.67	124.51	1373.67	125.6	1373.67
125.68	1373.68	125.78	1373.68	126.13	1373.71	129.15	1373.9	133.98	1374.21
135.12	1374.28	135.79	1374.32	136.04	1374.29	136.51	1374.23	136.74	1374.21
139.55	1373.86	139.95	1373.81	140.88	1373.71	141.36	1373.65	142.56	1373.5
144.48	1373.44	145.87	1373.4	146.62	1373.37	146.92	1373.36	147.3	1373.34
147.74	1373.32	148.46	1373.3	149.82	1373.25	150.9	1373.21	150.99	1373.21
151.17	1373.2	151.36	1373.19	151.46	1373.19	154.12	1372.96	154.8	1372.9
158.21	1372.71	158.23	1372.71	158.25	1372.71	158.27	1372.71	158.66	1372.68
159.74	1372.6	160.2	1372.58	160.43	1372.56	161.17	1372.54	162.51	1372.49
162.84	1372.52	168.04	1372.69	168.59	1372.71	168.65	1372.71	169	1372.72
171.34	1372.8	171.59	1372.8	214.38	1362.09	215.4	1361.95	250	1361.27
282.1	1361.91	288.73	1362.2	294.81	1363.1	330.92	1372.13	341.35	1372.35
362.05	1376.44	362.32	1376.39	362.38	1376.39	362.67	1376.39	363.03	1376.39
363.4	1376.4	363.76	1376.4	364.1	1376.39	364.3	1376.4	364.4	1376.4
364.73	1376.4	365.26	1376.4	365.33	1376.4	365.94	1376.4	366.57	1376.44
366.69	1376.44	367.31	1376.48	368.45	1376.54	368.79	1376.57	369.01	1376.57
371.16	1376.67	382.28	1377.16	386.66	1377.46	386.66	1377.4	386.67	1377.34
391.48	1377.42	407.41	1377.61	407.87	1377.61	412.17	1377.62	412.17	1377.79
412.17	1377.95	417.65	1378.19	420.85	1378.22	427.99	1378.67	434.56	1378.78
436.24	1378.88								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
86.36	.032	214.38	.028	282.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.59	330.92	46	46	46	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2608.01

INPUT
Description: Begin Channel Bottom Transition & 10' Riprap Apron
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
172.72	1372.41	214.89	1361.86	250	1361.16	285.1	1361.86	323.34	1371.42
339.68	1371.83	372.49	1380.03						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
172.72	.032	214.89	.04	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.72	323.34	10	10	10	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
172.72	214	1372	F
286	372.49	1372	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2598.02

INPUT
Description: Upstream End of Wing Wall (Approx Channel Station 59300)
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
171.98	1372.56	214.88	1361.84	250	1361.14	285.11	1361.85	328.11	1372.56
344.11	1372.92	372.48	1380.01						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
171.98	.032	214.88	.015	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.98	328.11	17	17	17	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
171.98	219	1372	F
281	372.48	1372	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2581.04

INPUT
Description: Upstream Face of C12

```
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
   227.7    1372   227.7  1361.1   272.3  1361.1   272.3    1372

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
   227.7           227.7    .015   272.3

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         227.7   272.3               24      24      24             .3       .5

CULVERT


RIVER: River
REACH: Ellsworth          RS: 2569

INPUT
Description:
Distance from Upstream XS =       4
Deck/Roadway Width        =      16
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*********************************************
       0    1372             500    1372

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
   227.7    1372   227.7  1361.1   272.3  1361.1   272.3    1372

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
   227.7           227.7    .015   272.3

Bank Sta: Left   Right    Coeff Contr.   Expan.
         227.7   272.3             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*********************************************
       0  1371.2             500  1371.2

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
   227.7 1371.15   227.7 1361.08   272.3 1361.08   272.3 1371.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
   227.7           227.7    .015   272.3

Bank Sta: Left   Right    Coeff Contr.   Expan.
         227.7   272.3             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
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 #12        Box        6      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                0      24     .015     .015         1                  .4                 1
Number of Barrels =  4
Upstream   Elevation =  1361.1
Centerline Stations
    Sta.    Sta.    Sta.    Sta.
  233.62  244.54  255.46  266.38
Downstream Elevation =  1361
Centerline Stations
    Sta.    Sta.    Sta.    Sta.
  233.62  244.54  255.46  266.38

CROSS SECTION


RIVER: River
```

```
REACH: Ellsworth          RS: 2557.04

INPUT
Description: Downstream Face of C12
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************
   227.7 1371.15   227.7 1361.08   272.3 1361.08   272.3 1371.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   227.7           227.7    .015   272.3

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         227.7   272.3              2.5     2.5     2.5             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2554.53*

INPUT
Description:
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************************
  219.29 1371.15  225.57 1361.19  231.42 1361.07  268.58 1361.07  274.43 1369.58
  278.33 1370.55  280.99 1370.61  287.96 1372.35

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************************
  219.29    .018  219.29    .018  236.23    .033  267.82    .039  278.33    .018
  287.96    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        219.29  278.33              2.5     2.5     2.5             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2552.03*

INPUT
Description:
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************************
  210.88 1371.15  223.43  1361.3  235.13 1361.06  264.87 1361.06  276.57 1368.01
  284.35 1369.96  289.69 1370.06  303.62 1373.55

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************************
  210.88    .021  210.88    .021  231.96    .035  271.27    .037  284.35    .021
  303.62    .021

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        210.88  284.35              2.5     2.5     2.5             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2549.52*

INPUT
Description:
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************************
  202.47 1371.15  221.29  1361.4  238.85 1361.06  261.15 1361.06   278.7 1366.44
  290.38 1369.36  298.38 1369.52  319.27 1374.74

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************************
  202.47    .023  202.47    .023  227.69    .036  274.73    .036  290.38    .023
  319.27    .023

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        202.47  290.38              2.5     2.5     2.5             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2547.02*

INPUT
Description:
Station Elevation Data    num=       8
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
  194.06 1371.15  219.16 1361.51  242.57 1361.05  257.43 1361.05  280.83 1364.87
  296.41 1368.76  307.07 1368.98  334.93 1375.94

Manning's n Values         num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************************
  194.06    .026  194.06    .026  223.43    .037  278.19    .035  296.41    .026
  334.93    .026

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        194.06  296.41              2.5     2.5     2.5             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2544.51*

INPUT
Description:
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
  185.65 1371.15  217.02 1361.62  246.28 1361.04  253.72 1361.04  282.97  1363.3
  302.43 1368.17  315.77 1368.43  350.59 1377.14

Manning's n Values         num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************************
  185.65    .029  185.65    .029  219.16    .039  281.64    .033  302.43    .029
  350.59    .029

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        185.65  302.43              2.51    2.51    2.51            .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2542.01

INPUT
Description: Downstream End of Wing  Wall
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
  177.24 1371.15  214.89 1361.73     250 1361.03   285.1 1361.73  308.46 1367.57
  324.46 1367.89  366.25 1378.34

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************
  177.24    .032  214.89     .04   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        177.24  308.46                10      10      10             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  177.24     220    1371       F
     280  366.25    1371       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2532.01

INPUT
Description: End Channel Bottom Transition, End Riprap
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
  176.97  1371.2  214.89 1361.72     250 1361.01   285.1 1361.72  318.71 1370.12
  334.71 1370.44  364.31 1377.84

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************
  176.97    .032  214.89    .028   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.97  318.71                19      19      19             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  176.97     215    1371       F
     285  364.31    1371       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2513.15*
```

INPUT
Description: Fully Expanded Section at 2:1
Station Elevation Data num= 120

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
151.69	1371.46	158.83	1371.55	160.82	1371.58	162.26	1371.57	163.23	1371.57
163.6	1371.57	163.99	1371.59	164.17	1371.6	164.27	1371.6	165.5	1371.65
166.24	1371.68	166.7	1371.65	167.6	1371.6	167.89	1371.58	168.41	1371.56
169.28	1371.52	169.65	1371.51	170.02	1371.46	170.1	1371.46	170.33	1371.43
170.45	1371.42	171.44	1371.32	171.46	1371.32	171.62	1371.32	171.7	1371.31
171.86	1371.31	171.88	1371.31	172.6	1371.3	172.98	1371.29	173.1	1371.29
173.14	1371.29	173.18	1371.29	174.83	1371.25	175.39	1371.23	175.47	1371.23
175.51	1371.22	175.88	1371.21	175.92	1371.2	175.95	1371.2	175.97	1371.2
176.09	1371.2	176.11	1371.2	176.12	1371.2	176.14	1371.19	176.15	1371.19
176.16	1371.19	176.23	1371.19	176.25	1371.19	176.27	1371.19	176.29	1371.19
176.3	1371.19	176.4	1371.18	176.43	1371.19	176.63	1371.24	176.71	1371.26
177.53	1371.01	214.77	1361.7	215.62	1361.66	250	1360.96	283.83	1361.65
295.27	1364.21	316.23	1369.45	320.94	1369.63	325.36	1370.15	330.8	1370.26
332.17	1370.42	332.59	1370.44	334.93	1370.51	335.78	1370.53	336.8	1370.61
337.01	1370.63	337.04	1370.63	337.05	1370.63	337.91	1370.69	338.07	1370.7
338.25	1370.71	338.43	1370.72	338.67	1370.74	338.79	1370.74	339.24	1370.77
339.31	1370.77	339.84	1370.8	339.9	1370.81	340.06	1370.84	340.13	1370.85
340.85	1370.99	341.16	1371.05	341.49	1371.11	342.08	1371.23	342.18	1371.25
342.8	1371.36	342.85	1371.37	342.89	1371.38	342.95	1371.39	342.96	1371.4
343.37	1371.46	343.66	1371.51	344.62	1371.65	345.06	1371.72	345.69	1371.81
346.15	1371.89	346.47	1371.93	346.73	1371.98	346.96	1372.01	347.66	1372.12
348	1372.17	348.32	1372.22	348.62	1372.27	349.14	1372.35	349.82	1372.45
350.14	1372.5	350.19	1372.51	351.8	1372.74	352.47	1372.84	360.27	1373.7
361.53	1373.89	364.6	1374.29	371.21	1375.15	371.64	1375.22	383.69	1376.99

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
151.69	.032	214.77	.028	283.83	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.71	316.23	113.16	113.16	113.16	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2400

INPUT
Description: Channel Station 59499.16
Station Elevation Data num= 126

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1373.01	49.96	1373.64	63.9	1373.83	74.03	1373.81	80.82	1373.79
83.39	1373.79	86.12	1373.92	87.36	1373.97	88.08	1374	96.7	1374.34
101.86	1374.54	105.09	1374.35	111.41	1374	113.39	1373.89	117.05	1373.69
123.15	1373.45	125.74	1373.34	128.33	1373.05	128.85	1373	130.46	1372.82
131.35	1372.73	138.24	1372.03	138.39	1372.01	139.55	1372.01	140.1	1372
141.22	1371.98	141.34	1371.98	146.39	1371.89	149.05	1371.85	149.87	1371.84
150.18	1371.84	150.23	1371.84	150.26	1371.83	150.28	1371.83	150.32	1371.83
150.42	1371.83	162	1371.54	165.93	1371.42	166.48	1371.38	166.76	1371.36
169.36	1371.25	169.62	1371.23	169.86	1371.22	169.98	1371.21	170.8	1371.18
170.92	1371.17	171.03	1371.17	171.14	1371.16	171.22	1371.16	171.3	1371.16
171.81	1371.13	171.86	1371.13	171.96	1371.13	172.1	1371.12	172.22	1371.12
172.31	1371.11	173.01	1371.09	173.04	1371.09	173.08	1371.09	173.14	1371.09
173.22	1371.14	174.57	1371.48	175.17	1371.63	176	1371.11	214.9	1361.39
250	1360.68	285.11	1361.39	301.37	1365.45	315.22	1366.33	328.25	1369.59
344.25	1369.91	348.29	1370.92	349.52	1371.04	356.41	1371.32	358.91	1371.4
361.93	1371.89	362.55	1372	362.63	1372	362.67	1372	365.19	1372.36
365.66	1372.42	366.2	1372.48	366.72	1372.54	367.43	1372.61	367.8	1372.66
369.12	1372.81	369.32	1372.83	370.88	1373	371.53	1373.07	371.72	1373.09
373.86	1373.34	374.75	1373.44	375.75	1373.55	377.46	1373.75	377.78	1373.78
379.59	1373.98	379.6	1373.99	379.73	1374	379.86	1374.01	380.02	1374.03
380.07	1374.03	381.28	1374.07	382.13	1374.09	384.96	1374.13	386.25	1374.15
388.09	1374.19	389.45	1374.23	390.39	1374.25	391.17	1374.28	391.83	1374.29
393.91	1374.34	394.89	1374.35	395.84	1374.37	396.74	1374.4	398.27	1374.47
400.27	1374.47	401.21	1374.47	401.35	1374.47	406.08	1374.47	408.06	1374.47
431.04	1372.63	434.74	1372.67	443.79	1372.36	463.24	1371.69	464.5	1371.7
500	1371.91								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.17	328.25	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2300

INPUT
Description: Channel Station 59599.16
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	1372.71	18.49	1372.94	31.3	1373.12	40.62	1373.1	46.86	1373.08
64.75	1373.08	83.68	1373.26	83.76	1373.26	83.78	1373.26	83.81	1373.26
83.83	1373.27	83.86	1373.27	83.89	1373.27	83.94	1373.27	84.02	1373.28
84.17	1373.28	84.57	1373.3	88.18	1373.47	99.19	1374	101.98	1374.13
102.8	1374.17	103.01	1374.18	103.22	1374.17	104.23	1374.11	106.04	1374
106.5	1373.97	109.11	1373.8	116.23	1373.37	120.25	1373.35	122.33	1373.35
126.73	1373.1	128.59	1373	131.8	1372.82	132.65	1372.77	133.02	1372.8
133.53	1372.84	135.64	1373	136.65	1373.08	138	1373.18	142.91	1373.55
147.26	1373.25	148.05	1373.17	149.42	1373.29	151.47	1373.41	153.47	1373.25
155.22	1373.1	156.38	1373	156.63	1372.98	159.44	1372.74	160.98	1372.72
169.88	1372.39	214.9	1361.13	250	1360.43	285.11	1361.13	317.89	1369.33
333.89	1369.65	336.45	1370.29	339.95	1371.18	340.83	1371	341.72	1370.64
342.77	1370.27	350.89	1370.35	357.04	1370.44	367.27	1370.75	375.81	1371
377.45	1371.05	380.19	1371.13	381.95	1371.19	382.69	1371.19	383.99	1371.2
393.72	1371.14	394.99	1371.14	395.3	1371.13	395.66	1371.12	399.29	1371
400.16	1371	402.25	1371	402.5	1371.01	402.8	1371.19	406.37	1371.07
406.45	1371.07	465.29	1371.42	500	1371.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.88	317.89	100	100	100.06	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2200

INPUT
Description: Channel Station 59699.16
Station Elevation Data num= 104

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1372.4	7.21	1372.39	12.9	1372.37	29.22	1372.37	46.55	1372.53
66.58	1372.95	85.27	1373.17	95.93	1373.62	100.13	1373.81	103.9	1373.97
116.87	1373.03	117.34	1373	118	1372.95	118.12	1372.94	119.29	1372.93
131.65	1372.8	132.59	1372.85	133.42	1372.91	134.94	1373	136.59	1373.1
139.69	1373.29	141	1373.37	145.23	1373.63	149.52	1373.54	150.25	1373.53
150.75	1373.53	152.68	1373.52	156.1	1373.41	157.57	1373.35	159.18	1373.29
163.52	1373.12	166.34	1373.02	214.89	1360.88	250	1360.18	285.1	1360.88
318.25	1369.17	334.25	1369.49	337.1	1370.2	339.37	1371	339.72	1370.84
339.98	1370.73	342.65	1370.92	343.53	1371	343.62	1371	343.69	1371
343.72	1371	343.76	1371	343.82	1371	343.91	1371	344.31	1371.04
344.32	1371.04	344.33	1371.04	344.41	1371.05	345.87	1371.2	346.4	1371.26
348.39	1371.47	350.2	1371.66	352.59	1371.92	352.92	1371.96	353.32	1372
353.34	1372	353.46	1372	353.82	1372	354.51	1372	354.7	1371.99
355.07	1371.96	355.33	1371.94	355.49	1371.93	355.99	1371.88	356.2	1371.86
356.38	1371.84	356.55	1371.82	358.31	1371.62	360.02	1371.42	363.59	1371
365.88	1371	366.95	1371	369.89	1371	377.2	1371.95	377.65	1371.98
377.75	1372.03	378.97	1372.71	378.98	1372.63	379.3	1372.69	379.72	1372.68
382.7	1372	383.28	1372	384.73	1371.62	386.44	1371.16	387.86	1371.47
390.82	1372	393.3	1371.54	393.39	1371.56	393.77	1372	393.81	1371.95
395.39	1372.58	395.45	1372.52	397.6	1371.51	397.61	1371.51	399.54	1370.74
413.35	1370.82	461.52	1371.22	465.03	1371.29	500	1371.43		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
166.34	318.25	99.24	100	100.82	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2100

INPUT
Description: Channel Station 59799.16
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1371.72	10.83	1371.82	28.92	1372.2	53.24	1372.48	67.61	1372.65
81.61	1372.8	86.8	1372.84	89.05	1372.95	89.82	1372.99	90.05	1373
104.82	1373.72	105.89	1373.78	106.56	1373.75	115.42	1373.34	120.73	1373.14
123.86	1373.09	126.04	1373.08	1[illegible].58	1373.07	138.7	1373.06	140.88	1373.04
145.13	1373	145.33	1373	157.07	1372.9	157.24	1372.9	157.29	1372.9
157.31	1372.9	157.38	1372.9	157.48	1372.89	167.3	1372.44	167.66	1372.44
214.9	1360.63	250	1359.93	285.11	1360.63	319.54	1369.24	335.54	1369.56
353	1373.92	353.23	1373.69	353.68	1373.53	353.96	1373.42	354.96	1373
355.81	1372.65	357.3	1372	358.24	1371.6	359.62	1371	360.5	1370.62
361.15	1370.34	363.24	1370.72	364.45	1371	365.1	1371.25	365.6	1371.37
366.71	1371.65	367.69	1371.74	368.17	1371.79	368.39	1371.79	369.58	1371.79
369.81	1371.78	370.87	1371.81	371	1371.81	372.02	1371.89	372.11	1371.89
372.89	1372	373.1	1372.04	373.16	1372.05	373.92	1372.15	374.61	1372.13
374.75	1372.14	375.34	1372.11	376.32	1372.11	376.39	1372.1	376.43	1372.09
376.47	1372.09	376.49	1372.09	377.84	1372.11	377.87	1372.1	377.88	1372.1
379.01	1372.02	379.05	1372	379.09	1372	379.88	1371.86	380.04	1371.84
380.06	1371.84	381.42	1371.41	382.95	1371.7	383	1371.7	383.28	1371.72

383.74	1371.82	383.97	1371.81	384.39	1371.9	384.84	1371.93	384.98	1371.92
385.43	1371.89	385.68	1371.79	386.04	1371.65	386.88	1371	387.23	1370.68
387.92	1370.36	389.88	1370.73	391.37	1371	392.71	1371.24	394.08	1371.51
394.54	1371.61	394.79	1371.68	394.94	1371.72	395.03	1371.75	395.1	1371.77
395.16	1371.79	395.25	1371.81	395.89	1371.87	395.94	1371.88	398.5	1370.86
399.42	1370.49	400.06	1370.54	414.16	1370.66	414.94	1370.67	458.98	1370.85
468.13	1370.88	500	1371.08						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.66	319.54	98.48	100	101.57	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2000

INPUT
Description: Channel Station 59899.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1371.54	15.72	1371.72	28.54	1371.87	41.02	1372.01	66.95	1372.19
90.13	1372.71	91.53	1372.76	91.6	1372.76	91.68	1372.76	91.77	1372.77
91.87	1372.77	91.98	1372.77	92.34	1372.78	92.77	1372.79	93.7	1372.83
95.08	1372.87	96.84	1372.92	98.18	1372.96	99.56	1373	100.21	1373.02
108.66	1373.25	114.26	1373.02	114.72	1373	115.34	1372.97	117.52	1372.88
118.69	1372.83	122.49	1372.67	127.02	1372.64	136.83	1372.58	156.24	1372.56
160.3	1372.51	161.56	1372.41	161.96	1372.37	162.73	1372.3	164.69	1372.14
166.24	1372	169.52	1371.72	214.9	1360.38	250	1359.67	285.1	1360.38
316.23	1368.16	332.23	1368.48	352.46	1373.53	353.34	1373.37	354.81	1373.25
357.08	1373	357.2	1372.96	359.01	1372	360.09	1371.26	360.56	1371
363.06	1371	364.06	1371	364.09	1371	365.22	1371.45	365.98	1371.71
366.28	1371.81	366.83	1372	367.64	1372.37	368.14	1372.58	368.65	1372.81
369.07	1372.97	369.26	1372.96	369.43	1372.95	369.64	1372.94	369.86	1372.93
370.67	1372.88	376.33	1372.39	377.55	1372.35	378.01	1372.34	379.75	1372
383.33	1371.09	383.7	1371	384	1370.92	384.16	1370.9	387.59	1370.3
388.77	1370.12	388.91	1370.1	389.51	1370	389.74	1369.96	390.12	1369.89
392.19	1369.88	396.33	1370	397.57	1370.04	399.47	1370.05	400.55	1370.13
400.91	1370.06	401.4	1369.97	402.26	1370.07	403.33	1370.2	413.83	1370.24
415.45	1370.24	476.62	1370.64	500	1370.65				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.52	316.23	100.03	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1900

INPUT
Description: Channel Station 59999.16
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1371.19	22.32	1371.35	45.04	1371.85	85.59	1372.37	92.75	1372.45
97.27	1372.68	97.45	1372.69	97.65	1372.7	97.88	1372.71	98.13	1372.72
98.41	1372.73	98.72	1372.74	99.07	1372.75	99.46	1372.77	99.91	1372.79
100.69	1372.82	100.91	1372.83	101.37	1372.84	102.13	1372.87	103.69	1372.93
103.99	1372.95	104.61	1372.97	105.32	1373	106.22	1373.04	108.11	1373.12
110.96	1373.24	113.53	1373.08	114.81	1373	117.35	1372.84	119.56	1372.7
120.76	1372.63	125.62	1372.35	128.57	1372.46	136.89	1372.68	146.94	1372.19
152.31	1372	153.56	1371.98	153.93	1371.97	156.25	1372	157.17	1372
157.85	1372.03	160.53	1372.15	161.4	1372.07	162.17	1372	170.55	1371.21
214.89	1360.12	250	1359.42	285.11	1360.12	317.71	1368.27	333.71	1368.58
353.57	1373.55	354.13	1373.3	355.18	1373.02	355.26	1373	357.6	1372.39
358.12	1372.26	359.14	1372	360.49	1371.66	363.08	1371	363.56	1370.88
366.42	1370.15	366.86	1370.03	366.98	1370	367.15	1369.99	369.79	1369.91
370.16	1369.99	370.24	1370	371.44	1370	373.42	1370.26	375.16	1370.21
375.24	1370.22	376.68	1370.15	376.76	1370.15	378.03	1370	378.2	1370
378.8	1369.89	379.24	1369.81	379.7	1369.79	380.72	1370	380.85	1370.02
380.89	1370.01	382.71	1370.18	383.59	1370.27	386.89	1370.69	389.02	1370.66
390.82	1370.66	391.21	1370.73	395.31	1370.85	395.45	1370.87	401.37	1370.72
401.7	1370.76	406.38	1370.04	407.23	1369.91	430.48	1370.06	479.99	1370.08
500	1370.04								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.55	317.71	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1800

INPUT
Description: Channel Station 60099.16
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1370.98	32.57	1371.39	69.65	1371.84	93.42	1372.33	99.42	1372.61
100.3	1372.65	101.28	1372.69	102.31	1372.72	103.65	1372.77	105.45	1372.84
108.02	1372.93	109.8	1373	111.86	1373.08	112.89	1373.11	113.16	1373.1
114.3	1373.03	114.77	1373	119.35	1372.73	121.45	1372.6	126.45	1372.3
128.83	1372.34	138.69	1372.4	152.58	1372.31	154.17	1372.29	155.38	1372.22
158.21	1372	159.63	1371.88	161.74	1371.71	167.27	1371.78	214.9	1359.87
250	1359.17	285.11	1359.87	315.77	1367.54	331.77	1367.86	347.78	1371.86
348.66	1371.09	348.82	1371.08	349.63	1371.18	349.98	1371.19	350.38	1371.23
351.14	1371.36	354.15	1372	355.51	1372.07	355.87	1372.07	356.01	1372.03
356.1	1372	356.46	1371.89	357.15	1371.67	358.65	1371.2	359.31	1371
361.13	1370.49	361.9	1370.28	362.91	1370	362.94	1369.99	363	1369.98
363.04	1369.98	363.18	1370	364.28	1370.2	364.36	1370.22	364.44	1370.23
365.75	1370.46	365.87	1370.48	366.6	1370.6	366.75	1370.62	367.08	1370.67
367.26	1370.69	367.44	1370.7	369.21	1370.74	369.36	1370.75	369.51	1370.75
369.93	1370.73	370.77	1370.69	371.68	1370.66	373.3	1371	373.94	1371
374.91	1371	376.88	1370.66	378.1	1370.72	378.61	1370.88	379.14	1371
380.35	1371.36	381.22	1371.57	381.69	1371.65	381.98	1371.68	382.48	1371.62
383.03	1371.5	384.92	1371	384.97	1370.99	384.98	1370.99	385	1370.98
386.81	1370.53	387.57	1370.38	388.07	1370.27	388.63	1370.23	389.2	1370.13
389.72	1370.09	390.01	1370.12	390.83	1370.21	391.76	1370.91	392.23	1371.27
394.02	1370.71	396.94	1369.8	406.41	1369.56	410.7	1369.49	437.06	1369.5
500	1369.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.27	315.77	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1700

INPUT
Description: Channel Station 60199.16
Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1370.66	10.97	1370.79	36.48	1371.32	38.69	1371.44	61.3	1371.49
67.07	1371.5	95.71	1371.63	96.59	1371.68	97.74	1371.73	99.85	1371.83
102.95	1371.98	103.31	1372	107.23	1372.19	115.12	1372.59	117.58	1372.47
117.85	1372.46	118.19	1372.44	118.66	1372.42	119.33	1372.39	120.39	1372.34
122.3	1372.25	126.76	1372.04	127.64	1372	128.2	1371.97	128.59	1371.96
128.84	1371.94	130.03	1371.89	131.65	1371.92	141.56	1371.95	141.83	1371.95
142.32	1371.96	143.39	1372	146.03	1372.09	147.08	1372.13	147.69	1372.16
149.67	1372.12	156.09	1372	156.91	1371.98	164.46	1371.71	168	1371.34
214.9	1359.62	250	1358.92	285.11	1359.62	314.57	1366.98	330.57	1367.3
338.73	1369.34	341.51	1370	344.34	1370.64	345.92	1371	349.43	1371.8
350.33	1372	353.27	1372.67	354.82	1373	357.35	1373.44	360.26	1374
360.28	1374	360.34	1374.01	360.4	1374.02	360.41	1374.02	360.73	1373.84
362.23	1373	363.68	1372.2	364.03	1372	365.72	1371.1	365.91	1371
366.28	1370.81	367.85	1370	368.87	1370	369.31	1370	370.91	1369.76
370.98	1369.74	371.03	1369.74	371.35	1369.73	372.34	1369.69	373.02	1369.78
373.21	1369.77	373.37	1369.76	374.14	1369.81	374.28	1369.8	374.5	1369.78
375.38	1369.77	375.63	1369.75	376.57	1369.68	377.05	1369.65	377.67	1369.6
377.96	1369.58	378.34	1369.56	378.51	1369.55	378.52	1369.55	378.63	1369.54
378.86	1369.53	379.23	1369.51	379.59	1369.48	380.1	1369.45	380.22	1369.44
380.41	1369.43	380.98	1369.39	385.39	1369.09	385.44	1369.09	385.45	1369.09
385.46	1369.09	385.47	1369.09	389.91	1369.37	390.11	1369.39	390.38	1369.43
390.76	1369.46	391.82	1369.53	392.29	1369.55	392.77	1369.55	396.19	1369.52
396.45	1369.52	396.63	1369.53	396.73	1369.53	396.88	1369.52	397.04	1369.51
397.21	1369.5	399.76	1369.25	400.24	1369.27	400.7	1370	401.28	1370.47
401.58	1370.82	404.58	1369.8	412.55	1368.95	412.81	1369.1	413.44	1369.47
413.95	1369.76	414.16	1369.41	414.34	1369.12	414.49	1368.88	470.96	1368.77
475.77	1368.74	482.76	1367.89	489.65	1367.05	491.3	1366.85	496.12	1366.81
500	1367.42								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
168	314.57	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
360.4	500	1374.02	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1600

INPUT
Description: Channel Station 60299.16
Station Elevation Data num= 152

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1370.49	1.04	1370.49	29.18	1370.62	65.66	1370.96	96.62	1371.09
98.29	1371.11	100.33	1371.22	100.6	1371.23	100.96	1371.25	101.44	1371.27
102.16	1371.31	103.39	1371.38	106.07	1371.52	115.11	1372	115.19	1372
117.13	1372.11	120.93	1372.01	121.44	1372	129.42	1371.81	132.3	1371.75
138.58	1371.98	139.35	1372	139.9	1372.01	140	1372.02	140.39	1372.01
140.81	1372	141.23	1372	143.58	1371.96	144.39	1371.94	145.96	1371.83
146.75	1371.79	147.64	1371.74	148.64	1371.69	149.49	1371.65	153.08	1371.46
155.68	1371.34	156.08	1371.33	156.83	1371.29	158.03	1371.24	161.41	1371.16
162.1	1371.1	162.75	1371.06	162.95	1371.03	163.28	1371.03	163.62	1371.02
163.76	1371.01	164.28	1371.02	166.51	1371.09	166.62	1371.09	166.89	1371.11
167.88	1371.12	214.89	1359.37	250	1358.66	285.11	1359.37	315.44	1366.95
331.44	1367.27	334.64	1368.07	337.07	1369.47	339.29	1369	340.01	1368.65
340.1	1368.61	340.56	1368.62	340.99	1368.63	351.98	1368.62	352.98	1368.72
353.82	1368.82	354.71	1368.93	355.34	1369	355.62	1369.03	356.32	1369.12
356.97	1369.22	360.04	1369.84	362.35	1369.29	363.63	1369	363.7	1368.98
364	1368.91	364.03	1368.92	364.37	1369	364.93	1369.16	365.1	1369.21
365.35	1369.28	365.7	1369.37	367.07	1369.74	367.47	1369.83	367.7	1369.89
368.03	1369.94	368.09	1369.95	368.67	1370	368.69	1370	370.8	1370
370.81	1370	378.45	1369.91	379.32	1370	380.08	1370.34	380.79	1370.67
382.63	1370.23	383.42	1370.02	383.56	1369.98	384.15	1370	386.43	1370
386.94	1370.08	387.55	1370.18	387.8	1370.23	388.83	1370.22	390.23	1370.13
391.45	1370.01	392.96	1370	393.05	1370	393.38	1370	394.3	1370
394.72	1370	394.8	1370.01	395.3	1370.08	395.61	1370.15	397.08	1370.42
398.97	1370.69	400.05	1370.54	400.38	1370.43	400.41	1370.4	401.23	1370.17
401.87	1370	402.13	1369.93	404.14	1369.95	404.14	1369.96	404.25	1370
404.33	1370.03	405.17	1370.13	407.99	1370.53	411.36	1370.97	411.59	1370.99
411.67	1370.99	413.06	1371.11	413.24	1371.13	413.92	1371.16	414.35	1371
417.55	1370.16	418	1370.07	418.16	1370.03	418.19	1370.02	418.21	1370.01
418.28	1370.03	418.3	1370	418.9	1369.02	419.39	1368.2	432.46	1368.18
433.57	1368.17	440.94	1367.28	448.2	1366.39	449.94	1366.18	451.81	1366.16
489.36	1372.09	500	1372.04						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.88	315.44	98.37	100	101.72	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
318.19	500	1370	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1500

INPUT
Description: Channel Station 60395.16
Station Elevation Data num= 164

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1369.95	13.24	1370	38.69	1370.27	48.33	1370.4	76.48	1370.86
97.5	1371.02	103.63	1371.32	106.21	1371.45	112.53	1371.76	116.23	1371.94
124.64	1371.44	133	1371	133.97	1371	134.29	1370.96	136.03	1370.74
140.1	1370.23	140.28	1370.21	141.55	1370.06	142.08	1370	146.33	1369.48
148.14	1369.26	148.93	1369.17	149.17	1369.15	150.36	1369	150.37	1369
150.41	1369	150.63	1369	151.11	1368.95	151.81	1368.89	152.45	1368.83
153	1368.77	153.34	1368.74	153.59	1368.71	153.9	1368.69	154.4	1368.65
155.67	1368.59	156.46	1368.53	156.89	1368.51	157.43	1368.49	157.95	1368.45
158.37	1368.43	158.49	1368.42	159.19	1368.39	159.31	1368.38	159.44	1368.38
159.58	1368.37	160.14	1368.35	160.29	1368.34	160.68	1368.32	160.83	1368.32
161.03	1368.31	161.14	1368.3	161.21	1368.3	161.34	1368.29	161.4	1368.29
161.66	1368.28	162	1368.27	163.07	1368.22	163.13	1368.22	163.29	1368.21
163.36	1368.21	165.32	1368.08	165.4	1368.08	165.42	1368.07	166.37	1368
168.03	1367.89	169.63	1367.78	170.31	1367.74	170.7	1367.85	171.27	1368
174.11	1368.84	174.32	1368.9	174.65	1369	175.01	1369.08	179.34	1370
181.26	1370	181.63	1370	182.09	1367.34	191.02	1364.61	192.9	1364.61
214.89	1359.11	250	1358.41	285.1	1359.11	307.1	1364.61	323.1	1364.93
336.11	1368.19	340.71	1369	341.5	1368.55	342.14	1368.18	342.45	1368
342.69	1367.89	342.7	1367.88	342.7	1367.89	342.73	1368	342.99	1368.01
343.58	1368.01	345.24	1368.02	348.39	1368.04	348.49	1368.04	348.57	1368.04
348.74	1368.04	348.79	1368.04	348.83	1368.04	348.88	1368.04	348.92	1368.04
349.8	1368.04	349.82	1368.04	349.83	1368.04	349.84	1368.04	349.85	1368.04
349.87	1368.04	350.59	1368.1	353.99	1368.21	354.5	1368.2	354.63	1368.2
355.72	1368.2	360.41	1368.04	360.62	1368.03	361.4	1368	361.45	1368
361.53	1368	361.59	1367.99	362.27	1367.99	362.76	1367.99	363.85	1367.99
364.4	1367.99	364.54	1367.99	364.98	1368	365.85	1368.03	367.67	1368.09
368.96	1368.14	369.27	1368.15	370.12	1368.18	370.63	1368.19	370.74	1368.2
371.03	1368.22	372	1368.28	372.84	1368.31	376.19	1368.36	382.93	1368.72
382.98	1368.72	385.21	1368.7	387.93	1368.69	389.05	1368.68	390.52	1368.67
391.68	1368.66	392.21	1368.66	397.63	1368.63	399.8	1368.61	402.07	1368.6
403.65	1368.59	403.87	1368.59	405.47	1368.59	410.95	1368.56	415.92	1368.57
416.77	1368.56	420.67	1368.5	423.57	1369.81	423.8	1369.3	424.01	1368.85

424.2 1368.45 424.24 1368.36 445.43 1371.73 500 1371.48

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
192.9	307.1	85.9	100	115.25	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1400

INPUT
Description: Channel Station 60499.16
Station Elevation Data num= 126

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1369.7	9.3	1369.83	30.02	1370.17	48.37	1370.3	93.95	1370.06
94.02	1370.06	94.57	1370.12	98.61	1370.65	98.64	1370.65	98.69	1370.65
107.22	1371	111.42	1371.17	119.55	1371.51	123.17	1371.53	127.52	1371.55
130.84	1371.14	132.02	1371	132.25	1370.97	133.12	1370.86	142.92	1370.86
145.56	1370.86	149.24	1370.87	153.52	1370.88	154.8	1370.85	162.51	1370.82
167.43	1370.73	214.9	1358.86	250	1358.16	285.1	1358.86	307.1	1364.36
323.1	1364.68	340.86	1369.12	344.9	1369	345.94	1369	346.04	1369
347.46	1369.36	347.56	1369.38	347.91	1369.35	351.5	1369.03	355.14	1369.52
356.13	1369.57	359.68	1370	360.25	1370	361.88	1370	364.55	1369.02
364.58	1369.03	364.63	1369.04	364.66	1369.04	365.76	1369.11	366.2	1369.1
366.27	1369.1	367.48	1369.15	367.74	1369.16	368.68	1369.19	368.81	1369.18
369.51	1369.19	370.02	1369.18	370.11	1369.18	370.88	1369.11	370.95	1369.11
371.91	1369	372.02	1368.99	372.15	1368.97	372.79	1368.89	373.72	1368.77
373.98	1368.78	374.07	1368.78	375.36	1368.81	375.62	1368.82	375.71	1368.83
375.93	1368.81	377.22	1368.64	377.35	1368.62	377.44	1368.61	377.88	1368.55
380.45	1368.52	380.55	1368.52	380.81	1368.5	381.15	1368.5	383.7	1368.79
385.51	1368.8	389.53	1368.93	390.21	1368.93	390.72	1368.94	391.08	1368.95
391.21	1369	391.28	1369.02	394.04	1370	394.53	1370.17	394.82	1370.27
396.38	1370.83	396.79	1370.97	396.87	1371	398.06	1371.42	398.29	1371.49
398.39	1371.52	398.44	1371.54	398.47	1371.54	398.5	1371.55	398.52	1371.55
398.55	1371.56	398.69	1371.55	398.8	1371.53	399.04	1371.48	400.64	1371.18
401.56	1371.02	401.67	1371	403.17	1370.72	404.19	1370.53	406.84	1370.05
406.91	1370.03	406.93	1370.05	407.02	1370.05	407.55	1370.06	409.61	1370.31
410.03	1370.36	410.54	1370.29	413.17	1370.72	434.39	1370.72	445.76	1369.74
446.46	1369.73	446.47	1369.74	447.95	1370.58	448.77	1371.04	449.31	1371.05
500	1370.78								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.43	340.86	85.31	100	114.26	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1300

INPUT
Description: Channel Station 60599.16
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1369.58	2.06	1369.62	15.86	1369.69	51.54	1369.42	70.3	1368.79
92.38	1368.05	92.58	1368.07	92.76	1368.1	93.09	1368.14	93.77	1368.22
99.02	1368.9	99.82	1369	100.02	1369.04	104.62	1370	105.01	1370.08
106.08	1370.31	119.33	1370.82	123.28	1370.97	123.96	1371	124.15	1371.01
124.33	1371.01	124.4	1371.02	126.56	1371.03	130.24	1371.05	132.37	1371.07
133.97	1371.08	134.09	1371.07	134.73	1371	135.23	1370.93	139.5	1370.42
145.07	1370.37	154.23	1370.28	158.23	1370.06	159.31	1370	160.75	1369.92
161.75	1369.87	162.98	1369.79	166.8	1369.66	171.53	1369.45	214.9	1358.61
250	1357.91	285.11	1358.61	312.45	1365.44	328.45	1365.76	337.49	1368.02
337.77	1368.25	338.54	1368.06	340.17	1368.1	340.81	1368.12	341.89	1368.14
343.44	1368.06	344.69	1368	346.87	1367.89	354.17	1367.51	363.72	1367.05
366.46	1367.01	368.09	1367	369.13	1367	379.6	1366.86	380.11	1366.85
382.97	1366.83	386.67	1366.71	391.03	1366.61	392.45	1366.79	394.54	1366.93
396.63	1367	398.52	1367.11	402.14	1367.16	402.28	1367.17	402.95	1367.22
405.11	1367.27	406.28	1367.11	406.29	1367.11	406.31	1367.09	406.32	1367.05
406.75	1367	409.49	1366.68	425.54	1367.07	430.59	1367.2	432.69	1367.21
439.61	1368.02	446.92	1368.87	453.71	1369.66	456.32	1369.97	496.49	1369.92
500	1369.64								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.53	312.45	94.31	100	105.05	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1200

INPUT
Description: Channel Station 60699.16
Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1368.8	10.71	1368.71	23.48	1368.26	39.23	1367.7	50.35	1367.34
54.25	1367.32	68.76	1366.76	93.91	1366.27	95.6	1366.11	96.7	1366.08
100.53	1366.04	100.69	1366.03	100.93	1366.03	101.13	1366.03	101.14	1366.03
102.15	1366.3	104.78	1367	106.55	1367.47	108.54	1368	110.39	1368.49
112.3	1369	115.09	1369.74	116.07	1370	116.13	1370.02	116.25	1370.05
120.72	1370.27	134.33	1370.97	140.42	1370.75	144.04	1370.62	145.05	1370.49
146.23	1370.34	149.06	1369.99	149.24	1369.97	152.71	1369.87	165.29	1369.47
171.06	1369.31	214.89	1358.35	250	1357.65	285.1	1358.35	311.64	1364.99
327.64	1365.31	334.51	1367.03	337.73	1368	339.63	1367.52	341.73	1367
342.06	1366.92	342.19	1366.89	348.34	1366.87	355.52	1366.86	361.96	1366.83
363.36	1366.86	365.1	1366.87	370.74	1366.73	380.89	1366.6	388.7	1366.92
395.74	1366.94	399.27	1366.93	407.14	1366.55	407.45	1366.55	407.49	1366.56
411.01	1367.04	411.09	1367.02	418.67	1368	418.81	1367.94	418.92	1367.89
419.04	1367.83	419.15	1367.78	426.48	1368.55	426.67	1368.46	433.55	1369.15
435.34	1369.14	439.15	1369.5	439.44	1369.64	439.72	1369.77	440.08	1369.91
440.36	1370.05	440.68	1370.19	454.49	1369.6	458.77	1369.42	470.45	1369.46
475.91	1369.41	491.8	1368.64	497.44	1368	498.62	1368	500	1367.85

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.06	311.64	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1100

INPUT
Description: Channel Station 60799.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1366.71	3.37	1366.6	11.7	1366.54	17.65	1366.31	33.57	1366
43.38	1366	45.41	1366	49.22	1366	65.89	1366	67.43	1366
86.01	1366	86.47	1366	90.84	1366.08	100.28	1366.04	102.29	1366.33
103.59	1366.52	104.18	1366.64	105.9	1367	110.87	1368	110.89	1368
110.91	1368	116.21	1369	117.85	1369.3	120.09	1369.72	123.67	1369.95
124.52	1370	129.48	1370.28	138.83	1370.83	143.92	1370.66	148.89	1370.49
152.51	1370.13	153.01	1370.09	153.81	1370.05	154.69	1370	161.91	1369.67
167.42	1369.39	168.59	1369.22	170.1	1369	171.18	1368.84	172.86	1368.61
214.89	1358.1	250	1357.4	285.11	1358.1	311.72	1364.76	327.72	1365.08
333.93	1366.63	337.41	1368	340.57	1367.01	340.6	1367	342.38	1366.54
343.22	1366.33	346.63	1366.33	357.63	1366.52	358.6	1366.7	359.36	1366.83
360.44	1367	362.46	1367.36	366.04	1368	366.92	1368.16	368.49	1368.44
371.69	1369	374.44	1369.48	376.01	1369.73	376.85	1369.86	377.25	1369.91
377.88	1370	378.36	1370	378.72	1370	381.2	1370	383.07	1369.6
385.38	1369	386.42	1368.73	389.26	1368	393.37	1367.17	394.13	1367
394.25	1367	394.77	1367	395.07	1367.07	395.56	1367.18	395.85	1367.25
396.12	1367.32	400.81	1367.08	400.9	1367.08	405.41	1366.85	424.92	1366.99
427.08	1366.77	428.94	1366.54	447.5	1366.62	454.22	1366.3	468.04	1366.28
491.1	1366.7	499.04	1367.2	500	1367.21				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.86	311.72	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1000

INPUT
Description: Channel Station 60899.16
Station Elevation Data num= 158

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1366.25	11.11	1366.16	15.42	1366.13	17.1	1366.12	31.94	1366
35.21	1365.98	35.37	1365.97	45.11	1365.9	46.41	1365.91	47.53	1365.9
48.55	1365.91	49.38	1365.91	50	1365.91	50.54	1365.92	51.01	1365.92
51.8	1365.92	52.48	1365.92	52.88	1365.91	63.1	1365.7	65.51	1365.67
66.65	1365.65	70.56	1365.59	72.15	1365.57	75.35	1365.52	77.4	1365.5
80.12	1365.47	88.1	1365.39	89.06	1365.38	92.09	1365.3	97.26	1365.74
97.69	1365.75	97.85	1365.76	98.06	1365.77	101.12	1365.92	102.97	1366
103.03	1366	104.34	1366.08	105.27	1366.2	105.33	1366.21	106.84	1366.38
106.91	1366.38	106.95	1366.39	107.33	1366.43	108.32	1366.55	109.25	1366.67

109.71	1366.72	111.77	1366.97	111.8	1366.98	111.81	1366.98	111.94	1367
114.65	1367.74	115.38	1368	116.12	1368.26	118.85	1369	119.96	1369.2
120.32	1369.27	122.49	1369.39	123.8	1369.47	129.02	1369.77	133.1	1370
136.27	1370.18	136.49	1370.2	136.69	1370.21	136.93	1370.2	137.05	1370.19
137.57	1370.16	140.78	1370	142.92	1369.89	144.41	1369.82	145.03	1369.78
145.37	1369.77	145.58	1369.76	146.54	1369.71	147.85	1369.53	151.78	1369
152.34	1368.92	152.77	1368.86	153.85	1368.81	162.71	1368.41	167.03	1368.3
173.66	1368.16	214.9	1357.85	250	1357.15	285.1	1357.85	307.11	1363.35
323.1	1363.67	332.33	1365.98	335.33	1368	336.38	1368	336.52	1368
336.84	1368	337.06	1368	337.61	1368	337.78	1368	338.14	1367.88
340.78	1367	341.91	1366.55	343.23	1366.03	358.8	1366.15	359.8	1366.15
360.15	1366.15	360.36	1366.16	360.42	1366.16	360.58	1366.16	360.62	1366.16
373.86	1366.12	378.08	1366.13	380.83	1366.11	387.3	1366.54	389.99	1366.69
392.19	1366.86	394.55	1367	394.92	1367.02	395.67	1367.07	396.7	1367.1
398.33	1367.13	398.81	1367.14	399.07	1367.14	399.17	1367.14	400.28	1367.14
402.3	1367.14	404.28	1367.18	404.65	1367.14	405.97	1367.13	406.24	1367.25
406.52	1367.24	408.17	1367.08	408.27	1367.08	411.75	1367.05	415.31	1367.06
415.97	1367.06	416.91	1367.07	417.92	1367.08	419.72	1367.1	424.61	1367.1
424.92	1367.1	465.25	1367.13	469.54	1367.24	470.34	1367.32	471.2	1367.41
473.1	1367.63	476.23	1368	476.9	1368.04	478.39	1368.14	479.36	1368.23
479.95	1368.26	481.67	1368.37	482.79	1368.43	484.77	1368.56	487.63	1368.78
488.76	1368.84	490.84	1368.94	492.33	1369	493.45	1369.02	497.12	1369.14
497.32	1369.14	497.5	1369.14	500	1369.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.66	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 900

INPUT
Description: Channel Station 60999.16
Station Elevation Data num= 238

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1367.07	.79	1367.08	1.99	1367.1	4.61	1367.14	4.82	1367.14
7.17	1367.2	7.41	1367.2	7.6	1367.21	17.13	1367.39	17.51	1367.4
17.66	1367.4	18.12	1367.41	18.97	1367.43	20.35	1367.45	25.43	1367.56
26.67	1367.58	27.66	1367.6	28.7	1367.62	30.76	1367.66	34.35	1367.72
35.26	1367.74	40.31	1367.84	42.43	1367.87	43.97	1367.9	44.51	1367.91
45.31	1367.93	46.85	1367.96	49.06	1368	49.22	1368	56.02	1368.14
57.23	1368.14	57.48	1368.14	60.96	1368.14	62.67	1368.14	64.68	1368.14
66.07	1368.14	67.85	1368.14	68.22	1368.14	69.55	1368.14	77.53	1368.14
83.45	1368.14	85.38	1368.14	86.98	1368.14	88.67	1368.14	89.49	1368.14
92.63	1368.24	93.11	1368.26	96.45	1368.34	103.38	1368.45	111.63	1368.82
113.55	1368.95	114.09	1369	114.83	1369.05	116.37	1369.14	130.78	1369.61
132.27	1369.66	132.75	1369.67	133.05	1369.66	158.75	1369.47	158.82	1369.47
158.91	1369.47	159.07	1369.46	168.69	1369.15	214.89	1357.6	250	1356.89
285.11	1357.6	307.11	1363.1	323.11	1363.42	341.76	1368.08	341.87	1368
341.91	1368	341.94	1368	341.96	1368	341.98	1368	342.01	1368
342.04	1368	342.09	1368	342.15	1368	342.22	1368	342.29	1368
342.63	1368	342.77	1368	342.89	1368	342.98	1368	343.08	1368
343.17	1368	344.08	1367.89	344.26	1367.88	344.43	1367.88	344.59	1367.87
344.75	1367.87	344.88	1367.86	345.6	1367.84	345.74	1367.83	345.85	1367.83
346	1367.82	346.18	1367.81	346.39	1367.81	346.54	1367.8	346.69	1367.79
346.99	1367.78	347.5	1367.76	347.9	1367.75	348.62	1367.72	348.64	1367.72
349.08	1367.7	350.13	1367.65	350.35	1367.64	350.38	1367.64	350.43	1367.64
350.51	1367.63	350.61	1367.63	350.74	1367.62	350.89	1367.61	351.2	1367.59
351.33	1367.58	353.24	1367.49	353.43	1367.48	353.64	1367.47	353.81	1367.46
353.92	1367.45	354	1367.45	354.08	1367.44	354.16	1367.44	354.25	1367.43
358.9	1367.14	359.35	1367.12	359.51	1367.11	359.68	1367.1	359.77	1367.09
359.85	1367.09	359.92	1367.08	359.97	1367.08	361.17	1367	361.2	1367
362.8	1366.88	363.13	1366.86	365.08	1366.73	365.75	1366.71	365.76	1366.71
366.84	1366.64	367.78	1366.6	367.94	1366.59	369.94	1366.54	372.72	1366.4
372.85	1366.39	372.97	1366.38	373.12	1366.38	377.23	1366.14	382.29	1366.14
383.91	1366.14	389.85	1366.76	391.42	1366.9	392.6	1367	392.84	1367.02
393.6	1367.09	393.98	1367.12	394.04	1367.12	394.22	1367.14	395.88	1367.28
397.01	1367.36	400.65	1367.63	402.17	1367.73	402.24	1367.74	402.36	1367.75
402.52	1367.76	402.74	1367.77	403.06	1367.8	403.5	1367.83	404.57	1367.9
404.95	1367.92	406.11	1367.98	406.49	1368	407.27	1368.04	408	1368.07
409.76	1368.14	412.24	1368.14	414.16	1368.23	414.38	1368.23	414.72	1368.24
422.39	1368.27	422.7	1368.28	422.96	1368.28	423.49	1368.29	424.13	1368.31
430.87	1368.35	431.83	1368.39	432.77	1368.43	435.86	1368.46	436.38	1368.48
438.92	1368.44	438.98	1368.43	439.08	1368.43	439.2	1368.43	443.99	1368.24
444.06	1368.23	444.19	1368.23	444.37	1368.23	444.6	1368.22	446.44	1368.14
447.88	1368.09	448.27	1368.08	448.44	1368.07	448.59	1368.07	448.69	1368.07
448.74	1368.06	449.29	1368.06	450.44	1368.06	452.5	1368.05	454.29	1368.04
456.11	1368.02	456.58	1368.02	457.07	1368	457.94	1367.97	458.84	1367.9
459.2	1367.87	460.95	1367.74	461.93	1367.67	463.76	1367.53	467.48	1367.24
467.97	1367.21	468.79	1367.14	469.81	1367.06	469.89	1367.07	469.96	1367.08
470.46	1367.09	471.12	1367.07	473.11	1367	474.11	1367	475.72	1366.96
475.97	1366.97	476.65	1366.96	477.44	1366.93	478.19	1366.95	479.56	1366.91
480.13	1366.92	481.92	1366.88	500	1366.39				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
168.69	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 800

INPUT
Description: Channel Station 61099.16
Station Elevation Data num= 193

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1365.2	11.06	1365.42	11.35	1365.43	11.63	1365.44	12.93	1365.47
13.33	1365.48	13.73	1365.49	21.77	1365.65	22.16	1365.66	22.58	1365.67
23.05	1365.68	23.56	1365.69	23.93	1365.69	24.24	1365.7	24.39	1365.7
26.39	1365.73	27.2	1365.75	27.99	1365.76	28.96	1365.76	32.76	1365.83
34.05	1365.83	35.1	1365.82	38.54	1365.81	39.38	1365.8	40.71	1365.78
41.32	1365.77	41.78	1365.77	45.05	1365.76	50.04	1365.78	52.72	1365.84
56.19	1365.96	56.29	1365.95	57.53	1366	58.65	1366.04	60.59	1366.1
61.08	1366.12	61.11	1366.12	61.14	1366.12	61.18	1366.12	61.27	1366.12
61.4	1366.12	61.54	1366.13	62.93	1366.14	64.4	1366.14	66.04	1366.17
66.15	1366.17	66.18	1366.18	66.19	1366.18	73.5	1366.25	73.53	1366.25
73.56	1366.25	73.78	1366.25	74.02	1366.25	74.39	1366.26	74.74	1366.27
75.34	1366.29	76.68	1366.35	79.47	1366.42	81.14	1366.51	83.24	1366.63
87.28	1366.72	88.18	1366.81	90.34	1367	90.58	1367	90.85	1367.03
91.94	1367.14	94.29	1367.28	95	1367.32	97.53	1367.47	102.19	1367.75
106.31	1368	107.09	1368.05	107.86	1368.09	108.61	1368.14	113.41	1368.42
123.04	1369	124.08	1369.06	125.42	1369.14	134.02	1369.14	135.16	1369.14
135.74	1369.12	139.49	1369	143.07	1368.88	153.34	1368.55	156.49	1368.45
158.29	1368.4	168.39	1368.14	170.43	1368.14	171.57	1368.11	171.9	1368.09
172.17	1368.08	172.45	1368.07	172.65	1368.06	174.03	1368	174.04	1368
174.05	1368	174.06	1368	175.55	1367.85	177.43	1367.67	177.7	1367.65
178.07	1367.71	179.23	1367.9	179.86	1368	180.21	1368	181.01	1368
182.09	1365.59	189.54	1363.68	214.89	1357.34	250	1356.64	285.11	1357.34
307.11	1362.84	323.1	1363.16	328.05	1364.4	336.49	1367.03	336.93	1367
336.96	1366.99	340.93	1366	341.8	1365.78	344.93	1365	345.46	1364.87
345.72	1364.8	347.22	1364.87	347.8	1364.89	348.45	1364.92	349.03	1364.94
350.07	1365	350.21	1365	350.38	1365	350.48	1365	350.6	1365
350.7	1365	350.89	1365.07	351.24	1365.2	352.08	1366	352.2	1366.5
352.31	1367	352.85	1367.74	352.99	1368	353.12	1368	353.38	1368
353.41	1368	353.44	1367.97	354.12	1367	354.25	1366.11	354.26	1366
354.34	1365.95	355.19	1365.5	355.63	1365.14	356.33	1365.14	359.16	1365.66
360.93	1365.56	365.49	1365.14	367.3	1365.14	373.87	1365.14	375.29	1365.14
376.11	1365.14	376.47	1365.14	376.57	1365.14	377.5	1365.14	377.8	1365.14
377.81	1365.14	379.68	1365.14	380.08	1365.14	380.93	1365.14	386.43	1365.14
390.4	1365.14	398.06	1365.14	400.14	1365.14	404.59	1365.14	421.08	1365.33
423.51	1365.37	424.12	1365.38	424.5	1365.39	429.46	1365.43	431.16	1365.45
432.92	1365.48	438.47	1365.59	439.97	1365.62	440.88	1365.63	443.34	1365.68
445.54	1365.71	450.77	1365.82	459.96	1366	463.29	1366.07	467.13	1366.14
467.92	1366.14	480.9	1366.36	483.16	1366.39	485.02	1366.43	485.87	1366.44
496.72	1366.6	497.51	1366.61	500	1366.66				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
189.54	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 700

INPUT
Description: Channel Station 61199.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1364.07	6.44	1364.07	9.47	1364.08	18.02	1364.07	19.96	1364.07
27.69	1364.09	34.66	1364.07	37.93	1364.06	74.42	1364.14	78.1	1364.14
83.71	1364.45	84.11	1364.47	86.76	1364.62	93.51	1365	95.5	1365.13
95.68	1365.14	96.1	1365.24	99.35	1366	99.62	1366.07	99.92	1366.14
102.24	1366.69	103.58	1367	104.02	1367.11	104.18	1367.14	105.78	1367.54
107.6	1368	108.12	1368.13	108.16	1368.14	108.18	1368.14	109.68	1368.14
140.33	1368.14	147.14	1368.05	150.83	1368	154.57	1367.89	173.98	1367.32
214.89	1357.09	250	1356.39	285.11	1357.09	307.11	1362.59	323.1	1362.91
332.03	1365.14	337.01	1367	339.14	1366.47	341.01	1366	343.13	1365.47
345.01	1365	345.12	1364.97	345.13	1365	346.48	1365.22	346.95	1365.29
347.33	1365.35	348.94	1365.62	352.58	1366	358.12	1366.55	358.71	1366.61
361.5	1367	362.82	1367.57	363.85	1368	364.77	1368	365.03	1368
365.21	1367.52	365.4	1367	365.85	1366.57	369.21	1366.5	370.83	1366.29
371.84	1366.16	384.65	1366.06	385.13	1366.04	385.78	1366.02	386.07	1366.02
392.47	1366	403.85	1365.97	406.54	1366	406.81	1366	407.36	1366
409.01	1366	420.74	1366	422.78	1366	425.29	1366	427.58	1366.03
430.72	1366.07	436.55	1366.14	445.25	1366.14	447.96	1366.14	453.08	1366.14
460.58	1366.14	486.58	1366.84	493.05	1367	497.26	1367.1	498.79	1367.14
499.01	1367.14	499.76	1367.14	500	1367.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.98	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 600

INPUT
Description: Channel Station 61299.16
Station Elevation Data num= 147

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1363.43	1.4	1363.43	1.63	1363.42	1.84	1363.42	5.76	1363.4
8.66	1363.39	13.84	1363.37	36.02	1363.4	37.92	1363.4	41.65	1363.4
54.55	1363.38	59.37	1363.42	64.42	1363.49	65.24	1363.51	72.1	1363.66
73.13	1363.68	74.68	1363.68	78.06	1363.78	82.54	1363.91	85.45	1364
88.64	1364.1	89.55	1364.12	90.05	1364.14	90.4	1364.23	93.28	1365
93.77	1365.14	93.78	1365.14	93.91	1365.18	94.02	1365.2	95.52	1365.61
96.99	1366	97.43	1366.12	97.47	1366.13	97.51	1366.14	97.73	1366.2
100.81	1367	101.05	1367.06	101.35	1367.14	105.96	1367.85	106.95	1368
107.46	1368.09	107.65	1368.13	107.73	1368.14	109.81	1368.14	129.27	1368.14
131.16	1368.06	132.45	1368	133.47	1367.95	134.55	1367.91	141.19	1367.63
142.29	1367.59	142.9	1367.56	143.17	1367.55	145.59	1367.45	153.33	1367.14
154.62	1367.07	155.74	1367	161.34	1366.67	169.65	1366.14	169.67	1366.14
169.73	1366.14	171.86	1366	173.54	1365.86	173.66	1365.85	173.96	1365.93
174.26	1366	174.44	1366.04	177.17	1366.73	177.93	1366.92	178.26	1367
180.22	1365.51	214.9	1356.84	250	1356.14	285.1	1356.84	294.47	1359.18
312.95	1360.36	320.96	1362.36	405.08	1364.05	419.73	1367.71	420.83	1367.59
422.83	1367.44	424	1367.36	424.48	1367.32	424.72	1367.31	425.03	1367.28
428.59	1367.25	429	1367.22	429.34	1367.2	433.48	1367.24	434.23	1367.22
437.25	1367.14	446.67	1367.14	452.35	1367.14	453.99	1367.14	456.01	1367.14
460.09	1367.03	462.98	1367.02	464.71	1367.04	465.96	1367.1	466.58	1367.08
467.26	1367.05	467.81	1367.01	467.89	1367	468.48	1366.86	470.57	1366.14
471.46	1366.14	472.76	1366.14	477.45	1366.62	478.72	1366.75	479.43	1366.83
481.12	1367	482.54	1367.13	482.68	1367.14	482.87	1367.14	484.47	1367.14
484.81	1367.02	484.87	1367	485.38	1366.6	487.09	1366.14	487.29	1366.07
487.47	1366	489.61	1365.2	489.76	1365.14	489.83	1365.1	490.03	1365
490.44	1364.77	491.57	1364.14	491.69	1364.07	491.81	1364	492.5	1363.6
493.24	1363.17	493.3	1363.14	493.48	1363.04	493.55	1363	494.4	1362.51
495.04	1362.14	495.22	1362.04	495.28	1362	496.48	1361.31	496.78	1361.14
496.94	1361.04	497.02	1361	497.95	1360.46	498.52	1360.14	498.62	1360.08
498.76	1360	500	1359.27						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	294.47	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
178.26	419.73	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
327.96	500	1370	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 500

INPUT
Description: Channel Station 61399.16
Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1363.11	35.9	1363.14	48.18	1363.14	59.28	1363.14	80.52	1363.14
81.79	1363.14	82.04	1363.14	83.45	1363.14	87.08	1363.93	87.37	1364
87.83	1364.1	88	1364.14	88.19	1364.19	91.55	1365	91.9	1365.08
92.14	1365.14	95.59	1365.96	95.74	1366	95.76	1366.01	96.33	1366.14
97.38	1366.39	99.89	1367	100.4	1367.12	100.5	1367.14	101.73	1367.25
102.3	1367.3	105.54	1367.55	110.14	1367.92	111.4	1368	112.86	1368.09
113.66	1368.14	113.97	1368.14	117.67	1368.14	117.72	1368.14	117.75	1368.14
117.84	1368.14	122.71	1368	122.94	1368	122.98	1368	129.06	1367.85
129.59	1367.84	148.11	1367.47	162.92	1367.14	165.49	1367.01	165.61	1367
167.44	1366.89	173.71	1366.51	174.91	1366.44	175.16	1366.52	214.89	1356.59
250	1355.88	285.11	1356.59	333.12	1368.59	338.45	1367	340.56	1367.53
342.45	1368	344.81	1368.59	345.31	1368.72	345.54	1368.77	346.06	1368.76
346.25	1368.76	362.03	1368.59	363.15	1368.59	363.93	1368.58	364.47	1368.58
382.05	1369	382.76	1369	384.4	1369	384.42	1369	384.43	1369
384.95	1369	385.24	1369	388.67	1369.07	391.99	1369.07	392.31	1369.06
392.58	1369.05	392.82	1369.04	392.88	1369.04	392.97	1369.04	393.46	1369.04
393.62	1369.04	393.91	1369.04	395.57	1369	395.75	1369	395.87	1369
395.92	1369	395.98	1369	396.13	1369	396.22	1369	396.27	1369
396.29	1369	396.55	1369	396.61	1369	396.67	1369	396.74	1369
400.4	1368.9	401.62	1368.88	403.51	1368.78	404.42	1368.74	405.26	1368.7
414.42	1368.14	414.56	1368.12	414.83	1368.08	415.3	1368	416.94	1367.74
420.45	1367.14	421.15	1367.1	421.85	1367.06	422.54	1367.02	422.89	1367
424.74	1366.89	426.76	1366.78	428.33	1366.69	432	1366.47	434.31	1366.34

437.72	1366.14	441.54	1366.14	447.79	1366.14	452.74	1366.14	454.29	1366.14
454.66	1366.02	454.72	1366	455.04	1365.89	456.37	1365.44	457.02	1365.21
457.23	1365.14	457.25	1365.13	457.55	1365	457.82	1364.87	459.42	1364.14
459.57	1364.05	459.66	1364	460.64	1363.43	461.14	1363.14	461.33	1363.03
461.38	1363	461.76	1362.78	462.85	1362.14	463	1362.05	463.09	1362
463.37	1361.84	464.56	1361.14	464.62	1361.1	464.8	1361	465.1	1360.82
466.51	1360	467.24	1359.58	467.99	1359.14	470.14	1359.14	475.95	1359.14
476.88	1359.14	477.22	1359.14	477.33	1359.2	477.69	1359.4	478.78	1360
479.01	1360.13	479.02	1360.14	479.4	1360.34	480.59	1361	480.69	1361.05
480.79	1361.11	480.84	1361.14	481.97	1361.77	482.37	1362	482.53	1362.09
482.63	1362.14	483.88	1362.85	484.16	1363	484.32	1363.09	484.41	1363.14
485.03	1363.49	485.92	1364	486.03	1364.06	486.17	1364.14	487.84	1364.59
489.4	1365	489.54	1365.05	489.84	1365.14	493.23	1365.34	494.62	1365.42
497.76	1365.6	500	1365.73						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.16	333.12	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
345.54	500	1368.77	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 400

INPUT
Description: Channel Station 61499.16
Station Elevation Data num= 204

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1362.75	23.68	1362.63	44.21	1362.74	44.42	1362.74	63.94	1362.86
69.17	1363	70.05	1363	71.4	1363	73.79	1363	78.37	1363
78.76	1363.02	81.64	1363.14	83.93	1363.71	85.09	1364	85.33	1364.06
85.64	1364.14	88.24	1364.78	89.13	1365	89.28	1365.04	89.69	1365.14
92.96	1365.96	93.11	1366	93.52	1366.1	93.67	1366.14	94.57	1366.36
97.15	1367	97.22	1367.02	97.71	1367.14	116.75	1367.14	122.79	1367.14
123.33	1367.11	123.8	1367.09	124.96	1367.03	125.51	1367	130.1	1366.77
133.92	1366.57	135.63	1366.48	136.54	1366.44	137.03	1366.41	137.25	1366.4
139.5	1366.29	142.29	1366.14	142.56	1366.14	142.82	1366.12	143.12	1366.09
144.12	1366	145.08	1365.87	146.95	1365.75	149.31	1365.54	151.26	1365.39
151.41	1365.38	151.54	1365.37	156.19	1365.14	156.62	1365.13	156.69	1365.13
156.87	1365.12	157.81	1365.09	160.57	1365	165.81	1364.81	168.16	1364.72
169.16	1364.68	171.07	1364.6	172.61	1364.99	172.66	1365	172.86	1365.05
176.66	1366	178.42	1366	181.5	1366	182.09	1364.59	191.85	1362.09
214.89	1356.33	250	1355.63	285.11	1356.33	328.34	1367.14	339.65	1367
339.96	1367.08	340.37	1367.18	344.05	1367.01	344.43	1367	344.76	1367
351.35	1367	352.29	1367.05	357.14	1367.1	359.91	1367.13	360.84	1367.14
363.62	1367.08	364.06	1367.07	364.45	1367.07	364.66	1367.06	364.93	1367.06
365.01	1367.05	365.44	1367.05	366.45	1367.03	367.09	1367.01	367.69	1367
368.34	1366.99	369.32	1366.97	370.57	1366.91	371.36	1366.89	371.41	1366.89
371.51	1366.89	371.67	1366.88	371.88	1366.88	372.52	1366.85	373.51	1366.81
375.92	1366.71	377.1	1366.66	380.83	1366.5	381.89	1366.46	382.56	1366.43
383.21	1366.41	383.4	1366.4	383.55	1366.4	384.07	1366.38	384.69	1366.36
389.18	1366.14	390.44	1366.07	391.38	1366.03	391.92	1366	393.11	1365.94
394.45	1365.88	395.28	1365.84	395.73	1365.82	395.85	1365.81	406.6	1365.14
412.21	1365.14	415.15	1365.14	419.19	1365.14	423.79	1365.14	424.07	1365.04
424.19	1365	425.11	1364.66	426.51	1364.14	426.62	1364.09	426.79	1364
427.73	1363.52	428.47	1363.14	428.52	1363.11	428.72	1363	428.95	1362.87
430.16	1362.18	430.2	1362.15	430.22	1362.14	430.28	1362.1	430.47	1362
430.51	1361.98	430.6	1361.93	431.7	1361.3	431.99	1361.14	432.17	1361.03
432.23	1361	433.22	1360.42	433.71	1360.14	433.84	1360.07	433.95	1360
435.07	1359.36	435.46	1359.14	435.69	1359.01	435.71	1359	437.24	1358.17
437.27	1358.15	437.29	1358.14	437.3	1358.14	437.46	1358.14	445.41	1358.14
446.78	1358.92	446.93	1359	447.05	1359.07	447.18	1359.14	447.5	1359.32
448.7	1360	448.93	1360.13	448.95	1360.14	449.02	1360.18	450.45	1361
450.62	1361.09	450.7	1361.14	451.02	1361.31	452.28	1362	452.44	1362.08
452.54	1362.14	452.97	1362.42	453.89	1363	453.97	1363.05	454.11	1363.14
455.15	1363.38	457.4	1364	457.99	1364.09	458.24	1364.07	458.73	1364.11
465.83	1364.07	475.22	1364.14	480.5	1364.14	484.59	1364.14	485.14	1364.14
489.56	1364.14	489.67	1364.14	489.76	1364.14	490.86	1364.14	491.84	1364.14
494.7	1364.14	499.82	1364.14	499.94	1364.14	500	1364.14		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
181.5	328.34	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
340.37	500	1367.18	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 300

INPUT
Description: Channel Station 61599.16, Begin Full Width Type "B" Bank Protection (n=0.40). Begin 56 foot Transition Zone to Flat Channel Bottom.

Station Elevation Data num= 178

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1362.14	26.62	1362.14	27.11	1362.14	30.52	1362.14	37.55	1362.14
37.97	1362.14	40.34	1362.14	42.68	1362.14	51.07	1362.14	61.1	1362.14
65.53	1362.14	65.99	1362.14	69.03	1362.14	70.77	1362.14	71.02	1362.18
71.32	1362.21	77.31	1363	77.86	1363.07	78.37	1363.14	81.13	1363.82
81.88	1364	82.09	1364.05	82.46	1364.14	85.58	1364.87	86.14	1365
86.18	1365.01	86.74	1365.14	89.02	1365.67	90.47	1366	90.61	1366.03
91.09	1366.14	94.51	1366.66	96.88	1367	97.67	1367.1	97.97	1367.14
113.78	1367.14	114.1	1367.14	114.17	1367.14	114.25	1367.13	114.41	1367.12
114.54	1367.11	114.73	1367.1	115.37	1367.06	116.38	1367	116.39	1367
116.4	1367	124.76	1366.47	126.12	1366.38	126.78	1366.34	128.51	1366.23
129.97	1366.14	131.86	1366.14	136.97	1366.14	140.81	1366.14	141.76	1366.14
147.2	1366.14	168.04	1366.14	168.3	1366.01	168.33	1366	168.73	1365.81
170.12	1365.14	170.18	1365.12	170.52	1365	171.3	1364.76	171.99	1364.53
173.09	1364.81	173.86	1365	176.5	1365.66	177.86	1366	178.67	1366
182.09	1364.34	183.74	1359.79	190.9	1361.58	192.89	1361.58	214.89	1356.08
250	1355.38	285.1	1356.08	318.94	1364.54	326.72	1366	328.67	1366
334.86	1366	336.93	1365.48	338.87	1365	339.27	1364.9	340.84	1364.51
346.16	1364.44	349.51	1364.39	360.3	1364.2	360.95	1364.18	361.89	1364.17
363.39	1364.14	364.11	1364.13	364.47	1364.13	367.53	1364.11	378.4	1364.14
378.55	1364.14	378.84	1364.14	379.92	1364.14	391.76	1364.14	392.13	1364.04
392.3	1364	393.73	1363.62	395.54	1363.14	395.67	1363.07	395.78	1363
396.46	1362.59	397.21	1362.14	397.37	1362.04	397.44	1362	398.17	1361.54
398.82	1361.14	398.89	1361.09	399.03	1361	399.98	1360.39	400.38	1360.14
400.6	1360.01	400.62	1360	401.82	1359.32	402.15	1359.14	402.29	1359.05
402.37	1359	402.65	1358.83	403.8	1358.14	403.88	1358.09	403.89	1358.07
403.94	1358.04	404	1358	404.06	1357.96	404.17	1357.88	404.27	1357.81
405.26	1357.14	408.85	1357.14	414.38	1357.14	415.14	1357.57	415.2	1357.6
415.27	1357.64	415.33	1357.67	415.47	1357.75	415.78	1357.92	415.92	1358
416.06	1358.08	416.16	1358.14	417.13	1358.68	417.69	1359	417.81	1359.07
417.93	1359.14	418.97	1359.72	419.46	1360	419.68	1360.12	419.7	1360.14
420.69	1360.78	421.03	1361	421.1	1361.05	421.24	1361.14	422.4	1361.72
422.94	1362	423.05	1362.05	423.25	1362.14	424.13	1362.5	425.32	1363
425.55	1363.08	425.73	1363.14	432.22	1363.85	433.64	1364	434.44	1364.08
434.98	1364.14	452.85	1364.99	453.12	1365	454.42	1365.07	455.88	1365.14
458.77	1365.14	470.42	1365.85	472.72	1366	474.23	1366.1	474.72	1366.13
474.97	1366.14	493.9	1366.14	500	1366.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	192.89	.04	326.72	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
192.89	326.72	56	56	56	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
326.72	500	1366	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 244

INPUT
Description: Channel Station 61655.16, Upstream end of Concrete Cutoff Wall.

Station Elevation Data num= 175

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1359.21	26.62	1359.21	27.11	1359.21	30.52	1359.21	37.55	1359.21
37.97	1359.21	40.34	1359.21	42.68	1359.21	51.07	1359.21	61.1	1359.21
65.53	1359.21	65.99	1359.21	69.03	1359.21	70.77	1359.21	71.02	1359.25
71.32	1359.28	77.31	1360.07	77.86	1360.14	78.37	1360.21	81.13	1360.89
81.88	1361.07	82.09	1361.12	82.46	1361.21	85.58	1361.94	86.14	1362.07
86.18	1362.08	86.74	1362.21	89.02	1362.74	90.47	1363.07	90.61	1363.1
91.09	1363.21	94.51	1363.73	96.88	1364.07	97.67	1364.17	97.97	1364.21
113.78	1364.21	114.1	1364.21	114.17	1364.21	114.25	1364.2	114.41	1364.19
114.54	1364.18	114.73	1364.17	115.37	1364.13	116.38	1364.07	116.39	1364.07
116.4	1364.07	124.76	1363.54	126.12	1363.45	126.78	1363.41	128.51	1363.3
129.97	1363.21	131.86	1363.21	136.97	1363.21	140.81	1363.21	141.76	1363.21
147.2	1363.21	168.04	1363.21	168.3	1363.08	168.33	1363.07	168.73	1362.88
170.12	1362.21	170.18	1362.19	170.52	1362.07	171.3	1361.83	171.99	1361.6
173.09	1361.88	173.86	1362.07	176.5	1362.73	177.86	1363.07	178.67	1363.07
182.09	1364.2	214.9	1355.3	250	1355.3	285.11	1355.3	317.92	1364.2
326.72	1363.07	328.67	1363.07	334.86	1363.07	336.93	1362.55	338.87	1362.07
339.27	1361.97	340.84	1361.58	346.16	1361.51	349.51	1361.46	360.3	1361.27
360.95	1361.25	361.89	1361.24	363.39	1361.21	364.11	1361.2	364.47	1361.2
367.53	1361.18	378.4	1361.21	378.55	1361.21	378.84	1361.21	379.92	1361.21
391.76	1361.21	392.13	1361.11	392.3	1361.07	393.73	1360.69	395.54	1360.21
395.67	1360.14	395.78	1360.07	396.46	1359.66	397.21	1359.21	397.37	1359.11
397.44	1359.07	398.17	1358.61	398.82	1358.21	398.89	1358.16	399.03	1358.07
399.98	1357.46	400.38	1357.21	400.6	1357.08	400.62	1357.07	401.82	1356.39
402.15	1356.21	402.29	1356.12	402.37	1356.07	402.65	1355.9	403.8	1355.21
403.88	1355.16	403.89	1355.14	403.94	1355.11	404	1355.07	404.06	1355.03
404.17	1354.95	404.27	1354.88	405.26	1354.21	408.85	1354.21	414.38	1354.21
415.14	1354.64	415.2	1354.67	415.27	1354.71	415.33	1354.74	415.47	1354.82
415.78	1354.99	415.92	1355.07	416.06	1355.15	416.16	1355.21	417.13	1355.75

417.69	1356.07	417.81	1356.14	417.93	1356.21	418.97	1356.79	419.46	1357.07
419.68	1357.19	419.7	1357.21	420.69	1357.85	421.03	1358.07	421.1	1358.12
421.24	1358.21	422.4	1358.79	422.94	1359.07	423.05	1359.12	423.25	1359.21
424.13	1359.57	425.32	1360.07	425.55	1360.15	425.73	1360.21	432.22	1360.92
433.64	1361.07	434.44	1361.15	434.98	1361.21	452.85	1362.06	453.12	1362.07
454.42	1362.14	455.88	1362.21	458.77	1362.21	470.42	1362.92	472.72	1363.07
474.23	1363.17	474.72	1363.2	474.97	1363.21	493.9	1363.21	500	1363.21

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	182.09	.013	317.92	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	1	1	1	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	182.09	1364.2	F
317.92	500	1364.2	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 243

INPUT
Description: Channel Station 61656.16, Downstream end of Concrete Cutoff Wall. Beginning of Grouted Riprap Transition Zone to Tie-in to existing 2 foot drop structure.

Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
182.09	1363.44	214.9	1355.24	250	1355.24	285.1	1355.24	317.91	1363.44

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
182.09		182.09	.013	317.91	

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.91	39	39	39	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 204

INPUT
Description: Channel Station 61695.16, Tie in With Existing 2' Drop Structure

Station Elevation Data num= 175

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1359.13	26.62	1359.13	27.11	1359.13	30.52	1359.13	37.55	1359.13
37.97	1359.13	40.34	1359.13	42.68	1359.13	51.07	1359.13	61.1	1359.13
65.53	1359.13	65.99	1359.13	69.03	1359.13	70.77	1359.13	71.02	1359.17
71.32	1359.2	77.31	1359.99	77.86	1360.06	78.37	1360.13	81.13	1360.81
81.88	1360.99	82.09	1361.04	82.46	1361.13	85.58	1361.86	86.14	1361.99
86.18	1362	86.74	1362.13	89.02	1362.66	90.47	1362.99	90.61	1363.02
91.09	1363.13	94.51	1363.65	96.88	1363.99	97.67	1364.09	97.97	1364.13
113.78	1364.13	114.1	1364.13	114.17	1364.13	114.25	1364.12	114.41	1364.11
114.54	1364.1	114.73	1364.09	115.37	1364.05	116.38	1363.99	116.39	1363.99
116.4	1363.99	124.76	1363.46	126.12	1363.37	126.78	1363.33	128.51	1363.22
129.97	1363.13	131.86	1363.13	136.97	1363.13	140.81	1363.13	141.76	1363.13
147.2	1363.13	168.04	1363.13	168.3	1363	168.33	1362.99	168.73	1362.8
170.12	1362.13	170.18	1362.11	170.52	1361.99	171.3	1361.75	171.99	1361.52
173.09	1361.8	173.86	1361.99	176.5	1362.65	177.86	1362.99	178.67	1362.99
200.5	1361.14	212.5	1355.14	250	1355.14	287.5	1355.14	299.5	1361.14
326.72	1362.99	328.67	1362.99	334.86	1362.99	336.93	1362.47	338.87	1361.99
339.27	1361.89	340.84	1361.5	346.16	1361.43	349.51	1361.38	360.3	1361.19
360.95	1361.17	361.89	1361.16	363.39	1361.13	364.11	1361.12	364.47	1361.12
367.53	1361.1	378.4	1361.13	378.55	1361.13	378.84	1361.13	379.92	1361.13
391.76	1361.13	392.13	1361.03	392.3	1360.99	393.73	1360.61	395.54	1360.13
395.67	1360.06	395.78	1359.99	396.46	1359.58	397.21	1359.13	397.37	1359.03
397.44	1358.99	398.17	1358.53	398.82	1358.13	398.89	1358.08	399.03	1357.99
399.98	1357.38	400.38	1357.13	400.6	1357	400.62	1356.99	401.82	1356.31
402.15	1356.13	402.29	1356.04	402.37	1355.99	402.65	1355.82	403.8	1355.13
403.88	1355.08	403.89	1355.06	403.94	1355.03	404	1354.99	404.06	1354.95
404.17	1354.87	404.27	1354.8	405.26	1354.13	408.85	1354.13	414.38	1354.13
415.14	1354.56	415.2	1354.59	415.27	1354.63	415.33	1354.66	415.47	1354.74
415.78	1354.91	415.92	1354.99	416.06	1355.07	416.16	1355.13	417.13	1355.67
417.69	1355.99	417.81	1356.06	417.93	1356.13	418.97	1356.71	419.46	1356.99
419.68	1357.11	419.7	1357.13	420.69	1357.77	421.03	1357.99	421.1	1358.04
421.24	1358.13	422.4	1358.71	422.94	1358.99	423.05	1359.04	423.25	1359.13
424.13	1359.49	425.32	1359.99	425.55	1360.07	425.73	1360.13	432.22	1360.84
433.64	1360.99	434.44	1361.07	434.98	1361.13	452.85	1361.98	453.12	1361.99
454.42	1362.06	455.88	1362.13	458.77	1362.13	470.42	1362.84	472.72	1362.99
474.23	1363.09	474.72	1363.12	474.97	1363.13	493.9	1363.13	500	1363.13

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	200.5	.013	299.5	.032

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

200.5	299.5	.1	.1	.1	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	178.67	1363.05	F
326.72	500	1363.05	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 203.9

INPUT
Description: Channel Station 61695.16, At D.S. Face of Existing 2' Drop Structure
Station Elevation Data num= 177

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1357.13	26.62	1357.13	27.11	1357.13	30.52	1357.13	37.55	1357.13
37.97	1357.13	40.34	1357.13	42.68	1357.13	51.07	1357.13	61.1	1357.13
65.53	1357.13	65.99	1357.13	69.03	1357.13	70.77	1357.13	71.02	1357.17
71.32	1357.2	77.31	1357.99	77.86	1358.06	78.37	1358.13	81.13	1358.81
81.88	1358.99	82.09	1359.04	82.46	1359.13	85.58	1359.86	86.14	1359.99
86.18	1360	86.74	1360.13	89.02	1360.66	90.47	1360.99	90.61	1361.02
91.09	1361.13	94.51	1361.65	95.88	1361.99	97.67	1362.09	97.97	1362.13
113.78	1362.13	114.1	1362.13	114.17	1362.13	114.25	1362.12	114.41	1362.11
114.54	1362.1	114.73	1362.09	115.37	1362.05	116.38	1361.99	116.39	1361.99
116.4	1361.99	124.76	1361.46	126.12	1361.37	126.78	1361.33	128.51	1361.22
129.97	1361.13	131.86	1361.13	136.97	1361.13	140.81	1361.13	141.76	1361.13
147.2	1361.13	168.04	1361.13	168.3	1361	168.33	1360.99	168.73	1360.8
170.12	1360.13	170.18	1360.11	170.52	1359.99	171.3	1359.75	171.99	1359.52
173.09	1359.8	173.86	1359.99	176.5	1360.65	177.86	1360.99	178.67	1360.99
200.5	1359.14	208.5	1355.14	212.5	1353.14	250	1353.14	287.5	1353.14
291.5	1355.14	299.5	1359.14	326.72	1360.99	328.67	1360.99	334.86	1360.99
336.93	1360.47	338.87	1359.99	339.27	1359.89	340.84	1359.5	346.16	1359.43
349.51	1359.38	360.3	1359.19	360.95	1359.17	361.89	1359.16	363.39	1359.13
364.11	1359.12	364.47	1359.12	367.53	1359.1	378.4	1359.13	378.55	1359.13
378.84	1359.13	379.92	1359.13	391.76	1359.13	392.13	1359.03	392.3	1358.99
393.73	1358.61	395.54	1358.13	395.67	1358.06	395.78	1357.99	396.46	1357.58
397.21	1357.13	397.37	1357.03	397.44	1356.99	398.17	1356.53	398.82	1356.13
398.89	1356.08	399.03	1355.99	399.98	1355.38	400.38	1355.13	400.6	1355
400.62	1354.99	401.82	1354.31	402.15	1354.13	402.29	1354.04	402.37	1353.99
402.65	1353.82	403.8	1353.13	403.88	1353.08	403.89	1353.06	403.94	1353.03
404	1352.99	404.06	1352.95	404.17	1352.87	404.27	1352.8	405.26	1352.13
408.85	1352.13	414.38	1352.13	415.14	1352.56	415.2	1352.59	415.27	1352.63
415.33	1352.66	415.47	1352.74	415.78	1352.91	415.92	1352.99	416.06	1353.07
416.16	1353.13	417.13	1353.67	417.69	1353.99	417.81	1354.06	417.93	1354.13
418.97	1354.71	419.46	1354.99	419.68	1355.11	419.7	1355.13	420.69	1355.77
421.03	1355.99	421.1	1356.04	421.24	1356.13	422.4	1356.71	422.94	1356.99
423.05	1357.04	423.25	1357.13	424.13	1357.49	425.32	1357.99	425.55	1358.07
425.73	1358.13	432.22	1358.84	433.64	1358.99	434.44	1359.07	434.98	1359.13
452.85	1359.98	453.12	1359.99	454.42	1360.06	455.88	1360.13	458.77	1360.13
470.42	1360.84	472.72	1360.99	474.23	1361.09	474.72	1361.12	474.97	1361.13
493.9	1361.13	500	1361.13						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	200.5	.013	299.5	.032

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

200.5	299.5	20	20	20	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	178.67	1361.05	F
326.72	500	1361.05	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 183.9

INPUT
Description: Channel Station 61715.16, At End of Concrete Apron, Begin Grouted Rip-rap protection on channel bottom.
Station Elevation Data num= 175

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1357.19	26.62	1357.19	27.11	1357.19	30.52	1357.19	37.55	1357.19
37.97	1357.19	40.34	1357.19	42.68	1357.19	51.07	1357.19	61.1	1357.19
65.53	1357.19	65.99	1357.19	69.03	1357.19	70.77	1357.19	71.02	1357.23
71.32	1357.26	77.31	1358.05	77.86	1358.12	78.37	1358.19	81.13	1358.87
81.88	1359.05	82.09	1359.1	82.46	1359.19	85.58	1359.92	86.14	1360.05
86.18	1360.06	86.74	1360.19	89.02	1360.72	90.47	1361.05	90.61	1361.08
91.09	1361.19	94.51	1361.71	96.88	1362.05	97.67	1362.15	97.97	1362.19
113.78	1362.19	114.1	1362.19	114.17	1362.19	114.25	1362.18	114.41	1362.17
114.54	1362.16	114.73	1362.15	115.37	1362.11	116.38	1362.05	116.39	1362.05
116.4	1362.05	124.76	1361.52	126.12	1361.43	126.78	1361.39	128.51	1361.28
129.97	1361.19	131.86	1361.19	136.97	1361.19	140.81	1361.19	141.76	1361.19
147.2	1361.19	168.04	1361.19	168.3	1361.06	168.33	1361.05	168.73	1360.86
170.12	1360.19	170.18	1360.17	170.52	1360.05	171.3	1359.81	171.99	1359.58
173.09	1359.86	173.86	1360.05	176.5	1360.71	177.86	1361.05	178.67	1361.05
200.5	1359.2	212.5	1353.2	250	1353.2	287.5	1353.2	299.5	1359.2

326.72	1361.05	328.67	1361.05	334.86	1361.05	336.93	1360.53	338.87	1360.05
339.27	1359.95	340.84	1359.56	346.16	1359.49	349.51	1359.44	360.3	1359.25
360.95	1359.23	361.89	1359.22	363.39	1359.19	364.11	1359.18	364.47	1359.18
367.53	1359.16	378.4	1359.19	378.55	1359.19	378.84	1359.19	379.92	1359.19
391.76	1359.19	392.13	1359.09	392.3	1359.05	393.73	1358.67	395.54	1358.19
395.67	1358.12	395.78	1358.05	396.46	1357.64	397.21	1357.19	397.37	1357.09
397.44	1357.05	398.17	1356.59	398.82	1356.19	398.89	1356.14	399.03	1356.05
399.98	1355.44	400.38	1355.19	400.6	1355.06	400.62	1355.05	401.82	1354.37
402.15	1354.19	402.29	1354.1	402.37	1354.05	402.65	1353.88	403.8	1353.19
403.88	1353.14	403.89	1353.12	403.94	1353.09	404	1353.05	404.06	1353.01
404.17	1352.93	404.27	1352.86	405.26	1352.19	408.85	1352.19	414.38	1352.19
415.14	1352.62	415.2	1352.65	415.27	1352.69	415.33	1352.72	415.47	1352.8
415.78	1352.97	415.92	1353.05	416.06	1353.13	416.16	1353.19	417.13	1353.73
417.69	1354.05	417.81	1354.12	417.93	1354.19	418.97	1354.77	419.46	1355.05
419.68	1355.17	419.7	1355.19	420.69	1355.83	421.03	1356.05	421.1	1356.1
421.24	1356.19	422.4	1356.77	422.94	1357.05	423.05	1357.1	423.25	1357.19
424.13	1357.55	425.32	1358.05	425.55	1358.13	425.73	1358.19	432.22	1358.9
433.64	1359.05	434.44	1359.13	434.98	1359.19	452.85	1360.04	453.12	1360.05
454.42	1360.12	455.88	1360.19	458.77	1360.19	470.42	1360.9	472.72	1361.05
474.23	1361.15	474.72	1361.18	474.97	1361.19	493.9	1361.19	500	1361.19

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	200.5	.04	299.5	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
200.5	299.5	20	20	20	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	178.67	1361.05	F
326.72	500	1361.05	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 163.9

INPUT
Description: Channel Station 61735.26, At End of Grouted Riprap Section.
Station Elevation Data num= 175

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1357.02	26.62	1357.02	27.11	1357.02	30.52	1357.02	37.55	1357.02
37.97	1357.02	40.34	1357.02	42.68	1357.02	51.07	1357.02	61.1	1357.02
65.53	1357.02	65.99	1357.02	69.03	1357.02	70.77	1357.02	71.02	1357.06
71.32	1357.09	77.31	1357.88	77.86	1357.95	78.37	1358.02	81.13	1358.7
81.88	1358.88	82.09	1358.93	82.46	1359.02	85.58	1359.75	86.14	1359.88
86.18	1359.89	86.74	1360.02	89.02	1360.55	90.47	1360.88	90.61	1360.91
91.09	1361.02	94.51	1361.54	96.88	1361.88	97.67	1361.98	97.97	1362.02
113.78	1362.02	114.1	1362.02	114.17	1362.02	114.25	1362.01	114.41	1362
114.54	1361.99	114.73	1361.98	115.37	1361.94	116.38	1361.88	116.39	1361.88
116.4	1361.88	124.76	1361.35	126.12	1361.26	126.78	1361.22	128.51	1361.11
129.97	1361.02	131.86	1361.02	136.97	1361.02	140.81	1361.02	141.76	1361.02
147.2	1361.02	168.04	1361.02	168.3	1360.89	168.33	1360.88	168.73	1360.69
170.12	1360.02	170.18	1360	170.52	1359.88	171.3	1359.64	171.99	1359.41
173.09	1359.69	173.86	1359.88	176.5	1360.54	177.86	1360.88	178.67	1360.88
200.5	1359.03	212.5	1353.03	250	1353.03	287.5	1353.03	299.5	1359.03
326.72	1360.88	328.67	1360.88	334.86	1360.88	336.93	1360.36	338.87	1359.88
339.27	1359.78	340.84	1359.39	346.16	1359.32	349.51	1359.27	360.3	1359.08
360.95	1359.06	361.89	1359.05	363.39	1359.02	364.11	1359.01	364.47	1359.01
367.53	1358.99	378.4	1359.02	378.55	1359.02	378.84	1359.02	379.92	1359.02
391.76	1359.02	392.13	1358.92	392.3	1358.88	393.73	1358.5	395.54	1358.02
395.67	1357.95	395.78	1357.88	396.46	1357.47	397.21	1357.02	397.37	1356.92
397.44	1356.88	398.17	1356.42	398.82	1356.02	398.89	1355.97	399.03	1355.88
399.98	1355.27	400.38	1355.02	400.6	1354.89	400.62	1354.88	401.82	1354.2
402.15	1354.02	402.29	1353.93	402.37	1353.88	402.65	1353.71	403.8	1353.02
403.88	1352.97	403.89	1352.95	403.94	1352.92	404	1352.88	404.06	1352.84
404.17	1352.76	404.27	1352.69	405.26	1352.02	408.85	1352.02	414.38	1352.02
415.14	1352.45	415.2	1352.48	415.27	1352.52	415.33	1352.55	415.47	1352.63
415.78	1352.8	415.92	1352.88	416.06	1352.96	416.16	1353.02	417.13	1353.56
417.69	1353.88	417.81	1353.95	417.93	1354.02	418.97	1354.6	419.46	1354.88
419.68	1355	419.7	1355.02	420.69	1355.66	421.03	1355.88	421.1	1355.93
421.24	1356.02	422.4	1356.6	422.94	1356.88	423.05	1356.93	423.25	1357.02
424.13	1357.38	425.32	1357.88	425.55	1357.96	425.73	1358.02	432.22	1358.73
433.64	1358.88	434.44	1358.96	434.98	1359.02	452.85	1359.87	453.12	1359.88
454.42	1359.95	455.88	1360.02	458.77	1360.02	470.42	1360.73	472.72	1360.88
474.23	1360.98	474.72	1361.01	474.97	1361.02	493.9	1361.02	500	1361.02

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	200.5	.028	299.5	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
200.5	299.5	63.9	63.9	63.9	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	178.67	1360.88	F
326.72	500	1360.88	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 100

INPUT
Description: Channel Station 61799.16
Station Elevation Data num= 256

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1360.14	10.37	1360.14	11.08	1360.14	13.3	1360.14	13.49	1360.14
16.57	1360.14	20.74	1360.14	26.76	1360.3	28.87	1360.34	32.11	1360.41
32.92	1360.43	33.9	1360.45	56.66	1361	56.73	1361	61.44	1361.12
62.39	1361.14	64.15	1361.36	69.24	1362	70.27	1362.12	70.43	1362.14
72.15	1362.6	73.68	1363	73.71	1363.01	74.19	1363.14	74.71	1363.27
77.29	1363.94	77.54	1364	78.06	1364.14	79.88	1364.59	81.49	1365
82.03	1365.14	85.27	1365.81	86.14	1366	86.38	1366.05	86.81	1366.14
88.47	1366.14	95.38	1366.14	108.15	1366.14	120.89	1366.14	136.15	1366.14
138.4	1366.48	139.13	1366.56	140.89	1366.75	143.24	1367	144.33	1367.12
144.46	1367.13	144.57	1367.14	145.4	1367.14	146.22	1367.14	154.8	1367.14
160.4	1367.14	162.74	1367.14	164.38	1367.14	165.15	1367.14	165.52	1367.01
165.55	1367	166.08	1366.79	167.8	1366.14	167.98	1366.06	168.11	1366
169.04	1365.68	170.02	1365.31	170.48	1365.14	170.72	1365	170.73	1365
172.73	1364.14	172.85	1364.09	173.09	1364	174.51	1363.44	175.26	1363.14
175.32	1363.11	175.48	1363.03	175.53	1363	175.64	1362.95	177.25	1362.14
177.74	1362	177.75	1362	178.35	1361.77	178.75	1361.61	179.78	1361.14
180.33	1361.09	181.41	1361	190.06	1360.26	191.51	1360.14	191.56	1360.12
191.66	1360.09	191.9	1360	193.28	1359.53	194.46	1359.14	194.6	1359.09
194.87	1359	196.38	1358.5	197.5	1358.14	197.75	1358.05	197.9	1358
200.38	1357.15	200.42	1357.14	200.5	1357.11	200.84	1357	201.23	1356.87
203.43	1356.14	203.56	1356.09	203.84	1356	205.5	1355.45	206.44	1355.14
206.79	1355.02	206.84	1355	208.74	1354.34	209.33	1354.14	209.72	1354.01
209.74	1354	209.85	1353.96	211.08	1353.54	212.27	1353.14	216.68	1353.01
217.02	1353	221.93	1352.86	227.68	1352.71	245.58	1352.47	253.03	1352.51
260.72	1352.53	274.12	1352.73	279.23	1352.88	281.27	1352.95	282.91	1353
284.93	1353.05	286.85	1353.1	287.25	1353.11	287.57	1353.12	287.68	1353.12
287.75	1353.12	288.74	1353.14	290.16	1353.22	290.25	1353.22	290.33	1353.22
290.39	1353.22	290.43	1353.22	293.4	1353.35	293.54	1353.35	293.74	1353.36
293.9	1353.36	294.08	1353.36	294.3	1353.37	297.85	1353.48	298.36	1353.49
299.12	1353.5	299.69	1353.51	301.69	1353.56	302.03	1353.56	302.12	1353.56
302.23	1353.56	302.37	1353.56	302.55	1353.56	306.66	1353.54	306.89	1353.53
307.15	1353.53	307.46	1353.52	307.71	1353.52	307.89	1353.51	308.02	1353.51
313.52	1353.28	313.64	1353.28	313.79	1353.27	313.97	1353.26	314.11	1353.26
314.21	1353.25	315.76	1353.14	316.75	1353.08	318.1	1353	322.15	1352.75
322.36	1352.74	326.13	1352.52	329.88	1352.33	330.77	1352.28	333.32	1352.14
334.85	1352.14	340.83	1352.14	348.77	1352.14	350.03	1352.2	350.11	1352.21
350.47	1352.23	351.66	1352.3	362.93	1353	364.47	1353.09	365.13	1353.14
365.96	1353.37	366.77	1353.54	368.99	1354	369.34	1354.06	369.85	1354.14
370.9	1354.57	371.94	1355	372.09	1355.06	372.27	1355.14	373.66	1355.8
374.06	1356	374.33	1356.11	374.4	1356.14	375.59	1356.7	376.25	1357
376.37	1357.05	376.57	1357.14	378.05	1357.81	378.47	1358	378.75	1358.13
378.78	1358.14	378.8	1358.15	379.01	1358.24	380.48	1358.9	380.72	1359
380.79	1359.03	381.03	1359.14	382	1359.58	382.91	1360	383.03	1360.05
383.21	1360.14	384.35	1360.64	385.16	1361	385.2	1361.02	385.48	1361.14
385.97	1361.36	387.41	1362	387.55	1362.06	387.7	1362.13	387.73	1362.14
389.64	1363	389.65	1363	389.97	1363.14	391.16	1363.67	391.89	1364
392.08	1364.08	392.2	1364.14	393.31	1364.62	394.17	1365	394.34	1365.08
394.5	1365.14	396.39	1365.14	400.77	1365.14	402.49	1365.14	403.71	1365.14
404.17	1365.14	405.41	1365.14	406.3	1365.14	413.98	1365.32	414.14	1365.32
414.16	1365.32	438.83	1365.55	460.2	1365.37	478.23	1365.49	481.91	1365.51
484.14	1365.5	488.64	1365.22	489.55	1365.44	489.6	1365.62	489.62	1365.66
489.71	1365.61								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	165.15	.028	394.5	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
165.15	394.5	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 0

INPUT
Description: confluence with Powerline Floodway
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3149.606	1365.293	156.923	1365.293	161.975	1365.293	166.175	1365.293	171.851	1366.14
3172.638	1366.273	176.509	1366.863	179.364	1367.253	182.185	1367.253	187.795	1367.16
3189.567	1366.963	193.012	1366.793	196.358	1366.273	198.622	1365.123	200.427	1364.27
3200.656	1364.143	202.395	1363.283	202.526	1363.183	203.839	1362.633	204.396	1362.27
3205.479	1361.74	3206.43	1361.283	207.972	1360.853	211.581	1360.273	215.519	1359.77
3216.601	1359.673	218.373	1359.583	221.096	1359.253	222.047	1358.953	223.983	1358.26
3226.936	1357.383	227.264	1357.283	228.084	1357.023	230.381	1356.263	231.923	1355.74
3233.301	1355.283	235.138	1354.663	236.352	1354.263	239.469	1353.283	239.534	1353.28
3240.322	1353.243	263.681	1352.26	3280.84	1352.263	281.168	1352.263	292.421	1352.26
3313.517	1352.263	315.518	1352.263	320.669	1352.263	338.287	1352.723	359.022	1353.21
3360.203	1353.243	361.286	1353.283	361.942	1353.513	363.878	1354.263	364.239	1354.42
3365.453	1354.893	366.371	1355.283	367.388	1355.673	368.897	1356.263	369.652	1356.59
3371.26	1357.283	372.113	1357.643	373.163	1358.263	375.295	1359.213	375.361	1359.25
3377.493	1360.233	377.559	1360.273	377.756	1360.36	3379.79	1361.283	380.708	1361.68
3381.988	1362.273	384.088	1363.253	384.121	1363.283	384.186	1363.283	386.385	1364.27

3399.967 1364.273400.591 1364.273404.396 1364.273412.106 1364.53

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
3149.606	.032	3198.622	.028	3386.385	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3198.6	3386.385	0	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:River

Reach	River Sta.	n1	n2	n3	n4	n5	n6
Ellsworth	17100	.025	.032	.028	.032	.025	
Ellsworth	17000	.025	.032	.028	.032	.025	
Ellsworth	16900	.025	.032	.028	.032	.025	
Ellsworth	16800	.025	.032	.028	.032	.025	
Ellsworth	16700	.025	.032	.028	.032	.025	
Ellsworth	16600	.025	.032	.028	.032	.025	
Ellsworth	16500	.025	.032	.028	.032	.025	
Ellsworth	16400	.025	.032	.028	.032	.025	
Ellsworth	16300	.025	.032	.028	.032	.025	
Ellsworth	16200	.025	.032	.028	.032	.025	
Ellsworth	16100	.025	.032	.028	.032	.025	
Ellsworth	16000	.025	.032	.028	.032	.025	
Ellsworth	15966.5	.025	.04	.028	.04	.025	
Ellsworth	15947.5	.025	.04	.025	.035		
Ellsworth	15937.5	.025	.015	.025			
Ellsworth	15920.67		.015				
Ellsworth	15895	Culvert					
Ellsworth	15870.67		.015				
Ellsworth	15855.5	.025	.04	.025			
Ellsworth	15845.5	.025	.04	.028	.04	.025	
Ellsworth	15826.6	.025	.032	.028	.032	.025	
Ellsworth	15809	.025	.032	.028	.032	.025	
Ellsworth	15800	.025	.032	.028	.032	.025	
Ellsworth	15700	.025	.032	.028	.032	.025	
Ellsworth	15600	.025	.032	.028	.032	.025	
Ellsworth	15550	.025	.04	.025			
Ellsworth	15460	.025	.015	.025			
Ellsworth	15450	.025	.015	.025			
Ellsworth	15350	Culvert					
Ellsworth	15192	.025	.04	.025			
Ellsworth	15100	.025	.04	.025			
Ellsworth	15000	.025	.032	.028	.032	.025	
Ellsworth	14900	.025	.032	.028	.032	.025	
Ellsworth	14800	.025	.032	.028	.032	.025	
Ellsworth	14700	.025	.032	.028	.032	.025	
Ellsworth	14600	.025	.032	.028	.032	.025	
Ellsworth	14579	.025	.032	.028	.032	.025	
Ellsworth	14569	.025	.032	.028	.032	.025	
Ellsworth	14501	.025	.032	.028	.032	.025	
Ellsworth	14491	.025	.032	.028	.032	.025	
Ellsworth	14451	.025	.032	.028	.032	.025	
Ellsworth	14400	.025	.032	.028	.032	.025	
Ellsworth	14300	.025	.032	.028	.032	.025	
Ellsworth	14200	.025	.032	.028	.032	.025	
Ellsworth	14100	.025	.032	.028	.032	.025	
Ellsworth	14000	.025	.04	.04	.032	.025	
Ellsworth	13900	.025	.032	.028	.032	.025	
Ellsworth	13800	.025	.032	.028	.032	.025	
Ellsworth	13700	.025	.032	.028	.032	.025	
Ellsworth	13600	.025	.032	.028	.032	.025	
Ellsworth	13500	.025	.032	.028	.032	.025	
Ellsworth	13400	.025	.032	.028	.032	.025	
Ellsworth	13300	.025	.032	.028	.032	.025	
Ellsworth	13200	.025	.032	.028	.032	.025	
Ellsworth	13100	.025	.032	.028	.032	.025	
Ellsworth	13000	.025	.032	.028	.032	.025	
Ellsworth	12900	.025	.032	.028	.032	.025	
Ellsworth	12800	.025	.032	.028	.032	.025	
Ellsworth	12700	.025	.032	.028	.032	.025	
Ellsworth	12600	.025	.032	.028	.032	.025	
Ellsworth	12500	.025	.032	.028	.032	.025	
Ellsworth	12400	.025	.032	.028	.032	.025	
Ellsworth	12300	.025	.032	.028	.032	.025	
Ellsworth	12200	.025	.032	.028	.032	.025	
Ellsworth	12100	.025	.032	.028	.032	.025	
Ellsworth	12000	.025	.032	.028	.032	.025	
Ellsworth	11900	.025	.032	.028	.032	.025	
Ellsworth	11800	.025	.032	.028	.032	.025	
Ellsworth	11700	.025	.032	.028	.032	.025	
Ellsworth	11600	.025	.032	.028	.032	.025	
Ellsworth	11500	.025	.032	.028	.032	.025	
Ellsworth	11400	.025	.032	.028	.032	.025	
Ellsworth	11300	.025	.032	.028	.032	.025	
Ellsworth	11200	.025	.032	.028	.032	.025	
Ellsworth	11100	.025	.032	.028	.032	.025	
Ellsworth	11000	.025	.032	.028	.032	.025	
Ellsworth	10900	.025	.032	.028	.032	.025	

*Ellsworth	*	10800	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	10700	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	10650.9	*	.04*	.028*	.04*	.025*	*	*
*Ellsworth	*	10623.7	*	.04*	.025*	.032*	*	*	*
*Ellsworth	*	10613.7	*	*	.015*	.025*	*	*	*
*Ellsworth	*	10600.87	*	*	.015*	*	*	*	*
*Ellsworth	*	10570	*Culvert	*	*	*	*	*	*
*Ellsworth	*	10539.74	*	*	.015*	*	*	*	*
*Ellsworth	*	10528.5	*	.04*	.025*	*	*	*	*
*Ellsworth	*	10518.5	*	.04*	.028*	.04*	.025*	.032*	*
*Ellsworth	*	10490.7	*	.032*	.028*	.032*	.025*	*	*
*Ellsworth	*	10400	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	10300	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	10200	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	10100	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	10000	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9900	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9800	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9700	*	.025*	.04*	.025*	*	*	*
*Ellsworth	*	9600	*	.025*	.04*	.025*	*	*	*
*Ellsworth	*	9500	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9400	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9340.54	*	.04*	.028*	.04*	.025*	*	*
*Ellsworth	*	9314.67	*	.04*	.025*	.035*	*	*	*
*Ellsworth	*	9304.67	*	*	.015*	.025*	*	*	*
*Ellsworth	*	9288.82	*	*	.015*	*	*	*	*
*Ellsworth	*	9248	*Culvert	*	*	*	*	*	*
*Ellsworth	*	9207.65	*	*	.015*	*	*	*	*
*Ellsworth	*	9193.48	*	.04*	.025*	*	*	*	*
*Ellsworth	*	9183.48	*	.04*	.028*	.04*	.025*	.032*	*
*Ellsworth	*	9154.01	*	.032*	.028*	.032*	.025*	*	*
*Ellsworth	*	9143	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9100	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9000	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8900	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8800	*	.025*	.04*	.025*	*	*	*
*Ellsworth	*	8700	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8600	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8500	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8400	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8300	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8200	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8100	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	8000	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7900	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7800	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7700	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7600	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7500	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7400	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7300	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7200	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7100	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	7000	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	6900	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	6800	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	6700	*	.025*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	6687.62	*	.04*	.028*	.04*	.025*	*	*
*Ellsworth	*	6675.17*	*	.04*	.025*	*	*	*	*
*Ellsworth	*	6662.73	*	*	.015*	.025*	*	*	*
*Ellsworth	*	6646.88	*	*	.015*	*	*	*	*
*Ellsworth	*	6615	*Culvert	*	*	*	*	*	*
*Ellsworth	*	6585.95	*	*	.015*	*	*	*	*
*Ellsworth	*	6571.49	*	*	.04*	.025*	*	*	*
*Ellsworth	*	6559.04*	*	.04*	.028*	.04*	.025*	*	*
*Ellsworth	*	6546.60	*	.032*	.028*	.032*	.025*	*	*
*Ellsworth	*	6527	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	6500	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	6400	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	6300	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	6200	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	6100	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	6000	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5900	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5800	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5700	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5600	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5500	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5400	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5300	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5200	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5100	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	5000	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4900	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4800	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4700	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4674	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4664	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4600	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4500	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4400	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4300	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4200	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4100	*	.032*	.028*	.032*	*	*	*
*Ellsworth	*	4000	*	.032*	.028*	.032*	*	*	*

Ellsworth	3900		.032	.028	.032			
Ellsworth	3800		.032	.028	.032			
Ellsworth	3700		.032	.028	.032			
Ellsworth	3600		.032	.028	.032			
Ellsworth	3505.64		.032	.013	.032			
Ellsworth	3473.65		.032	.013	.032			
Ellsworth	3473.64		.032	.013	.032			
Ellsworth	3461.64		.032	.032	.013	.032		
Ellsworth	3461.63		.032	.013	.032			
Ellsworth	3460.63		.032	.013	.032			
Ellsworth	3444.63		.032	.04	.013	.04	.032	
Ellsworth	3444.62		.032	.04	.032			
Ellsworth	3432.91		.032	.04	.032			
Ellsworth	3425.08		.032	.04	.032			
Ellsworth	3400		.032	.04	.028	.032		
Ellsworth	3300		.032	.04	.028	.032		
Ellsworth	3200		.032	.04	.028	.032		
Ellsworth	3100		.032	.04	.032			
Ellsworth	3000		.032	.028	.032			
Ellsworth	2900		.032	.028	.032			
Ellsworth	2800		.032	.028	.032			
Ellsworth	2700		.032	.028	.032			
Ellsworth	2654.00		.032	.028	.032			
Ellsworth	2608.01		.032	.04	.032			
Ellsworth	2598.02		.032	.015	.032			
Ellsworth	2581.04			.015				
Ellsworth	2569	Culvert						
Ellsworth	2557.04			.015				
Ellsworth	2554.53		.018	.018	.033	.039	.018	.018
Ellsworth	2552.03		.021	.021	.035	.037	.021	.021
Ellsworth	2549.52		.023	.023	.036	.036	.023	.023
Ellsworth	2547.02		.026	.026	.037	.035	.026	.026
Ellsworth	2544.51		.029	.029	.039	.033	.029	.029
Ellsworth	2542.01		.032	.04	.032			
Ellsworth	2532.01		.032	.028	.032			
Ellsworth	2513.15		.032	.028	.032			
Ellsworth	2400		.032	.028	.032			
Ellsworth	2300		.032	.028	.032			
Ellsworth	2200		.032	.028	.032			
Ellsworth	2100		.032	.028	.032			
Ellsworth	2000		.032	.028	.032			
Ellsworth	1900		.032	.028	.032			
Ellsworth	1800		.032	.028	.032			
Ellsworth	1700		.032	.028	.032			
Ellsworth	1600		.032	.028	.032			
Ellsworth	1500		.032	.028	.032			
Ellsworth	1400		.032	.028	.032			
Ellsworth	1300		.032	.028	.032			
Ellsworth	1200		.032	.028	.032			
Ellsworth	1100		.032	.028	.032			
Ellsworth	1000		.032	.028	.032			
Ellsworth	900		.032	.028	.032			
Ellsworth	800		.032	.028	.032			
Ellsworth	700		.032	.028	.032			
Ellsworth	600		.032	.028	.032			
Ellsworth	500		.032	.028	.032			
Ellsworth	400		.032	.028	.032			
Ellsworth	300		.032	.04	.032			
Ellsworth	244		.032	.013	.032			
Ellsworth	243			.013				
Ellsworth	204		.032	.013	.032			
Ellsworth	203.9		.032	.013	.032			
Ellsworth	183.9		.032	.04	.032			
Ellsworth	163.9		.032	.028	.032			
Ellsworth	100		.032	.028	.032			
Ellsworth	0		.032	.028	.032			

SUMMARY OF REACH LENGTHS

River: River

Reach	River Sta.	Left	Channel	Right
Ellsworth	17100	100	100	100
Ellsworth	17000	100	100	100
Ellsworth	16900	100	100	100
Ellsworth	16800	100	100	100
Ellsworth	16700	100	100	100
Ellsworth	16600	100	100	100
Ellsworth	16500	100	100	100
Ellsworth	16400	100	100	100
Ellsworth	16300	100	100	100
Ellsworth	16200	100	100	100
Ellsworth	16100	100	100	100
Ellsworth	16000	33.5	33.5	33.5
Ellsworth	15966.5	19.34	19.34	19.34
Ellsworth	15947.5	10	10	10
Ellsworth	15937.5	16.83	16.83	16.83
Ellsworth	15920.67	50	50	50
Ellsworth	15895	Culvert		
Ellsworth	15870.67	15.17	15.17	15.17
Ellsworth	15855.5	10	10	10

*Ellsworth	*	15845.5	*	19.28*	19.28*	19.28*
*Ellsworth	*	15826.6	*	17.6*	17.6*	17.6*
*Ellsworth	*	15809	*	9*	9*	9*
*Ellsworth	*	15800	*	100*	100*	100*
*Ellsworth	*	15700	*	100*	100*	100*
*Ellsworth	*	15600	*	50*	50*	50*
*Ellsworth	*	15550	*	64*	90*	120*
*Ellsworth	*	15460	*	10*	10*	10*
*Ellsworth	*	15450	*	258*	258*	258*
*Ellsworth	*	15350	*Culvert	*	*	*
*Ellsworth	*	15192	*	92*	92*	92*
*Ellsworth	*	15100	*	102.51*	100*	97.56*
*Ellsworth	*	15000	*	100*	100*	100*
*Ellsworth	*	14900	*	100*	100*	100*
*Ellsworth	*	14800	*	100*	100*	100*
*Ellsworth	*	14700	*	100*	100*	100*
*Ellsworth	*	14600	*	21*	21*	21*
*Ellsworth	*	14579	*	10*	10*	10*
*Ellsworth	*	14569	*	68*	68*	68*
*Ellsworth	*	14501	*	10*	10*	10*
*Ellsworth	*	14491	*	40*	40*	40*
*Ellsworth	*	14451	*	51*	51*	51*
*Ellsworth	*	14400	*	100*	100*	100*
*Ellsworth	*	14300	*	100*	100*	100*
*Ellsworth	*	14200	*	100*	100*	100*
*Ellsworth	*	14100	*	100*	100*	100*
*Ellsworth	*	14000	*	100*	100*	100*
*Ellsworth	*	13900	*	100*	100*	100*
*Ellsworth	*	13800	*	98.87*	100*	101.06*
*Ellsworth	*	13700	*	98.65*	100*	101.34*
*Ellsworth	*	13600	*	99.78*	100*	100.25*
*Ellsworth	*	13500	*	100.01*	100*	100*
*Ellsworth	*	13400	*	102.36*	100*	97.83*
*Ellsworth	*	13300	*	103.02*	100*	97.3*
*Ellsworth	*	13200	*	103.09*	100*	97.23*
*Ellsworth	*	13100	*	95.48*	100*	104.29*
*Ellsworth	*	13000	*	96.55*	100*	103.25*
*Ellsworth	*	12900	*	101.64*	100*	98.37*
*Ellsworth	*	12800	*	103.54*	100*	96.09*
*Ellsworth	*	12700	*	100.41*	100*	99.62*
*Ellsworth	*	12600	*	94.09*	100*	105.5*
*Ellsworth	*	12500	*	100.08*	100*	100*
*Ellsworth	*	12400	*	102.09*	100*	97.8*
*Ellsworth	*	12300	*	103.82*	100*	96.25*
*Ellsworth	*	12200	*	92.68*	100*	106.55*
*Ellsworth	*	12100	*	99.46*	100*	100.61*
*Ellsworth	*	12000	*	100.05*	100*	100.03*
*Ellsworth	*	11900	*	105.72*	100*	94.44*
*Ellsworth	*	11800	*	99.31*	100*	100.6*
*Ellsworth	*	11700	*	95.66*	100*	104.2*
*Ellsworth	*	11600	*	100.01*	100*	100.01*
*Ellsworth	*	11500	*	103.72*	100*	96.19*
*Ellsworth	*	11400	*	105.19*	100*	94.8*
*Ellsworth	*	11300	*	95.44*	100*	104.32*
*Ellsworth	*	11200	*	96.62*	100*	103.41*
*Ellsworth	*	11100	*	100.08*	100*	100.04*
*Ellsworth	*	11000	*	104.31*	100*	94.91*
*Ellsworth	*	10900	*	102.12*	100*	97.9*
*Ellsworth	*	10800	*	95.49*	100*	104.3*
*Ellsworth	*	10700	*	49.1*	49.1*	49.1*
*Ellsworth	*	10650.9	*	27.9*	27.9*	27.9*
*Ellsworth	*	10623.7	*	10*	10*	10*
*Ellsworth	*	10613.7	*	12.83*	12.83*	12.83*
*Ellsworth	*	10600.87	*	61*	61*	61*
*Ellsworth	*	10570	*Culvert	*	*	*
*Ellsworth	*	10539.74	*	11.24*	11.24*	11.24*
*Ellsworth	*	10528.5	*	10*	10*	10*
*Ellsworth	*	10518.5	*	28.35*	28.35*	28.35*
*Ellsworth	*	10490.7	*	90.7*	90.7*	90.7*
*Ellsworth	*	10400	*	99.61*	100*	100.39*
*Ellsworth	*	10300	*	99.63*	100*	100.39*
*Ellsworth	*	10200	*	103.09*	100*	96.83*
*Ellsworth	*	10100	*	94.34*	100*	105.4*
*Ellsworth	*	10000	*	97.24*	100*	102.97*
*Ellsworth	*	9900	*	100.03*	100*	100.09*
*Ellsworth	*	9800	*	105.55*	100*	93.83*
*Ellsworth	*	9700	*	99.48*	100*	100.56*
*Ellsworth	*	9600	*	96.99*	100*	104.86*
*Ellsworth	*	9500	*	100.07*	100*	100*
*Ellsworth	*	9400	*	59.46*	59.46*	59.46*
*Ellsworth	*	9340.54	*	25.88*	25.88*	25.88*
*Ellsworth	*	9314.67	*	10*	10*	10*
*Ellsworth	*	9304.67	*	15.85*	15.85*	15.85*
*Ellsworth	*	9288.82	*	81*	81*	81*
*Ellsworth	*	9248	*Culvert	*	*	*
*Ellsworth	*	9207.65	*	14.17*	14.17*	14.17*
*Ellsworth	*	9193.48	*	10*	10*	10*
*Ellsworth	*	9183.48	*	29.74*	29.74*	29.74*
*Ellsworth	*	9154.01	*	11.01*	11.01*	11.01*
*Ellsworth	*	9143	*	43*	43*	43*
*Ellsworth	*	9100	*	100.01*	100*	100.01*
*Ellsworth	*	9000	*	100.08*	100*	100.06*
*Ellsworth	*	8900	*	105.14*	100*	94.38*
*Ellsworth	*	8800	*	105.5*	100*	95.16*
*Ellsworth	*	8700	*	90.15*	100*	108.77*

*Ellsworth	*	8600	* 100.12*	100*	100.04*
*Ellsworth	*	8500	* 101.68*	100*	98.5*
*Ellsworth	*	8400	* 108.13*	100*	92.32*
*Ellsworth	*	8300	* 91.63*	100*	109.15*
*Ellsworth	*	8200	* 96*	100*	103.91*
*Ellsworth	*	8100	* 100.26*	100*	100.05*
*Ellsworth	*	8000	* 105.08*	100*	94.7*
*Ellsworth	*	7900	* 100.63*	100*	99.55*
*Ellsworth	*	7800	* 92.33*	100*	107.1*
*Ellsworth	*	7700	* 100.03*	100*	100.01*
*Ellsworth	*	7600	* 102.51*	100*	99.47*
*Ellsworth	*	7500	* 109.18*	100*	89.79*
*Ellsworth	*	7400	* 96.46*	100*	105.69*
*Ellsworth	*	7300	* 97.94*	100*	102.45*
*Ellsworth	*	7200	* 100.01*	100*	100.03*
*Ellsworth	*	7100	* 95.01*	100*	105.49*
*Ellsworth	*	7000	* 103.4*	100*	95.97*
*Ellsworth	*	6900	* 100.01*	100*	100.11*
*Ellsworth	*	6800	* 103.39*	100*	95.64*
*Ellsworth	*	6700	* 12.38*	12.38*	12.38*
*Ellsworth	*	6687.62	* 14.9*	14.9*	14.9*
*Ellsworth	*	6675.17*	* 10*	10*	10*
*Ellsworth	*	6662.73	* 15.93*	15.93*	15.93*
*Ellsworth	*	6646.88	* 61*	61*	61*
*Ellsworth	*	6615	*Culvert *	*	*
*Ellsworth	*	6585.95	* 14.26*	14.26*	14.26*
*Ellsworth	*	6571.49	* 10*	10*	10*
*Ellsworth	*	6559.04*	* 14.9*	14.9*	14.9*
*Ellsworth	*	6546.60	* 19.6*	19.6*	19.6*
*Ellsworth	*	6527	* 27*	27*	27*
*Ellsworth	*	6500	* 92.36*	100*	109.95*
*Ellsworth	*	6400	* 89.93*	100*	111.65*
*Ellsworth	*	6300	* 95.01*	100*	105.75*
*Ellsworth	*	6200	* 89.55*	100*	112.01*
*Ellsworth	*	6100	* 89.86*	100*	110.57*
*Ellsworth	*	6000	* 93.44*	100*	106.76*
*Ellsworth	*	5900	* 93.19*	100*	106.49*
*Ellsworth	*	5800	* 88.19*	100*	110.63*
*Ellsworth	*	5700	* 93.95*	100*	105.17*
*Ellsworth	*	5600	* 93.4*	100*	105.25*
*Ellsworth	*	5500	* 91.63*	100*	106.73*
*Ellsworth	*	5400	* 100.13*	100*	100.03*
*Ellsworth	*	5300	* 92.52*	100*	106.5*
*Ellsworth	*	5200	* 96.11*	100*	103.33*
*Ellsworth	*	5100	* 95.3*	100*	103.78*
*Ellsworth	*	5000	* 95.36*	100*	103.76*
*Ellsworth	*	4900	* 95.44*	100*	104.05*
*Ellsworth	*	4800	* 90.21*	100*	108.18*
*Ellsworth	*	4700	* 26*	26*	26*
*Ellsworth	*	4674	* 10*	10*	10*
*Ellsworth	*	4664	* 64*	64*	64*
*Ellsworth	*	4600	* 94.44*	100*	105.1*
*Ellsworth	*	4500	* 95.83*	100*	103.83*
*Ellsworth	*	4400	* 92.56*	100*	107.14*
*Ellsworth	*	4300	* 95.8*	100*	103.64*
*Ellsworth	*	4200	* 96.42*	100*	103.62*
*Ellsworth	*	4100	* 95.47*	100*	103.98*
*Ellsworth	*	4000	* 94.83*	100*	104.71*
*Ellsworth	*	3900	* 95.3*	100*	104.2*
*Ellsworth	*	3800	* 92.84*	100*	106.52*
*Ellsworth	*	3700	* 94.33*	100*	105.12*
*Ellsworth	*	3600	* 94*	95.35*	97.2*
*Ellsworth	*	3505.64	* 31.99*	31.99*	31.99*
*Ellsworth	*	3473.65	* .01*	.01*	.01*
*Ellsworth	*	3473.64	* 12*	12*	12*
*Ellsworth	*	3461.64	* .01*	.01*	.01*
*Ellsworth	*	3461.63	* 1*	1*	1*
*Ellsworth	*	3460.63	* 16*	16*	16*
*Ellsworth	*	3444.63	* .1*	.1*	.1*
*Ellsworth	*	3444.62	* 11.71*	11.71*	11.71*
*Ellsworth	*	3432.91	* 7.83*	7.83*	7.83*
*Ellsworth	*	3425.08	* 25.08*	25.08*	25.08*
*Ellsworth	*	3400	* 127.83*	100*	65.35*
*Ellsworth	*	3300	* 113.64*	100*	82.22*
*Ellsworth	*	3200	* 120.07*	100*	75.53*
*Ellsworth	*	3100	* 134.22*	100*	55.34*
*Ellsworth	*	3000	* 100.02*	100*	100.15*
*Ellsworth	*	2900	* 100.01*	100*	100.06*
*Ellsworth	*	2800	* 100.01*	100*	100.06*
*Ellsworth	*	2700	* 46*	46*	46*
*Ellsworth	*	2654.00*	* 46*	46*	46*
*Ellsworth	*	2608.01	* 10*	10*	10*
*Ellsworth	*	2598.02	* 17*	17*	17*
*Ellsworth	*	2581.04	* 24*	24*	24*
*Ellsworth	*	2569	*Culvert *	*	*
*Ellsworth	*	2557.04	* 2.5*	2.5*	2.5*
*Ellsworth	*	2554.53*	* 2.5*	2.5*	2.5*
*Ellsworth	*	2552.03*	* 2.5*	2.5*	2.5*
*Ellsworth	*	2549.52*	* 2.5*	2.5*	2.5*
*Ellsworth	*	2547.02*	* 2.5*	2.5*	2.5*
*Ellsworth	*	2544.51*	* 2.51*	2.51*	2.51*
*Ellsworth	*	2542.01	* 10*	10*	10*
*Ellsworth	*	2532.01	* 19*	19*	19*
*Ellsworth	*	2513.15*	* 113.16*	113.16*	113.16*
*Ellsworth	*	2400	* 100*	100*	100*

*Ellsworth	* 2300	* 100*	100*	100.06*
*Ellsworth	* 2200	* 99.24*	100*	100.82*
*Ellsworth	* 2100	* 98.48*	100*	101.57*
*Ellsworth	* 2000	* 100.03*	100*	100*
*Ellsworth	* 1900	* 100*	100*	100*
*Ellsworth	* 1800	* 100*	100*	100*
*Ellsworth	* 1700	* 100*	100*	100.01*
*Ellsworth	* 1600	* 98.37*	100*	101.72*
*Ellsworth	* 1500	* 85.9*	100*	115.25*
*Ellsworth	* 1400	* 85.31*	100*	114.26*
*Ellsworth	* 1300	* 94.31*	100*	105.05*
*Ellsworth	* 1200	* 100*	100*	100.01*
*Ellsworth	* 1100	* 100*	100*	100.01*
*Ellsworth	* 1000	* 100*	100*	100.01*
*Ellsworth	* 900	* 100*	100*	100.01*
*Ellsworth	* 800	* 100*	100*	100.01*
*Ellsworth	* 700	* 100*	100*	100.01*
*Ellsworth	* 600	* 100*	100*	100.01*
*Ellsworth	* 500	* 100*	100*	100.01*
*Ellsworth	* 400	* 100*	100*	100.01*
*Ellsworth	* 300	* 56*	56*	56*
*Ellsworth	* 244	* 1*	1*	1*
*Ellsworth	* 243	* 39*	39*	39*
*Ellsworth	* 204	* .1*	.1*	.1*
*Ellsworth	* 203.9	* 20*	20*	20*
*Ellsworth	* 183.9	* 20*	20*	20*
*Ellsworth	* 163.9	* 63.9*	63.9*	63.9*
*Ellsworth	* 100	* 100*	100*	100*
*Ellsworth	* 0	* 0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River

Reach	River Sta.	Contr.	Expan.
*Ellsworth	* 17100	* .1*	.3*
*Ellsworth	* 17000	* .1*	.3*
*Ellsworth	* 16900	* .1*	.3*
*Ellsworth	* 16800	* .1*	.3*
*Ellsworth	* 16700	* .1*	.3*
*Ellsworth	* 16600	* .1*	.3*
*Ellsworth	* 16500	* .1*	.3*
*Ellsworth	* 16400	* .1*	.3*
*Ellsworth	* 16300	* .1*	.3*
*Ellsworth	* 16200	* .1*	.3*
*Ellsworth	* 16100	* .3*	.5*
*Ellsworth	* 16000	* .1*	.3*
*Ellsworth	* 15966.5	* .1*	.3*
*Ellsworth	* 15947.5	* .1*	.3*
*Ellsworth	* 15937.5	* .1*	.3*
*Ellsworth	* 15920.67	* .1*	.3*
*Ellsworth	* 15895	*Culvert *	*
*Ellsworth	* 15870.67	* .1*	.3*
*Ellsworth	* 15855.5	* .1*	.3*
*Ellsworth	* 15845.5	* .1*	.3*
*Ellsworth	* 15826.6	* .1*	.3*
*Ellsworth	* 15809	* .1*	.3*
*Ellsworth	* 15800	* .1*	.3*
*Ellsworth	* 15700	* .1*	.3*
*Ellsworth	* 15600	* .1*	.3*
*Ellsworth	* 15550	* .3*	.5*
*Ellsworth	* 15460	* .3*	.5*
*Ellsworth	* 15450	* .3*	.5*
*Ellsworth	* 15350	*Culvert *	*
*Ellsworth	* 15192	* .3*	.5*
*Ellsworth	* 15100	* .1*	.3*
*Ellsworth	* 15000	* .1*	.3*
*Ellsworth	* 14900	* .1*	.3*
*Ellsworth	* 14800	* .1*	.3*
*Ellsworth	* 14700	* .1*	.3*
*Ellsworth	* 14600	* .1*	.3*
*Ellsworth	* 14579	* .3*	.5*
*Ellsworth	* 14569	* .3*	.5*
*Ellsworth	* 14501	* .3*	.5*
*Ellsworth	* 14491	* .1*	.3*
*Ellsworth	* 14451	* .1*	.3*
*Ellsworth	* 14400	* .1*	.3*
*Ellsworth	* 14300	* .1*	.3*
*Ellsworth	* 14200	* .1*	.3*
*Ellsworth	* 14100	* .1*	.3*
*Ellsworth	* 14000	* .1*	.3*
*Ellsworth	* 13900	* .1*	.3*
*Ellsworth	* 13800	* .1*	.3*
*Ellsworth	* 13700	* .1*	.3*
*Ellsworth	* 13600	* .1*	.3*
*Ellsworth	* 13500	* .1*	.3*
*Ellsworth	* 13400	* .1*	.3*
*Ellsworth	* 13300	* .1*	.3*
*Ellsworth	* 13200	* .1*	.3*
*Ellsworth	* 13100	* .1*	.3*
*Ellsworth	* 13000	* .1*	.3*

*Ellsworth	*	12900	*	.1*	.3*
*Ellsworth	*	12800	*	.1*	.3*
*Ellsworth	*	12700	*	.1*	.3*
*Ellsworth	*	12600	*	.1*	.3*
*Ellsworth	*	12500	*	.1*	.3*
*Ellsworth	*	12400	*	.1*	.3*
*Ellsworth	*	12300	*	.1*	.3*
*Ellsworth	*	12200	*	.1*	.3*
*Ellsworth	*	12100	*	.1*	.3*
*Ellsworth	*	12000	*	.1*	.3*
*Ellsworth	*	11900	*	.1*	.3*
*Ellsworth	*	11800	*	.1*	.3*
*Ellsworth	*	11700	*	.1*	.3*
*Ellsworth	*	11600	*	.1*	.3*
*Ellsworth	*	11500	*	.1*	.3*
*Ellsworth	*	11400	*	.1*	.3*
*Ellsworth	*	11300	*	.1*	.3*
*Ellsworth	*	11200	*	.1*	.3*
*Ellsworth	*	11100	*	.1*	.3*
*Ellsworth	*	11000	*	.1*	.3*
*Ellsworth	*	10900	*	.1*	.3*
*Ellsworth	*	10800	*	.3*	.5*
*Ellsworth	*	10700	*	.3*	.5*
*Ellsworth	*	10650.9	*	.3*	.5*
*Ellsworth	*	10623.7	*	.1*	.3*
*Ellsworth	*	10613.7	*	.1*	.3*
*Ellsworth	*	10600.87	*	.1*	.3*
*Ellsworth	*	10570	*Culvert	*	*
*Ellsworth	*	10539.74	*	.1*	.3*
*Ellsworth	*	10528.5	*	.1*	.3*
*Ellsworth	*	10518.5	*	.1*	.3*
*Ellsworth	*	10490.7	*	.1*	.3*
*Ellsworth	*	10400	*	.1*	.3*
*Ellsworth	*	10300	*	.1*	.3*
*Ellsworth	*	10200	*	.1*	.3*
*Ellsworth	*	10100	*	.1*	.3*
*Ellsworth	*	10000	*	.1*	.3*
*Ellsworth	*	9900	*	.1*	.3*
*Ellsworth	*	9800	*	.1*	.3*
*Ellsworth	*	9700	*	.1*	.3*
*Ellsworth	*	9600	*	.3*	.5*
*Ellsworth	*	9500	*	.3*	.5*
*Ellsworth	*	9400	*	.3*	.5*
*Ellsworth	*	9340.54	*	.3*	.5*
*Ellsworth	*	9314.67	*	.3*	.5*
*Ellsworth	*	9304.67	*	.3*	.5*
*Ellsworth	*	9288.82	*	.3*	.5*
*Ellsworth	*	9248	*Culvert	*	*
*Ellsworth	*	9207.65	*	.3*	.5*
*Ellsworth	*	9193.48	*	.3*	.5*
*Ellsworth	*	9183.48	*	.3*	.5*
*Ellsworth	*	9154.01	*	.1*	.3*
*Ellsworth	*	9143	*	.1*	.3*
*Ellsworth	*	9100	*	.1*	.3*
*Ellsworth	*	9000	*	.1*	.3*
*Ellsworth	*	8900	*	.1*	.3*
*Ellsworth	*	8800	*	.1*	.3*
*Ellsworth	*	8700	*	.1*	.3*
*Ellsworth	*	8600	*	.1*	.3*
*Ellsworth	*	8500	*	.1*	.3*
*Ellsworth	*	8400	*	.1*	.3*
*Ellsworth	*	8300	*	.1*	.3*
*Ellsworth	*	8200	*	.1*	.3*
*Ellsworth	*	8100	*	.1*	.3*
*Ellsworth	*	8000	*	.1*	.3*
*Ellsworth	*	7900	*	.1*	.3*
*Ellsworth	*	7800	*	.1*	.3*
*Ellsworth	*	7700	*	.1*	.3*
*Ellsworth	*	7600	*	.1*	.3*
*Ellsworth	*	7500	*	.1*	.3*
*Ellsworth	*	7400	*	.1*	.3*
*Ellsworth	*	7300	*	.1*	.3*
*Ellsworth	*	7200	*	.1*	.3*
*Ellsworth	*	7100	*	.1*	.3*
*Ellsworth	*	7000	*	.1*	.3*
*Ellsworth	*	6900	*	.3*	.5*
*Ellsworth	*	6800	*	.3*	.5*
*Ellsworth	*	6700	*	.1*	.3*
*Ellsworth	*	6687.62	*	.3*	.5*
*Ellsworth	*	6675.17	**	.1*	.3*
*Ellsworth	*	6662.73	*	.1*	.3*
*Ellsworth	*	6646.88	*	.3*	.5*
*Ellsworth	*	6615	*Culvert	*	*
*Ellsworth	*	6585.95	*	.3*	.5*
*Ellsworth	*	6571.49	*	.3*	.5*
*Ellsworth	*	6559.04	**	.3*	.5*
*Ellsworth	*	6546.60	*	.1*	.3*
*Ellsworth	*	6527	*	.1*	.3*
*Ellsworth	*	6500	*	.1*	.3*
*Ellsworth	*	6400	*	.1*	.3*
*Ellsworth	*	6300	*	.1*	.3*
*Ellsworth	*	6200	*	.1*	.3*
*Ellsworth	*	6100	*	.1*	.3*
*Ellsworth	*	6000	*	.1*	.3*
*Ellsworth	*	5900	*	.1*	.3*

*Ellsworth	*	5800	*	.1*	.3*
*Ellsworth	*	5700	*	.1*	.3*
*Ellsworth	*	5600	*	.1*	.3*
*Ellsworth	*	5500	*	.1*	.3*
*Ellsworth	*	5400	*	.1*	.3*
*Ellsworth	*	5300	*	.1*	.3*
*Ellsworth	*	5200	*	.1*	.3*
*Ellsworth	*	5100	*	.1*	.3*
*Ellsworth	*	5000	*	.1*	.3*
*Ellsworth	*	4900	*	.1*	.3*
*Ellsworth	*	4800	*	.1*	.3*
*Ellsworth	*	4700	*	.1*	.3*
*Ellsworth	*	4674	*	.1*	.3*
*Ellsworth	*	4664	*	.1*	.3*
*Ellsworth	*	4600	*	.1*	.3*
*Ellsworth	*	4500	*	.1*	.3*
*Ellsworth	*	4400	*	.1*	.3*
*Ellsworth	*	4300	*	.1*	.3*
*Ellsworth	*	4200	*	.1*	.3*
*Ellsworth	*	4100	*	.1*	.3*
*Ellsworth	*	4000	*	.1*	.3*
*Ellsworth	*	3900	*	.1*	.3*
*Ellsworth	*	3800	*	.1*	.3*
*Ellsworth	*	3700	*	.1*	.3*
*Ellsworth	*	3600	*	.1*	.3*
*Ellsworth	*	3505.64	*	.3*	.5*
*Ellsworth	*	3473.65	*	.3*	.5*
*Ellsworth	*	3473.64	*	.3*	.5*
*Ellsworth	*	3461.64	*	.3*	.5*
*Ellsworth	*	3461.63	*	.3*	.5*
*Ellsworth	*	3460.63	*	.3*	.5*
*Ellsworth	*	3444.63	*	.1*	.3*
*Ellsworth	*	3444.62	*	.1*	.3*
*Ellsworth	*	3432.91	*	.1*	.3*
*Ellsworth	*	3425.08	*	.1*	.3*
*Ellsworth	*	3400	*	.1*	.3*
*Ellsworth	*	3300	*	.1*	.3*
*Ellsworth	*	3200	*	.1*	.3*
*Ellsworth	*	3100	*	.1*	.3*
*Ellsworth	*	3000	*	.1*	.3*
*Ellsworth	*	2900	*	.1*	.3*
*Ellsworth	*	2800	*	.3*	.5*
*Ellsworth	*	2700	*	.1*	.3*
*Ellsworth	*	2654.00	**	.3*	.5*
*Ellsworth	*	2608.01	*	.3*	.5*
*Ellsworth	*	2598.02	*	.3*	.5*
*Ellsworth	*	2581.04	*	.3*	.5*
*Ellsworth	*	2569	*Culvert	*	*
*Ellsworth	*	2557.04	*	.3*	.5*
*Ellsworth	*	2554.53	**	.3*	.5*
*Ellsworth	*	2552.03	**	.3*	.5*
*Ellsworth	*	2549.52	**	.3*	.5*
*Ellsworth	*	2547.02	**	.3*	.5*
*Ellsworth	*	2544.51	**	.3*	.5*
*Ellsworth	*	2542.01	*	.3*	.5*
*Ellsworth	*	2532.01	*	.3*	.5*
*Ellsworth	*	2513.15	**	.1*	.3*
*Ellsworth	*	2400	*	.1*	.3*
*Ellsworth	*	2300	*	.1*	.3*
*Ellsworth	*	2200	*	.1*	.3*
*Ellsworth	*	2100	*	.1*	.3*
*Ellsworth	*	2000	*	.1*	.3*
*Ellsworth	*	1900	*	.1*	.3*
*Ellsworth	*	1800	*	.1*	.3*
*Ellsworth	*	1700	*	.1*	.3*
*Ellsworth	*	1600	*	.1*	.3*
*Ellsworth	*	1500	*	.1*	.3*
*Ellsworth	*	1400	*	.1*	.3*
*Ellsworth	*	1300	*	.1*	.3*
*Ellsworth	*	1200	*	.1*	.3*
*Ellsworth	*	1100	*	.1*	.3*
*Ellsworth	*	1000	*	.1*	.3*
*Ellsworth	*	900	*	.1*	.3*
*Ellsworth	*	800	*	.1*	.3*
*Ellsworth	*	700	*	.1*	.3*
*Ellsworth	*	600	*	.1*	.3*
*Ellsworth	*	500	*	.1*	.3*
*Ellsworth	*	400	*	.1*	.3*
*Ellsworth	*	300	*	.1*	.3*
*Ellsworth	*	244	*	.1*	.3*
*Ellsworth	*	243	*	.1*	.3*
*Ellsworth	*	204	*	.1*	.3*
*Ellsworth	*	203.9	*	.1*	.3*
*Ellsworth	*	183.9	*	.1*	.3*
*Ellsworth	*	163.9	*	.1*	.3*
*Ellsworth	*	100	*	.1*	.3*
*Ellsworth	*	0	*	.1*	.3*

****

Profile Output Table - Standard Table 1

Reach	River Sta	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
Ellsworth	17100	600.00	1384.17	1390.46	1387.48	1390.58	0.000638	2.78	216.11	61.90	0.26
Ellsworth	17000	600.00	1384.11	1390.39	1387.42	1390.51	0.000639	2.78	215.96	72.75	0.26
Ellsworth	16900	600.00	1384.05	1390.33	1387.36	1390.45	0.000641	2.78	215.70	84.57	0.26
Ellsworth	16800	600.00	1383.99	1390.27	1387.29	1390.39	0.000644	2.79	215.41	98.77	0.26
Ellsworth	16700	600.00	1383.93	1390.20	1387.24	1390.32	0.000646	2.79	215.12	112.09	0.26
Ellsworth	16600	600.00	1383.87	1390.14	1387.17	1390.26	0.000649	2.79	214.79	123.09	0.26
Ellsworth	16500	600.00	1383.81	1390.07	1387.12	1390.19	0.000651	2.80	214.52	185.39	0.26
Ellsworth	16400	600.00	1383.75	1390.01	1387.03	1390.13	0.000653	2.80	214.22	166.40	0.26
Ellsworth	16300	600.00	1383.69	1389.94	1387.00	1390.06	0.000656	2.81	213.84	157.77	0.26
Ellsworth	16200	600.00	1383.63	1389.87	1386.93	1390.00	0.000659	2.81	213.50	150.45	0.26
Ellsworth	16100	600.00	1383.57	1389.81	1386.87	1389.93	0.000663	2.82	213.11	148.89	0.26
Ellsworth	16000	600.00	1383.51	1389.74	1386.82	1389.86	0.000667	2.82	212.60	148.70	0.26
Ellsworth	15966.5	600.00	1383.49	1389.71		1389.84	0.000990	2.83	212.27	59.17	0.26
Ellsworth	15947.5	600.00	1383.48	1389.72	1386.03	1389.81	0.000497	2.44	246.18	64.09	0.19
Ellsworth	15937.5	600.00	1383.47	1389.70	1385.74	1389.81	0.000068	2.66	225.23	65.44	0.19
Ellsworth	15920.67	600.00	1383.46	1389.46	1386.31	1389.79	0.000352	4.58	130.97	21.83	0.33
Ellsworth	15895	Culvert									
Ellsworth	15870.67	600.00	1383.42	1388.57		1389.01	0.000546	5.34	112.46	21.83	0.41
Ellsworth	15855.5	600.00	1383.42	1388.76	1385.70	1388.92	0.000854	3.19	188.06	61.04	0.25
Ellsworth	15845.5	600.00	1383.41	1388.77	1385.98	1388.91	0.000536	2.96	202.72	59.18	0.25
Ellsworth	15826.6	600.00	1383.40	1388.66		1388.88	0.001445	3.77	158.99	51.45	0.38
Ellsworth	15809	600.00	1383.43	1388.63		1388.85	0.001508	3.83	156.47	51.05	0.39
Ellsworth	15800	600.00	1383.39	1388.61		1388.84	0.001491	3.82	157.15	51.16	0.38
Ellsworth	15700	600.00	1383.33	1388.44		1388.68	0.001652	3.97	151.24	50.23	0.40
Ellsworth	15600	600.00	1383.27	1388.23		1388.50	0.001878	4.16	144.13	49.08	0.43
Ellsworth	15550	600.00	1383.24	1388.08		1388.38	0.003446	4.34	138.31	48.13	0.45
Ellsworth	15460	600.00	1383.18	1387.66		1388.18	0.000744	5.77	103.93	27.68	0.53
Ellsworth	15450	600.00	1381.86	1387.71	1384.91	1388.12	0.000376	5.16	116.32	109.54	0.39
Ellsworth	15350	Culvert									
Ellsworth	15192	600.00	1380.41	1386.03	1383.69	1386.26	0.001558	3.89	154.36	54.31	0.33
Ellsworth	15100	600.00	1380.33	1385.90	1383.64	1386.08	0.001826	3.43	175.17	53.91	0.33
Ellsworth	15000	600.00	1380.25	1385.74	1383.55	1385.93	0.001188	3.51	171.12	53.30	0.34
Ellsworth	14900	600.00	1380.17	1385.61	1383.48	1385.81	0.001236	3.56	168.61	52.93	0.35
Ellsworth	14800	600.00	1380.09	1385.48	1383.40	1385.68	0.001293	3.62	165.80	52.51	0.36
Ellsworth	14700	600.00	1380.01	1385.34	1383.32	1385.55	0.001362	3.69	162.58	52.01	0.37
Ellsworth	14600	600.00	1379.93	1385.19	1383.23	1385.41	0.001448	3.78	158.88	51.43	0.38
Ellsworth	14579	600.00	1379.90	1385.16	1383.21	1385.38	0.001450	3.78	158.80	51.41	0.38
Ellsworth	14569	600.00	1379.90	1385.14		1385.36	0.001472	3.80	157.90	51.27	0.38
Ellsworth	14501	600.00	1379.85	1385.03		1385.26	0.001557	3.88	154.62	50.75	0.39
Ellsworth	14491	600.00	1379.84	1385.01	1383.15	1385.24	0.001566	3.89	154.28	50.70	0.39
Ellsworth	14451	600.00	1379.81	1384.94	1383.12	1385.18	0.001622	3.94	152.24	50.38	0.40
Ellsworth	14400	600.00	1379.77	1384.84	1383.06	1385.09	0.001700	4.01	149.61	49.97	0.41
Ellsworth	14300	600.00	1379.69	1384.64	1382.99	1384.91	0.001900	4.18	143.50	48.99	0.43
Ellsworth	14200	600.00	1379.61	1384.40	1382.91	1384.70	0.002202	4.42	135.79	47.71	0.46
Ellsworth	14100	600.00	1379.53	1384.10	1382.85	1384.45	0.002722	4.78	125.40	45.93	0.51
Ellsworth	14000	600.00	1379.45	1384.09	1381.74	1384.22	0.001116	2.84	211.13	64.94	0.28
Ellsworth	13900	600.00	1379.37	1384.01	1381.66	1384.13	0.000713	2.85	210.60	64.88	0.28
Ellsworth	13800	600.00	1379.29	1383.94	1381.57	1384.06	0.000708	2.84	211.18	64.95	0.28
Ellsworth	13700	600.00	1379.21	1383.87	1381.49	1383.99	0.000702	2.83	211.80	78.22	0.28
Ellsworth	13600	600.00	1379.13	1383.80	1381.41	1383.92	0.000695	2.82	212.54	78.27	0.28
Ellsworth	13500	600.00	1379.05	1383.73	1381.34	1383.85	0.000689	2.81	213.25	80.69	0.27
Ellsworth	13400	600.00	1378.97	1383.66	1381.26	1383.78	0.000682	2.80	214.01	80.92	0.27
Ellsworth	13300	600.00	1378.89	1383.59	1381.17	1383.71	0.000675	2.79	214.89	74.28	0.27
Ellsworth	13200	600.00	1378.81	1383.53	1381.08	1383.65	0.000667	2.78	215.73	65.50	0.27
Ellsworth	13100	600.00	1378.73	1383.46	1381.02	1383.58	0.000660	2.77	216.67	65.61	0.27
Ellsworth	13000	600.00	1378.65	1383.39	1380.94	1383.51	0.000651	2.76	217.66	65.73	0.27
Ellsworth	12900	600.00	1378.57	1383.33	1380.86	1383.45	0.000643	2.74	218.71	65.86	0.27
Ellsworth	12800	600.00	1378.49	1383.27	1380.78	1383.38	0.000634	2.73	219.82	66.00	0.26
Ellsworth	12700	600.00	1378.41	1383.21	1380.69	1383.32	0.000625	2.71	221.00	66.14	0.26

Ellsworth	12600	600.00	1378.33	1383.14	1380.61	1383.26	0.000615	2.70	222.24	66.29	0.26
Ellsworth	12500	600.00	1378.25	1383.08	1380.54	1383.20	0.000605	2.68	223.54	66.45	0.26
Ellsworth	12400	600.00	1378.17	1383.02	1380.45	1383.14	0.000595	2.67	224.93	66.61	0.26
Ellsworth	12300	600.00	1378.09	1382.97	1380.38	1383.08	0.000585	2.65	226.38	66.79	0.25
Ellsworth	12200	600.00	1378.01	1382.91	1380.30	1383.02	0.000574	2.63	227.90	66.97	0.25
Ellsworth	12100	600.00	1377.93	1382.85	1380.21	1382.96	0.000563	2.61	229.52	67.16	0.25
Ellsworth	12000	600.00	1377.85	1382.80	1380.13	1382.90	0.000552	2.60	231.21	67.36	0.25
Ellsworth	11900	600.00	1377.77	1382.74	1380.06	1382.85	0.000541	2.58	232.98	67.57	0.24
Ellsworth	11800	600.00	1377.69	1382.69	1379.98	1382.79	0.000529	2.55	234.85	67.79	0.24
Ellsworth	11700	600.00	1377.61	1382.64	1379.89	1382.74	0.000517	2.53	236.79	68.02	0.24
Ellsworth	11600	600.00	1377.53	1382.59	1379.82	1382.69	0.000505	2.51	238.86	68.28	0.24
Ellsworth	11500	600.00	1377.45	1382.54	1379.73	1382.64	0.000493	2.49	240.95	68.51	0.23
Ellsworth	11400	600.00	1377.37	1382.51	1379.69	1382.59	0.000401	2.21	271.95	78.84	0.21
Ellsworth	11300	600.00	1377.29	1382.45	1379.57	1382.54	0.000468	2.44	245.65	69.07	0.23
Ellsworth	11200	600.00	1377.21	1382.40	1379.49	1382.50	0.000456	2.42	248.03	69.33	0.23
Ellsworth	11100	600.00	1377.13	1382.36	1379.41	1382.45	0.000443	2.39	250.55	69.62	0.22
Ellsworth	11000	600.00	1377.05	1382.32	1379.34	1382.41	0.000431	2.37	253.21	69.93	0.22
Ellsworth	10900	600.00	1376.97	1382.28	1379.25	1382.36	0.000418	2.34	255.93	70.24	0.22
Ellsworth	10800	600.00	1376.89	1382.24	1379.17	1382.32	0.000406	2.32	258.79	70.57	0.21
Ellsworth	10700	600.00	1376.81	1382.20	1379.10	1382.28	0.000394	2.29	261.63	70.88	0.21
Ellsworth	10650.9	600.00	1376.77	1382.18		1382.26	0.000524	2.28	262.90	71.02	0.21
Ellsworth	10623.7	600.00	1376.75	1382.18	1378.74	1382.23	0.000311	1.74	345.47	79.35	0.15
Ellsworth	10613.7	600.00	1376.74	1382.18	1378.44	1382.23	0.000035	1.73	346.65	80.22	0.14
Ellsworth	10600.87	600.00	1376.73	1382.16	1378.26	1382.23	0.000054	1.99	301.61	55.50	0.15
Ellsworth	10570	Culvert									
Ellsworth	10539.74	600.00	1376.68	1382.05		1382.11	0.000056	2.01	297.79	55.50	0.15
Ellsworth	10528.5	600.00	1376.67	1382.05	1378.37	1382.10	0.000271	1.80	333.56	81.18	0.14
Ellsworth	10518.5	600.00	1376.66	1382.05	1378.64	1382.10	0.000169	1.75	341.90	80.11	0.15
Ellsworth	10490.7	600.00	1376.64	1382.01		1382.09	0.000400	2.31	260.21	70.72	0.21
Ellsworth	10400	600.00	1376.57	1381.97	1378.85	1382.05	0.000390	2.28	262.72	71.01	0.21
Ellsworth	10300	600.00	1376.49	1381.94	1378.77	1382.02	0.000378	2.26	265.77	71.35	0.21
Ellsworth	10200	600.00	1376.41	1381.90	1378.69	1381.98	0.000366	2.23	268.93	71.70	0.20
Ellsworth	10100	600.00	1376.33	1381.87	1378.62	1381.94	0.000354	2.20	272.18	72.06	0.20
Ellsworth	10000	600.00	1376.25	1381.83	1378.53	1381.91	0.000342	2.18	275.54	72.44	0.20
Ellsworth	9900	600.00	1376.17	1381.80	1378.46	1381.87	0.000331	2.15	279.03	72.83	0.19
Ellsworth	9800	600.00	1376.09	1381.77	1378.38	1381.84	0.000320	2.12	282.56	73.21	0.19
Ellsworth	9700	600.00	1376.01	1381.73	1378.29	1381.80	0.000537	2.10	285.51	73.53	0.19
Ellsworth	9600	1172.00	1375.93	1381.55	1378.65	1381.70	0.001119	3.15	371.49	90.57	0.27
Ellsworth	9500	1172.00	1375.85	1381.52	1378.22	1381.62	0.000353	2.48	472.49	109.99	0.21
Ellsworth	9400	1172.00	1375.77	1381.49	1378.14	1381.58	0.000342	2.45	477.56	110.35	0.21
Ellsworth	9340.54	1172.00	1375.72	1381.47		1381.56	0.000413	2.44	480.64	110.58	0.21
Ellsworth	9314.67	1172.00	1375.70	1381.46	1378.00	1381.54	0.000414	2.22	528.37	122.44	0.17
Ellsworth	9304.67	1172.00	1375.69	1381.45	1377.85	1381.54	0.000061	2.36	497.14	125.72	0.18
Ellsworth	9288.82	1172.00	1375.68	1381.43	1377.57	1381.53	0.000079	2.58	453.89	79.00	0.19
Ellsworth	9248	Culvert									
Ellsworth	9207.65	1172.00	1375.61	1381.23		1381.34	0.000085	2.64	443.94	79.00	0.20
Ellsworth	9193.48	1172.00	1375.60	1381.24	1377.77	1381.33	0.000473	2.41	485.58	126.01	0.19
Ellsworth	9183.48	1172.00	1375.59	1381.24	1377.84	1381.32	0.000214	2.26	517.75	123.46	0.18
Ellsworth	9154.01	1172.00	1375.57	1381.21		1381.31	0.000361	2.50	468.77	109.72	0.21
Ellsworth	9143	1172.00	1375.56	1381.20	1377.93	1381.30	0.000359	2.50	469.46	109.77	0.21
Ellsworth	9100	1172.00	1375.53	1381.19	1377.91	1381.29	0.000356	2.49	471.11	109.89	0.21
Ellsworth	9000	1172.00	1375.45	1381.16	1377.81	1381.25	0.000345	2.46	476.22	110.26	0.21
Ellsworth	8900	1172.00	1375.37	1381.12	1377.74	1381.22	0.000334	2.43	481.46	110.64	0.21
Ellsworth	8800	1172.00	1375.29	1381.11	1377.35	1381.17	0.000360	1.97	594.34	121.58	0.16
Ellsworth	8700	1172.00	1375.21	1381.05	1377.59	1381.13	0.000317	2.39	490.62	111.30	0.20
Ellsworth	8600	1744.00	1375.13	1380.87	1378.09	1381.07	0.000748	3.64	479.62	110.50	0.31
Ellsworth	8500	1744.00	1375.05	1380.79	1377.99	1381.00	0.000745	3.63	480.27	110.56	0.31
Ellsworth	8400	1744.00	1374.97	1380.72	1377.93	1380.92	0.000742	3.63	480.91	110.60	0.31
Ellsworth	8300	1744.00	1374.89	1380.64		1380.85	0.000740	3.62	481.54	110.63	0.31
Ellsworth	8200	1744.00	1374.81	1380.57		1380.77	0.000737	3.62	482.27	110.70	0.31
Ellsworth	8100	1744.00	1374.73	1380.50		1380.70	0.000733	3.61	483.00	110.75	0.30
Ellsworth	8000	1744.00	1374.65	1380.42		1380.63	0.000730	3.61	483.75	110.79	0.30
Ellsworth	7900	1744.00	1374.57	1380.35	1377.53	1380.55	0.000726	3.60	484.61	172.62	0.30
Ellsworth	7800	1744.00	1374.49	1380.28	1377.45	1380.48	0.000723	3.59	485.51	269.51	0.30
Ellsworth	7700	1744.00	1374.41	1380.21	1377.36	1380.41	0.000719	3.58	486.48	199.56	0.30
Ellsworth	7600	1744.00	1374.33	1380.14	1377.28	1380.34	0.000714	3.58	487.53	118.66	0.30
Ellsworth	7500	1744.00	1374.25	1380.07	1377.21	1380.26	0.000710	3.57	488.49	111.36	0.30
Ellsworth	7400	1744.00	1374.17	1380.00		1380.19	0.000706	3.56	489.47	111.21	0.30

Ellsworth	7300	1744.00	1374.09	1379.93		1380.12	0.000702	3.56	490.55	111.28	0.30
Ellsworth	7200	1744.00	1374.01	1379.86		1380.05	0.000697	3.55	491.79	111.39	0.30
Ellsworth	7100	1744.00	1373.93	1379.79		1379.98	0.000692	3.54	492.99	111.46	0.30
Ellsworth	7000	1744.00	1373.85	1379.72		1379.91	0.000687	3.53	494.33	111.57	0.30
Ellsworth	6900	1744.00	1373.77	1379.65		1379.84	0.000681	3.52	495.70	111.67	0.29
Ellsworth	6800	1744.00	1373.69	1379.58		1379.77	0.000676	3.51	497.10	111.77	0.29
Ellsworth	6700	1744.00	1373.61	1379.52		1379.71	0.000670	3.50	498.58	111.87	0.29
Ellsworth	6687.62	1744.00	1373.60	1379.51		1379.70	0.000826	3.50	498.63	111.87	0.29
Ellsworth	6675.17*	1744.00	1373.59	1379.49	1376.42	1379.68	0.000979	3.52	496.04	117.18	0.27
Ellsworth	6662.73	1744.00	1373.58	1379.43	1376.39	1379.68	0.000166	3.95	441.41	121.17	0.30
Ellsworth	6646.88	1744.00	1373.56	1379.34	1376.34	1379.66	0.000255	4.57	381.43	66.00	0.34
Ellsworth	6615	Culvert									
Ellsworth	6585.95	1744.00	1373.47	1378.32		1378.78	0.000443	5.45	320.06	66.00	0.44
Ellsworth	6571.49	1744.00	1373.45	1378.36	1376.30	1378.72	0.002229	4.78	364.71	117.05	0.40
Ellsworth	6559.04*	1744.00	1373.44	1378.37	1376.26	1378.67	0.001183	4.37	398.73	111.67	0.37
Ellsworth	6546.60	1744.00	1373.42	1378.34		1378.65	0.001330	4.44	392.40	103.99	0.40
Ellsworth	6527	1744.00	1373.39	1378.32		1378.62	0.001326	4.44	392.88	104.04	0.40
Ellsworth	6500	1744.00	1373.35	1378.28		1378.59	0.001322	4.43	393.27	104.05	0.40
Ellsworth	6400	1744.00	1373.21	1378.15		1378.45	0.001312	4.42	394.23	104.13	0.40
Ellsworth	6300	1744.00	1373.07	1378.02		1378.32	0.001303	4.41	395.17	104.19	0.40
Ellsworth	6200	1744.00	1372.93	1377.89		1378.19	0.001292	4.40	396.37	104.29	0.40
Ellsworth	6100	1744.00	1372.79	1377.76		1378.06	0.001280	4.39	397.67	104.40	0.40
Ellsworth	6000	1744.00	1372.65	1377.64		1377.93	0.001266	4.37	399.12	104.49	0.39
Ellsworth	5900	1744.00	1372.51	1377.51		1377.81	0.001251	4.35	400.79	104.63	0.39
Ellsworth	5800	1744.00	1372.37	1377.39		1377.68	0.001235	4.33	402.61	104.77	0.39
Ellsworth	5700	1744.00	1372.23	1377.27		1377.56	0.001218	4.31	404.53	104.92	0.39
Ellsworth	5600	1744.00	1372.09	1377.15		1377.44	0.001199	4.29	406.73	105.08	0.38
Ellsworth	5500	1744.00	1371.95	1377.03		1377.32	0.001179	4.26	409.16	105.27	0.38
Ellsworth	5400	1744.00	1371.81	1376.92		1377.20	0.001157	4.24	411.78	105.45	0.38
Ellsworth	5300	1744.00	1371.67	1376.81		1377.08	0.001134	4.21	414.71	105.67	0.37
Ellsworth	5200	1744.00	1371.53	1376.70		1376.97	0.001110	4.17	417.90	105.93	0.37
Ellsworth	5100	1744.00	1371.39	1376.59		1376.86	0.001083	4.14	421.41	106.17	0.37
Ellsworth	5000	1744.00	1371.25	1376.49		1376.75	0.001054	4.10	425.39	106.48	0.36
Ellsworth	4900	1744.00	1371.11	1376.39		1376.64	0.001025	4.06	429.63	106.80	0.36
Ellsworth	4800	1744.00	1370.97	1376.29		1376.54	0.000995	4.02	434.14	107.15	0.35
Ellsworth	4700	1744.00	1370.83	1376.20		1376.44	0.000962	3.97	439.14	107.52	0.35
Ellsworth	4674	1744.00	1370.82	1376.17		1376.42	0.000974	3.99	437.34	107.40	0.35
Ellsworth	4664	1744.00	1370.80	1376.16		1376.40	0.000972	3.99	437.62	107.40	0.35
Ellsworth	4600	1744.00	1370.69	1376.10		1376.34	0.000932	3.93	444.14	107.90	0.34
Ellsworth	4500	1744.00	1370.55	1376.01		1376.25	0.000899	3.88	449.80	108.32	0.34
Ellsworth	4400	1744.00	1370.41	1375.93		1376.16	0.000864	3.82	455.95	108.77	0.33
Ellsworth	4300	1744.00	1370.27	1375.85		1376.07	0.000830	3.77	462.47	109.25	0.32
Ellsworth	4200	1744.00	1370.13	1375.77		1375.99	0.000796	3.72	469.35	109.75	0.32
Ellsworth	4100	1744.00	1369.99	1375.70		1375.91	0.000761	3.66	476.75	110.30	0.31
Ellsworth	4000	1744.00	1369.85	1375.63		1375.83	0.000727	3.60	484.50	110.85	0.30
Ellsworth	3900	1744.00	1369.71	1375.56		1375.76	0.000693	3.54	492.70	111.44	0.30
Ellsworth	3800	1744.00	1369.57	1375.50		1375.69	0.000660	3.48	501.31	112.06	0.29
Ellsworth	3700	1744.00	1369.43	1375.44		1375.62	0.000627	3.42	510.35	112.71	0.28
Ellsworth	3600	1744.00	1369.29	1375.39		1375.56	0.000595	3.36	519.79	113.38	0.28
Ellsworth	3505.64	1744.00	1369.17	1375.35		1375.52	0.000298	3.30	528.69	113.98	0.27
Ellsworth	3473.65	1744.00	1369.13	1375.34		1375.51	0.000293	3.28	532.27	114.23	0.27
Ellsworth	3473.64	1744.00	1369.13	1375.22		1375.48	0.000143	4.09	426.31	70.00	0.29
Ellsworth	3461.64	1744.00	1369.13	1375.22		1375.48	0.000143	4.09	426.18	70.00	0.29
Ellsworth	3461.63	1744.00	1370.13	1375.04		1375.44	0.000282	5.08	343.39	70.00	0.40
Ellsworth	3460.63	1744.00	1371.13	1373.80	1373.80	1375.15	0.001983	9.33	186.95	70.00	1.01
Ellsworth	3444.63	1744.00	1363.13	1369.21	1365.80	1369.47	0.000144	4.10	425.26	70.00	0.29
Ellsworth	3444.62	1744.00	1363.13	1369.21		1369.47	0.001361	4.10	425.26	70.00	0.29
Ellsworth	3432.91	1744.00	1363.13	1369.19		1369.45	0.001373	4.11	424.05	70.00	0.29
Ellsworth	3425.08	1744.00	1363.13	1369.26		1369.41	0.000830	3.07	568.03	115.30	0.24
Ellsworth	3400	1744.00	1363.02	1369.22		1369.39	0.000624	3.28	531.79	114.22	0.27
Ellsworth	3300	1744.00	1362.78	1369.17		1369.33	0.000560	3.15	552.85	115.68	0.25
Ellsworth	3200	1744.00	1362.55	1369.13	1365.50	1369.27	0.000502	3.03	575.10	260.10	0.24
Ellsworth	3100	1744.00	1362.32	1369.07	1365.27	1369.21	0.000733	2.93	595.99	140.20	0.23
Ellsworth	3000	1744.00	1362.06	1369.03		1369.15	0.000358	2.80	622.11	120.38	0.22
Ellsworth	2900	1744.00	1361.83	1369.00	1364.79	1369.12	0.000321	2.70	646.56	121.98	0.21
Ellsworth	2800	1744.00	1361.60	1368.98		1369.08	0.000289	2.60	671.85	123.64	0.20
Ellsworth	2700	1744.00	1361.37	1368.97		1369.05	0.000214	2.28	765.27	135.68	0.17
Ellsworth	2654.00*	1744.00	1361.27	1368.95		1369.04	0.000225	2.34	743.72	131.23	0.17

Ellsworth	2608.01	1744.00	1361.16	1368.82	1364.16	1368.99	0.000558	3.32	525.73	125.90	0.22
Ellsworth	2598.02	1744.00	1361.14	1368.74	1364.36	1368.97	0.000107	3.86	452.10	125.53	0.25
Ellsworth	2581.04	1744.00	1361.10	1368.47	1364.71	1368.91	0.000292	5.30	328.83	44.60	0.34
Ellsworth	2569	Culvert									
Ellsworth	2557.04	1744.00	1361.08	1365.19		1366.60	0.001756	9.51	183.29	44.60	0.83
Ellsworth	2554.53*	1744.00	1361.07	1365.23		1366.54	0.006185	9.20	189.57	48.41	0.82
Ellsworth	2552.03*	1744.00	1361.06	1365.27		1366.47	0.006562	8.82	197.76	53.57	0.81
Ellsworth	2549.52*	1744.00	1361.06	1365.33		1366.38	0.006724	8.24	211.53	61.35	0.78
Ellsworth	2547.02*	1744.00	1361.05	1365.43		1366.24	0.006118	7.25	240.51	74.11	0.71
Ellsworth	2544.51*	1744.00	1361.04	1365.54		1366.10	0.004490	6.00	290.89	87.83	0.58
Ellsworth	2542.01	1744.00	1361.03	1364.96	1364.31	1365.96	0.008294	8.00	218.09	96.07	0.74
Ellsworth	2532.01	1744.00	1361.01	1365.06	1364.04	1365.77	0.002816	6.74	258.93	96.96	0.62
Ellsworth	2513.15*	1744.00	1360.96	1365.12		1365.60	0.002565	5.56	313.45	97.85	0.55
Ellsworth	2400	1744.00	1360.68	1364.84		1365.32	0.002525	5.54	314.64	97.82	0.54
Ellsworth	2300	1744.00	1360.43	1364.59		1365.06	0.002514	5.53	315.11	97.85	0.54
Ellsworth	2200	1744.00	1360.18	1364.34		1364.81	0.002520	5.54	314.88	97.84	0.54
Ellsworth	2100	1744.00	1359.93	1364.08		1364.56	0.002527	5.54	314.56	97.82	0.54
Ellsworth	2000	1744.00	1359.67	1363.83		1364.31	0.002528	5.55	314.49	97.79	0.54
Ellsworth	1900	1744.00	1359.42	1363.58		1364.05	0.002516	5.54	315.06	97.87	0.54
Ellsworth	1800	1744.00	1359.17	1363.32		1363.80	0.002523	5.54	314.73	97.83	0.54
Ellsworth	1700	1744.00	1358.92	1363.07	1361.87	1363.55	0.002531	5.55	314.43	97.82	0.55
Ellsworth	1600	1744.00	1358.66	1362.82	1361.61	1363.29	0.002531	5.55	314.36	97.79	0.55
Ellsworth	1500	1744.00	1358.41	1362.56		1363.04	0.002523	5.54	314.74	97.83	0.54
Ellsworth	1400	1744.00	1358.16	1362.31		1362.79	0.002533	5.55	314.30	97.79	0.55
Ellsworth	1300	1744.00	1357.91	1362.05		1362.53	0.002544	5.56	313.89	97.78	0.55
Ellsworth	1200	1744.00	1357.65	1361.80		1362.28	0.002527	5.54	314.55	97.81	0.54
Ellsworth	1100	1744.00	1357.40	1361.55		1362.03	0.002537	5.55	314.12	97.78	0.55
Ellsworth	1000	1744.00	1357.15	1361.29		1361.77	0.002554	5.56	313.44	97.73	0.55
Ellsworth	900	1744.00	1356.89	1361.03		1361.52	0.002560	5.57	313.16	97.69	0.55
Ellsworth	800	1744.00	1356.64	1360.78		1361.26	0.002560	5.57	313.16	97.71	0.55
Ellsworth	700	1744.00	1356.39	1360.51		1361.00	0.002593	5.59	311.81	97.60	0.55
Ellsworth	600	1744.00	1356.14	1360.25	1359.09	1360.72	0.002852	5.49	317.44	111.70	0.57
Ellsworth	500	1744.00	1355.88	1359.92	1358.83	1360.43	0.002819	5.76	302.99	108.84	0.57
Ellsworth	400	1744.00	1355.63	1359.61	1358.59	1360.14	0.002966	5.86	297.81	109.82	0.59
Ellsworth	300	1744.00	1355.38	1358.32	1358.32	1359.48	0.018021	8.63	202.03	101.13	1.00
Ellsworth	244	1744.00	1355.30	1357.51	1357.86	1359.09	0.003128	10.10	172.75	106.72	1.26
Ellsworth	243	1744.00	1355.24	1357.34	1357.78	1359.07	0.003661	10.56	165.15	87.01	1.35
Ellsworth	204	1744.00	1355.14	1357.45	1357.65	1358.85	0.002471	9.48	183.95	104.57	1.13
Ellsworth	203.9	1744.00	1353.14	1358.23	1355.65	1358.48	0.000170	4.02	433.42	205.59	0.33
Ellsworth	183.9	1744.00	1353.20	1358.21	1355.70	1358.47	0.001698	4.09	426.01	203.95	0.34
Ellsworth	163.9	1744.00	1353.03	1358.20	1355.53	1358.44	0.000747	3.95	441.34	207.32	0.32
Ellsworth	100	1744.00	1352.14	1358.32		1358.37	0.000144	1.87	930.27	182.22	0.15
Ellsworth	0	1744.00	1352.26	1358.27	1354.38	1358.35	0.000209	2.27	768.55	149.23	0.18

Profile Output Table - Standard Table 2

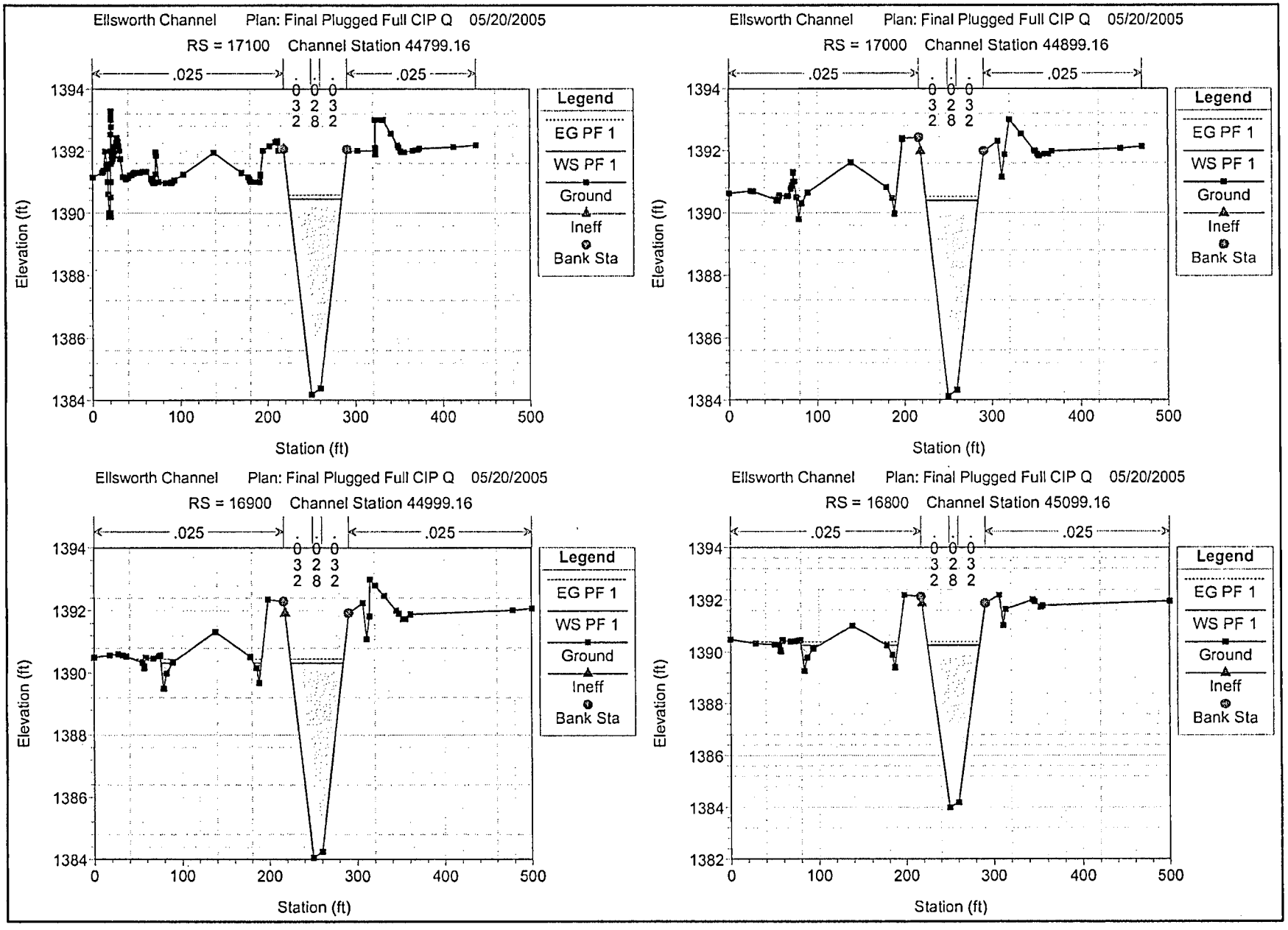
Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Ellsworth	17100	1390.58	1390.46	0.12	0.06	0.00		600.00		61.90
Ellsworth	17000	1390.51	1390.39	0.12	0.06	0.00		600.00		72.75
Ellsworth	16900	1390.45	1390.33	0.12	0.06	0.00		600.00		84.57
Ellsworth	16800	1390.39	1390.27	0.12	0.06	0.00		600.00		98.77
Ellsworth	16700	1390.32	1390.20	0.12	0.06	0.00		600.00		132.09
Ellsworth	16600	1390.26	1390.14	0.12	0.06	0.00		600.00		123.09
Ellsworth	16500	1390.19	1390.07	0.12	0.07	0.00		600.00		185.39
Ellsworth	16400	1390.13	1390.01	0.12	0.07	0.00		600.00		166.40
Ellsworth	16300	1390.06	1389.94	0.12	0.07	0.00		600.00		157.77
Ellsworth	16200	1390.00	1389.87	0.12	0.07	0.00		600.00		150.45
Ellsworth	16100	1389.93	1389.81	0.12	0.07	0.00		600.00		148.89
Ellsworth	16000	1389.86	1389.74	0.12	0.03	0.00		600.00		148.70
Ellsworth	15966.5	1389.84	1389.71	0.12	0.01	0.01		600.00		59.17
Ellsworth	15947.5	1389.81	1389.72	0.09	0.00	0.00		600.00		64.09
Ellsworth	15937.5	1389.81	1389.70	0.11	0.00	0.02		600.00		65.44
Ellsworth	15920.67	1389.79	1389.46	0.33				600.00		21.83
Ellsworth	15895	Culvert								
Ellsworth	15870.67	1389.01	1388.57	0.44	0.01	0.09		600.00		21.83

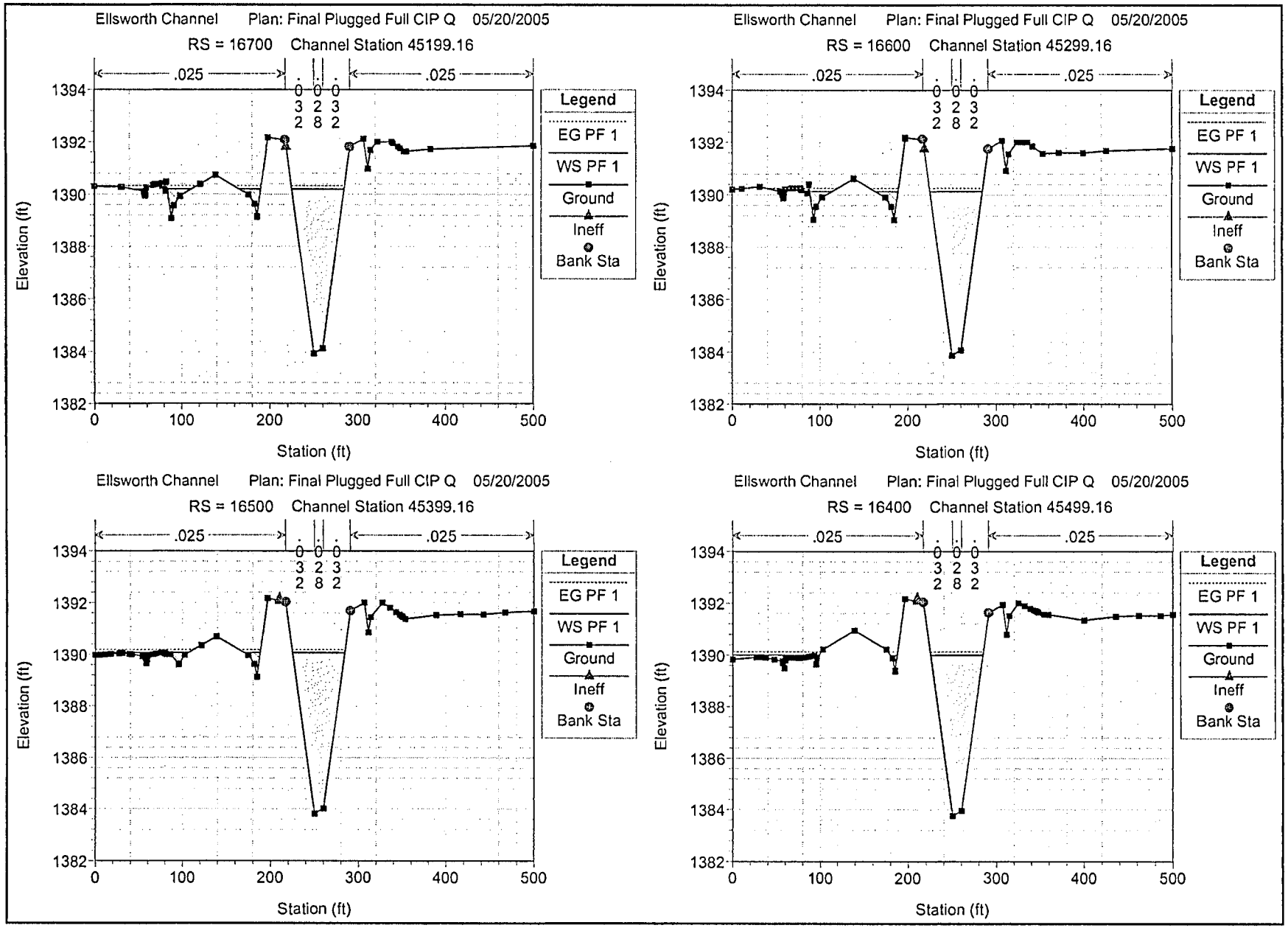
Ellsworth	15855.5	1388.92	1388.76	0.16	0.01	0.01		600.00		61.04
Ellsworth	15845.5	1388.91	1388.77	0.14	0.02	0.01		600.00		59.18
Ellsworth	15826.6	1388.88	1388.66	0.22	0.03	0.00		600.00		51.45
Ellsworth	15809	1388.85	1388.63	0.23	0.01	0.00		600.00		51.05
Ellsworth	15800	1388.84	1388.61	0.23	0.16	0.00		600.00		51.16
Ellsworth	15700	1388.68	1388.44	0.24	0.18	0.00		600.00		50.23
Ellsworth	15600	1388.50	1388.23	0.27	0.12	0.00		600.00		49.08
Ellsworth	15550	1388.38	1388.08	0.29	0.12	0.07		600.00		48.13
Ellsworth	15460	1388.18	1387.66	0.52	0.01	0.05		600.00		27.68
Ellsworth	15450	1388.12	1387.71	0.41				600.00		109.54
Ellsworth	15350	Culvert								
Ellsworth	15192	1386.26	1386.03	0.23	0.15	0.03		600.00		54.31
Ellsworth	15100	1386.08	1385.90	0.18	0.15	0.00		600.00		53.91
Ellsworth	15000	1385.93	1385.74	0.19	0.12	0.00		600.00		53.30
Ellsworth	14900	1385.81	1385.61	0.20	0.13	0.00		600.00		52.93
Ellsworth	14800	1385.68	1385.48	0.20	0.13	0.00		600.00		52.51
Ellsworth	14700	1385.55	1385.34	0.21	0.14	0.00		600.00		52.01
Ellsworth	14600	1385.41	1385.19	0.22	0.03	0.00		600.00		51.43
Ellsworth	14579	1385.38	1385.16	0.22	0.01	0.00		600.00		51.41
Ellsworth	14569	1385.36	1385.14	0.22	0.10	0.00		600.00		51.27
Ellsworth	14501	1385.26	1385.03	0.23	0.02	0.00		600.00		50.75
Ellsworth	14491	1385.24	1385.01	0.23	0.06	0.00		600.00		50.70
Ellsworth	14451	1385.18	1384.94	0.24	0.08	0.00		600.00		50.38
Ellsworth	14400	1385.09	1384.84	0.25	0.18	0.00		600.00		49.97
Ellsworth	14300	1384.91	1384.64	0.27	0.20	0.00		600.00		48.99
Ellsworth	14200	1384.70	1384.40	0.30	0.24	0.01		600.00		47.71
Ellsworth	14100	1384.45	1384.10	0.36	0.17	0.07		600.00		45.93
Ellsworth	14000	1384.22	1384.09	0.13	0.09	0.00		600.00		64.94
Ellsworth	13900	1384.13	1384.01	0.13	0.07	0.00		600.00		64.88
Ellsworth	13800	1384.06	1383.94	0.13	0.07	0.00		600.00		64.95
Ellsworth	13700	1383.99	1383.87	0.12	0.07	0.00		600.00		78.22
Ellsworth	13600	1383.92	1383.80	0.12	0.07	0.00		600.00		78.27
Ellsworth	13500	1383.85	1383.73	0.12	0.07	0.00		600.00		80.69
Ellsworth	13400	1383.78	1383.66	0.12	0.07	0.00		600.00		80.92
Ellsworth	13300	1383.71	1383.59	0.12	0.07	0.00		600.00		74.28
Ellsworth	13200	1383.65	1383.53	0.12	0.07	0.00		600.00		65.50
Ellsworth	13100	1383.58	1383.46	0.12	0.07	0.00		600.00		65.61
Ellsworth	13000	1383.51	1383.39	0.12	0.06	0.00		600.00		65.73
Ellsworth	12900	1383.45	1383.33	0.12	0.06	0.00		600.00		65.86
Ellsworth	12800	1383.38	1383.27	0.12	0.06	0.00		600.00		66.00
Ellsworth	12700	1383.32	1383.21	0.11	0.06	0.00		600.00		66.14
Ellsworth	12600	1383.26	1383.14	0.11	0.06	0.00		600.00		66.29
Ellsworth	12500	1383.20	1383.08	0.11	0.06	0.00		600.00		66.45
Ellsworth	12400	1383.14	1383.02	0.11	0.06	0.00		600.00		66.61
Ellsworth	12300	1383.08	1382.97	0.11	0.06	0.00		600.00		66.79
Ellsworth	12200	1383.02	1382.91	0.11	0.06	0.00		600.00		66.97
Ellsworth	12100	1382.96	1382.85	0.11	0.06	0.00		600.00		67.16
Ellsworth	12000	1382.90	1382.80	0.10	0.05	0.00		600.00		67.36
Ellsworth	11900	1382.85	1382.74	0.10	0.05	0.00		600.00		67.57
Ellsworth	11800	1382.79	1382.69	0.10	0.05	0.00		600.00		67.79
Ellsworth	11700	1382.74	1382.64	0.10	0.05	0.00		600.00		68.02
Ellsworth	11600	1382.69	1382.59	0.10	0.05	0.00		600.00		68.28
Ellsworth	11500	1382.64	1382.54	0.10	0.04	0.01		600.00		68.51
Ellsworth	11400	1382.59	1382.51	0.08	0.04	0.00		600.00		78.84
Ellsworth	11300	1382.54	1382.45	0.09	0.05	0.00		600.00		69.07
Ellsworth	11200	1382.50	1382.40	0.09	0.04	0.00		600.00		69.33
Ellsworth	11100	1382.45	1382.36	0.09	0.04	0.00		600.00		69.62
Ellsworth	11000	1382.41	1382.32	0.09	0.04	0.00		600.00		69.93
Ellsworth	10900	1382.36	1382.28	0.09	0.04	0.00		600.00		70.24
Ellsworth	10800	1382.32	1382.24	0.08	0.04	0.00		600.00		70.57
Ellsworth	10700	1382.28	1382.20	0.08	0.02	0.00		600.00		70.88
Ellsworth	10650.9	1382.26	1382.18	0.08	0.01	0.02		600.00		71.02
Ellsworth	10623.7	1382.23	1382.18	0.05	0.00	0.00		600.00		79.35
Ellsworth	10613.7	1382.23	1382.18	0.05	0.00	0.00		600.00		80.22
Ellsworth	10600.87	1382.23	1382.16	0.06				600.00		55.50
Ellsworth	10570	Culvert								
Ellsworth	10539.74	1382.11	1382.05	0.06	0.00	0.00		600.00		55.50
Ellsworth	10528.5	1382.10	1382.05	0.05	0.00	0.00		600.00		81.18

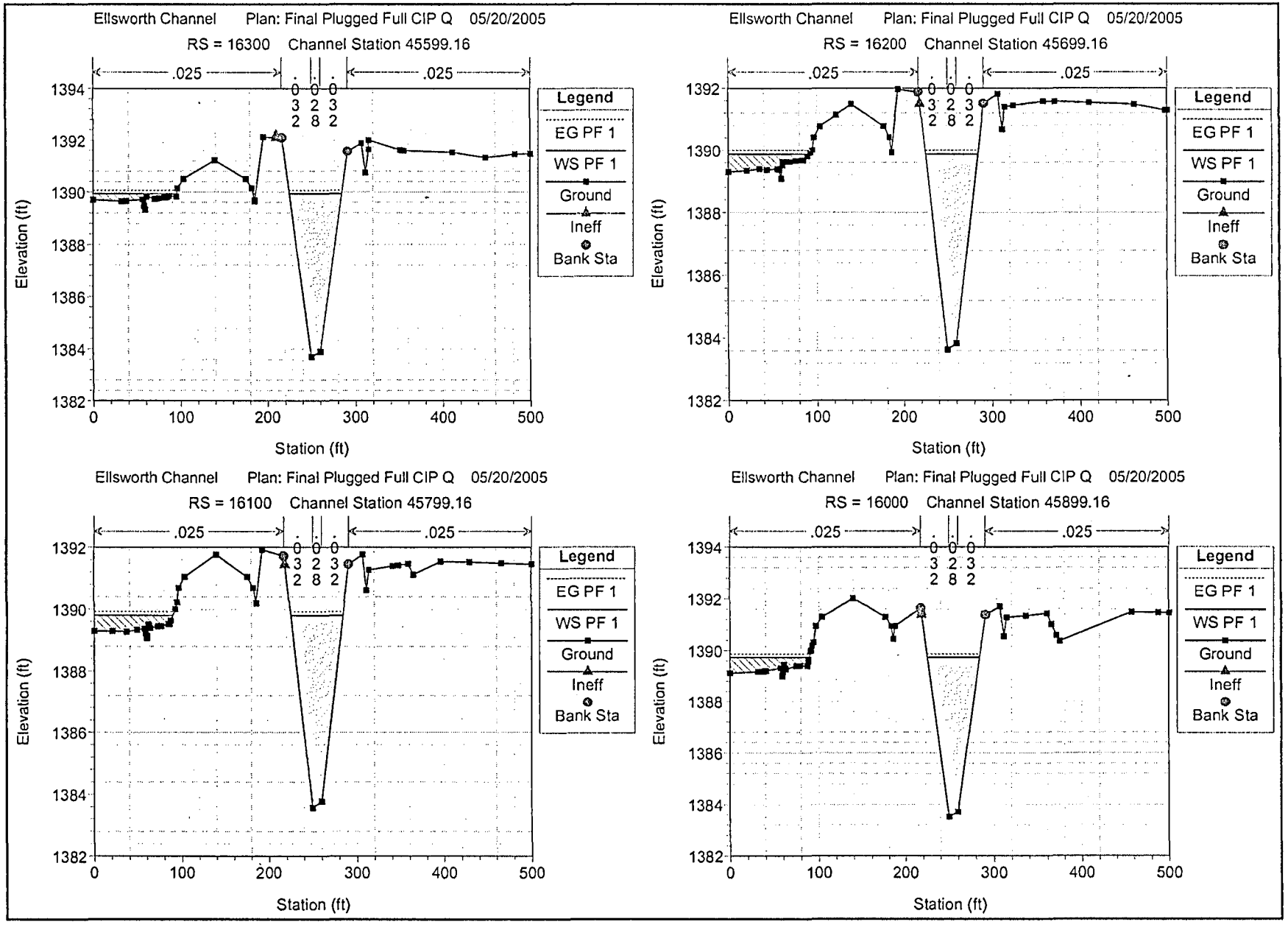
Ellsworth	10518.5	1382.10	1382.05	0.05	0.01	0.00		600.00	80.11
Ellsworth	10490.7	1382.09	1382.01	0.08	0.04	0.00		600.00	70.72
Ellsworth	10400	1382.05	1381.97	0.08	0.04	0.00		600.00	71.01
Ellsworth	10300	1382.02	1381.94	0.08	0.04	0.00		600.00	71.35
Ellsworth	10200	1381.98	1381.90	0.08	0.04	0.00		600.00	71.70
Ellsworth	10100	1381.94	1381.87	0.08	0.03	0.00		600.00	72.06
Ellsworth	10000	1381.91	1381.83	0.07	0.03	0.00		600.00	72.44
Ellsworth	9900	1381.87	1381.80	0.07	0.03	0.00		600.00	72.83
Ellsworth	9800	1381.84	1381.77	0.07	0.04	0.00		600.00	73.21
Ellsworth	9700	1381.80	1381.73	0.07	0.08	0.01		600.00	73.53
Ellsworth	9600	1381.70	1381.55	0.15	0.06	0.03		1172.00	90.57
Ellsworth	9500	1381.62	1381.52	0.10	0.03	0.00		1172.00	109.99
Ellsworth	9400	1381.58	1381.49	0.09	0.02	0.00		1172.00	110.35
Ellsworth	9340.54	1381.56	1381.47	0.09	0.01	0.01		1172.00	110.58
Ellsworth	9314.67	1381.54	1381.46	0.08	0.00	0.00		1172.00	122.44
Ellsworth	9304.67	1381.54	1381.45	0.09	0.00	0.01		1172.00	125.72
Ellsworth	9288.82	1381.53	1381.43	0.10				1172.00	79.00
Ellsworth	9248	Culvert							
Ellsworth	9207.65	1381.34	1381.23	0.11	0.00	0.01		1172.00	79.00
Ellsworth	9193.48	1381.33	1381.24	0.09	0.00	0.01		1172.00	126.01
Ellsworth	9183.48	1381.32	1381.24	0.08	0.01	0.01		1172.00	123.46
Ellsworth	9154.01	1381.31	1381.21	0.10	0.00	0.00		1172.00	109.72
Ellsworth	9143	1381.30	1381.20	0.10	0.02	0.00		1172.00	109.77
Ellsworth	9100	1381.29	1381.19	0.10	0.04	0.00		1172.00	109.89
Ellsworth	9000	1381.25	1381.16	0.09	0.03	0.00		1172.00	110.26
Ellsworth	8900	1381.22	1381.12	0.09	0.03	0.01		1172.00	110.64
Ellsworth	8800	1381.17	1381.11	0.06	0.03	0.00		1172.00	121.58
Ellsworth	8700	1381.13	1381.05	0.09	0.05	0.01		1172.00	111.30
Ellsworth	8600	1381.07	1380.87	0.21	0.07	0.00		1744.00	110.50
Ellsworth	8500	1381.00	1380.79	0.20	0.07	0.00		1744.00	110.56
Ellsworth	8400	1380.92	1380.72	0.20	0.07	0.00		1744.00	110.60
Ellsworth	8300	1380.85	1380.64	0.20	0.07	0.00		1744.00	110.63
Ellsworth	8200	1380.77	1380.57	0.20	0.07	0.00		1744.00	110.70
Ellsworth	8100	1380.70	1380.50	0.20	0.07	0.00		1744.00	110.75
Ellsworth	8000	1380.63	1380.42	0.20	0.07	0.00		1744.00	110.79
Ellsworth	7900	1380.55	1380.35	0.20	0.07	0.00		1744.00	172.62
Ellsworth	7800	1380.48	1380.28	0.20	0.07	0.00		1744.00	269.51
Ellsworth	7700	1380.41	1380.21	0.20	0.07	0.00		1744.00	199.56
Ellsworth	7600	1380.34	1380.14	0.20	0.07	0.00		1744.00	118.66
Ellsworth	7500	1380.26	1380.07	0.20	0.07	0.00		1744.00	111.36
Ellsworth	7400	1380.19	1380.00	0.20	0.07	0.00		1744.00	111.21
Ellsworth	7300	1380.12	1379.93	0.20	0.07	0.00		1744.00	111.28
Ellsworth	7200	1380.05	1379.86	0.20	0.07	0.00		1744.00	111.39
Ellsworth	7100	1379.98	1379.79	0.19	0.07	0.00		1744.00	111.46
Ellsworth	7000	1379.91	1379.72	0.19	0.07	0.00		1744.00	111.57
Ellsworth	6900	1379.84	1379.65	0.19	0.07	0.00		1744.00	111.67
Ellsworth	6800	1379.77	1379.58	0.19	0.07	0.00		1744.00	111.77
Ellsworth	6700	1379.71	1379.52	0.19	0.01	0.00		1744.00	111.87
Ellsworth	6687.62	1379.70	1379.51	0.19	0.01	0.00		1744.00	111.87
Ellsworth	6675.17*	1379.68	1379.49	0.19	0.00	0.01		1744.00	117.18
Ellsworth	6662.73	1379.68	1379.43	0.24	0.00	0.01		1744.00	121.17
Ellsworth	6646.88	1379.66	1379.34	0.32				1744.00	66.00
Ellsworth	6615	Culvert							
Ellsworth	6585.95	1378.78	1378.32	0.46	0.01	0.05		1744.00	66.00
Ellsworth	6571.49	1378.72	1378.36	0.36	0.02	0.03		1744.00	117.05
Ellsworth	6559.04*	1378.67	1378.37	0.30	0.02	0.00		1744.00	111.67
Ellsworth	6546.60	1378.65	1378.34	0.31	0.03	0.00		1744.00	103.99
Ellsworth	6527	1378.62	1378.32	0.31	0.04	0.00		1744.00	104.04
Ellsworth	6500	1378.59	1378.28	0.31	0.13	0.00		1744.00	104.05
Ellsworth	6400	1378.45	1378.15	0.30	0.13	0.00		1744.00	104.13
Ellsworth	6300	1378.32	1378.02	0.30	0.13	0.00		1744.00	104.19
Ellsworth	6200	1378.19	1377.89	0.30	0.13	0.00		1744.00	104.29
Ellsworth	6100	1378.06	1377.76	0.30	0.13	0.00		1744.00	104.40
Ellsworth	6000	1377.93	1377.64	0.30	0.13	0.00		1744.00	104.49
Ellsworth	5900	1377.81	1377.51	0.29	0.12	0.00		1744.00	104.63
Ellsworth	5800	1377.68	1377.39	0.29	0.12	0.00		1744.00	104.77
Ellsworth	5700	1377.56	1377.27	0.29	0.12	0.00		1744.00	104.92
Ellsworth	5600	1377.44	1377.15	0.29	0.12	0.00		1744.00	105.08

Ellsworth	5500	1377.32	1377.03	0.28	0.12	0.00		1744.00	105.27
Ellsworth	5400	1377.20	1376.92	0.28	0.11	0.00		1744.00	105.45
Ellsworth	5300	1377.08	1376.81	0.27	0.11	0.00		1744.00	105.67
Ellsworth	5200	1376.97	1376.70	0.27	0.11	0.00		1744.00	105.93
Ellsworth	5100	1376.86	1376.59	0.27	0.11	0.00		1744.00	106.17
Ellsworth	5000	1376.75	1376.49	0.26	0.10	0.00		1744.00	106.48
Ellsworth	4900	1376.64	1376.39	0.26	0.10	0.00		1744.00	106.80
Ellsworth	4800	1376.54	1376.29	0.25	0.10	0.00		1744.00	107.15
Ellsworth	4700	1376.44	1376.20	0.24	0.03	0.00		1744.00	107.52
Ellsworth	4674	1376.42	1376.17	0.25	0.01	0.00		1744.00	107.40
Ellsworth	4664	1376.40	1376.16	0.25	0.06	0.00		1744.00	107.40
Ellsworth	4600	1376.34	1376.10	0.24	0.09	0.00		1744.00	107.90
Ellsworth	4500	1376.25	1376.01	0.23	0.09	0.00		1744.00	108.32
Ellsworth	4400	1376.16	1375.93	0.23	0.08	0.00		1744.00	108.77
Ellsworth	4300	1376.07	1375.85	0.22	0.08	0.00		1744.00	109.25
Ellsworth	4200	1375.99	1375.77	0.21	0.08	0.00		1744.00	109.75
Ellsworth	4100	1375.91	1375.70	0.21	0.07	0.00		1744.00	110.30
Ellsworth	4000	1375.83	1375.63	0.20	0.07	0.00		1744.00	110.85
Ellsworth	3900	1375.76	1375.56	0.19	0.07	0.00		1744.00	111.44
Ellsworth	3800	1375.69	1375.50	0.19	0.06	0.00		1744.00	112.06
Ellsworth	3700	1375.62	1375.44	0.18	0.06	0.00		1744.00	112.71
Ellsworth	3600	1375.56	1375.39	0.17	0.04	0.00		1744.00	113.38
Ellsworth	3505.64	1375.52	1375.35	0.17	0.01	0.00		1744.00	113.98
Ellsworth	3473.65	1375.51	1375.34	0.17	0.00	0.03		1744.00	114.23
Ellsworth	3473.64	1375.48	1375.22	0.26	0.00	0.00		1744.00	70.00
Ellsworth	3461.64	1375.48	1375.22	0.26	0.00	0.04		1744.00	70.00
Ellsworth	3461.63	1375.44	1375.04	0.40	0.00	0.29		1744.00	70.00
Ellsworth	3460.63	1375.15	1373.80	1.35	0.01	0.55		1744.00	70.00
Ellsworth	3444.63	1369.47	1369.21	0.26	0.00	0.00		1744.00	70.00
Ellsworth	3444.62	1369.47	1369.21	0.26	0.02	0.00		1744.00	70.00
Ellsworth	3432.91	1369.45	1369.19	0.26	0.01	0.03		1744.00	70.00
Ellsworth	3425.08	1369.41	1369.26	0.15	0.02	0.00		1744.00	115.30
Ellsworth	3400	1369.39	1369.22	0.17	0.06	0.00		1744.00	114.22
Ellsworth	3300	1369.33	1369.17	0.15	0.05	0.00		1744.00	115.68
Ellsworth	3200	1369.27	1369.13	0.14	0.06	0.00		1744.00	260.10
Ellsworth	3100	1369.21	1369.07	0.13	0.05	0.00		1744.00	140.20
Ellsworth	3000	1369.15	1369.03	0.12	0.03	0.00		1744.00	120.38
Ellsworth	2900	1369.12	1369.00	0.11	0.03	0.00		1744.00	121.98
Ellsworth	2800	1369.08	1368.98	0.10	0.02	0.01		1744.00	123.64
Ellsworth	2700	1369.05	1368.97	0.08	0.01	0.00		1744.00	135.68
Ellsworth	2654.00*	1369.04	1368.95	0.09	0.02	0.03		1744.00	131.23
Ellsworth	2608.01	1368.99	1368.82	0.17	0.00	0.02		1744.00	125.90
Ellsworth	2598.02	1368.97	1368.74	0.23	0.00	0.06		1744.00	125.53
Ellsworth	2581.04	1368.91	1368.47	0.44				1744.00	44.60
Ellsworth	2569	Culvert							
Ellsworth	2557.04	1366.60	1365.19	1.41	0.01	0.05		1744.00	44.60
Ellsworth	2554.53*	1366.54	1365.23	1.31	0.02	0.05		1744.00	48.41
Ellsworth	2552.03*	1366.47	1365.27	1.21	0.02	0.08		1744.00	53.57
Ellsworth	2549.52*	1366.38	1365.33	1.06	0.02	0.12		1744.00	61.35
Ellsworth	2547.02*	1366.24	1365.43	0.82	0.01	0.13		1744.00	74.11
Ellsworth	2544.51*	1366.10	1365.54	0.56	0.01	0.13		1744.00	87.83
Ellsworth	2542.01	1365.96	1364.96	0.99	0.04	0.14		1744.00	96.07
Ellsworth	2532.01	1365.77	1365.06	0.70	0.05	0.11		1744.00	96.96
Ellsworth	2513.15*	1365.60	1365.12	0.48	0.29	0.00		1744.00	97.85
Ellsworth	2400	1365.32	1364.84	0.48	0.25	0.00		1744.00	97.82
Ellsworth	2300	1365.06	1364.59	0.48	0.25	0.00		1744.00	97.85
Ellsworth	2200	1364.81	1364.34	0.48	0.25	0.00		1744.00	97.84
Ellsworth	2100	1364.56	1364.08	0.48	0.25	0.00		1744.00	97.82
Ellsworth	2000	1364.31	1363.83	0.48	0.25	0.00		1744.00	97.79
Ellsworth	1900	1364.05	1363.58	0.48	0.25	0.00		1744.00	97.87
Ellsworth	1800	1363.80	1363.32	0.48	0.25	0.00		1744.00	97.83
Ellsworth	1700	1363.55	1363.07	0.48	0.25	0.00		1744.00	97.82
Ellsworth	1600	1363.29	1362.82	0.48	0.25	0.00		1744.00	97.79
Ellsworth	1500	1363.04	1362.56	0.48	0.25	0.00		1744.00	97.83
Ellsworth	1400	1362.79	1362.31	0.48	0.25	0.00		1744.00	97.79
Ellsworth	1300	1362.53	1362.05	0.48	0.25	0.00		1744.00	97.78
Ellsworth	1200	1362.28	1361.80	0.48	0.25	0.00		1744.00	97.81
Ellsworth	1100	1362.03	1361.55	0.48	0.25	0.00		1744.00	97.78

Ellsworth	1000	1361.77	1361.29	0.48	0.26	0.00	1744.00	97.73
Ellsworth	900	1361.52	1361.03	0.48	0.26	0.00	1744.00	97.69
Ellsworth	800	1361.26	1360.78	0.48	0.26	0.00	1744.00	97.71
Ellsworth	700	1361.00	1360.51	0.49	0.27	0.01	1744.00	97.60
Ellsworth	600	1360.72	1360.25	0.47	0.28	0.00	1744.00	111.70
Ellsworth	500	1360.43	1359.92	0.51	0.29	0.00	1744.00	108.84
Ellsworth	400	1360.14	1359.61	0.53	0.60	0.06	1744.00	109.82
Ellsworth	300	1359.48	1358.32	1.16	0.24	0.01	1744.00	101.13
Ellsworth	244	1359.09	1357.51	1.58	0.35	0.04	1744.00	106.72
Ellsworth	243	1359.07	1357.34	1.73	0.00	0.01	1744.00	87.01
Ellsworth	204	1358.85	1357.45	1.40	0.12	0.10	1744.00	104.57
Ellsworth	203.9	1358.48	1358.23	0.25	0.01	0.00	1744.00	205.59
Ellsworth	183.9	1358.47	1358.21	0.26	0.02	0.01	1744.00	203.95
Ellsworth	163.9	1358.44	1358.20	0.24	0.02	0.06	1744.00	207.32
Ellsworth	100	1358.37	1358.32	0.05	0.02	0.00	1744.00	182.22
Ellsworth	0	1358.35	1358.27	0.08			1744.00	149.23

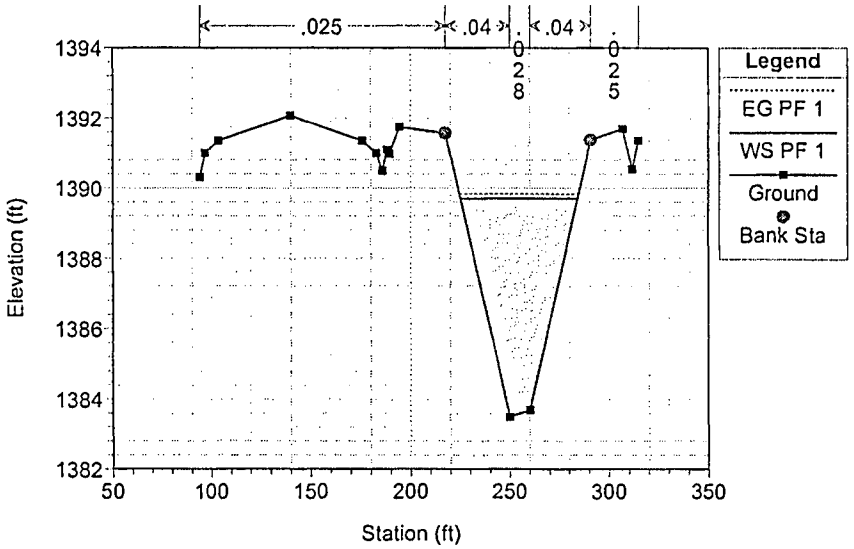

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 17100 Channel Station 44799.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 17000 Channel Station 44899.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16900 Channel Station 44999.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16800 Channel Station 45099.16


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16700 Channel Station 45199.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16600 Channel Station 45299.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16500 Channel Station 45399.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16400 Channel Station 45499.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1382
1384
1386
1388
1390
1392
1394
0
100
200
300
400
500


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16300 Channel Station 45599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16200 Channel Station 45699.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16100 Channel Station 45799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 16000 Channel Station 45899.16
.025
.025
0.032
0.028
0.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1382
1384
1386
1388
1390
1392
1394
0
100
200
300
400
500

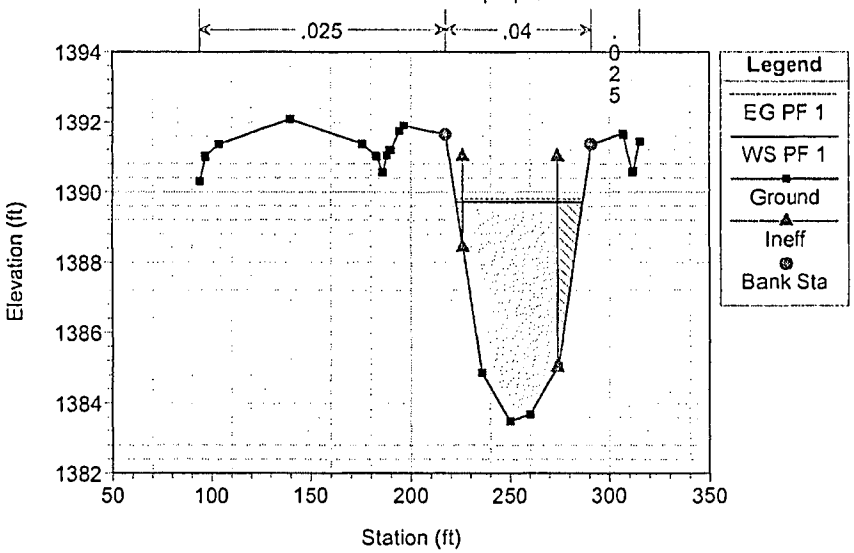
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 15966.5 Begin Channel Bottom Transition (Begin Flow Constriction)



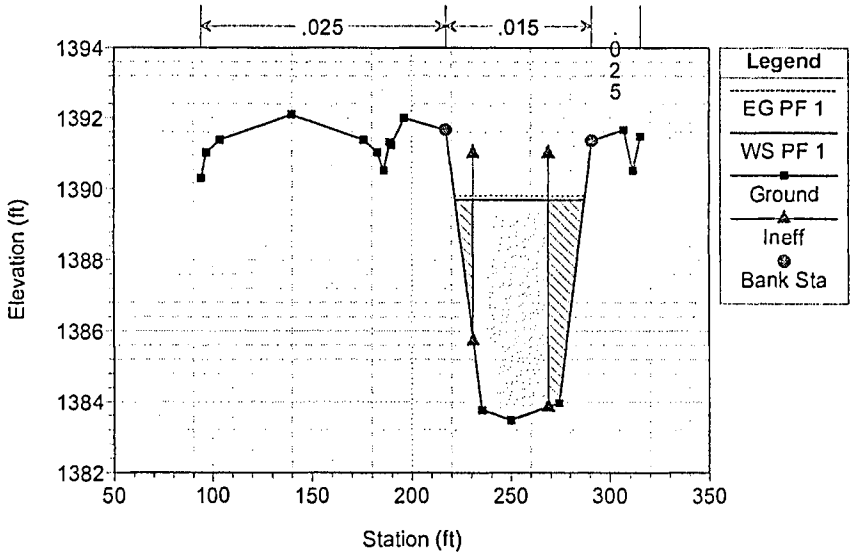
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 15947.5 Full Riprap Section



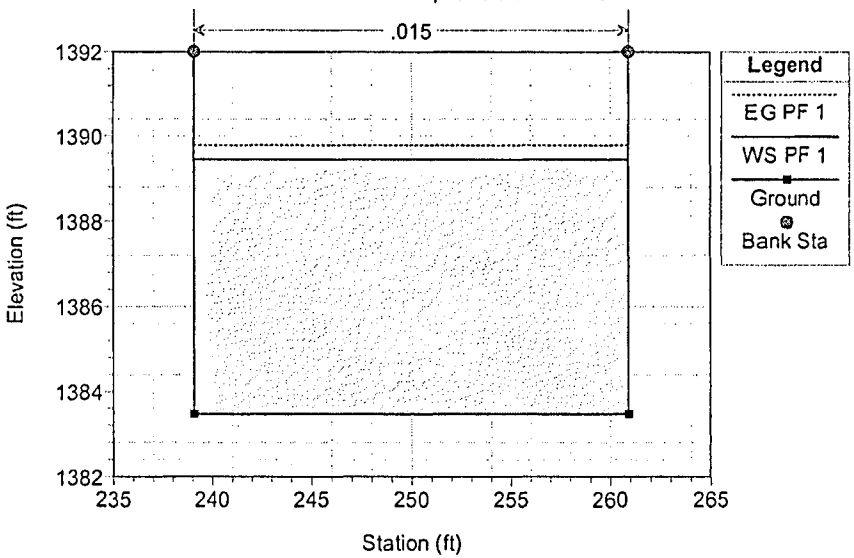
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

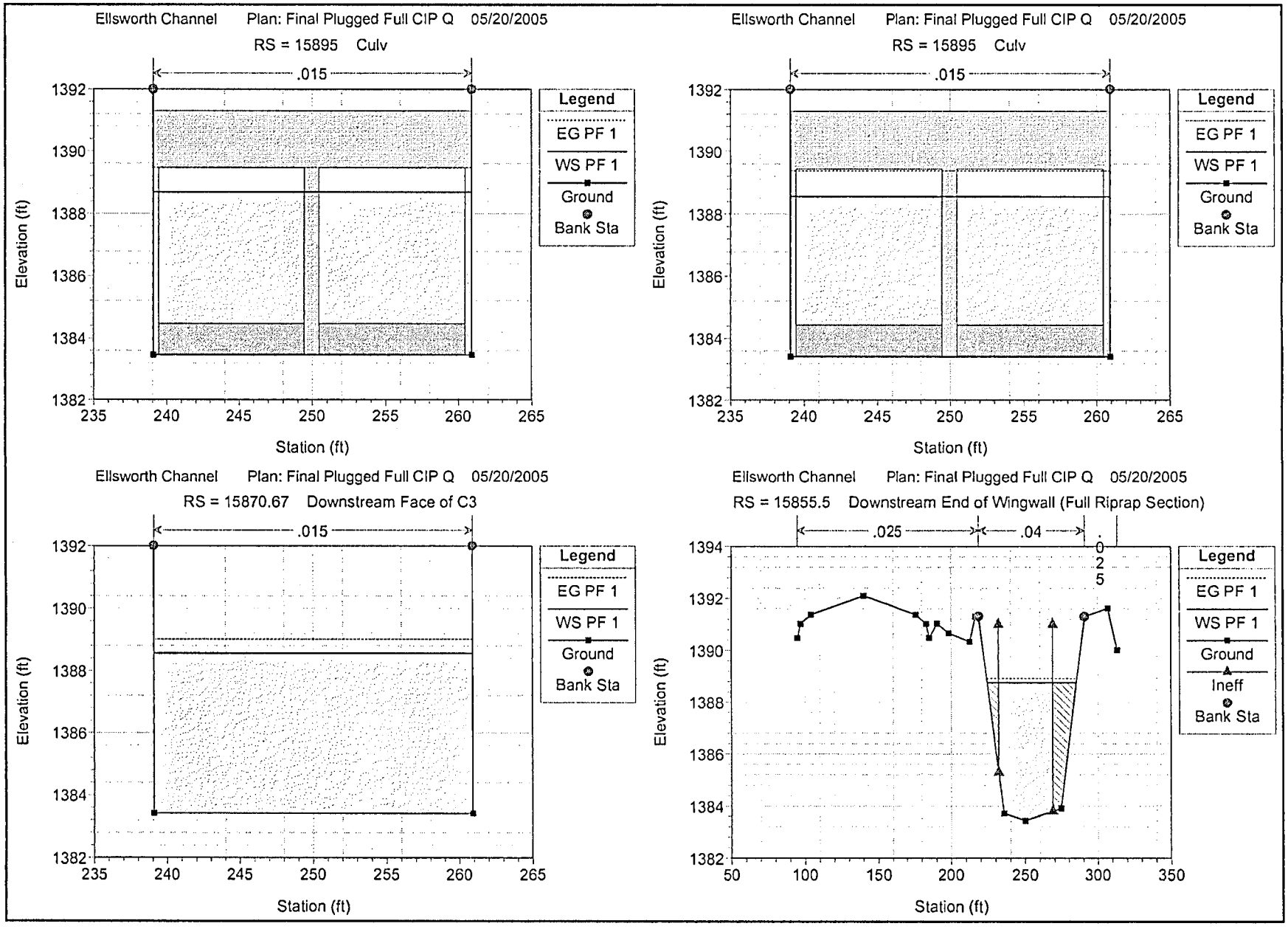
RS = 15937.5 Upstream End of Wingwall

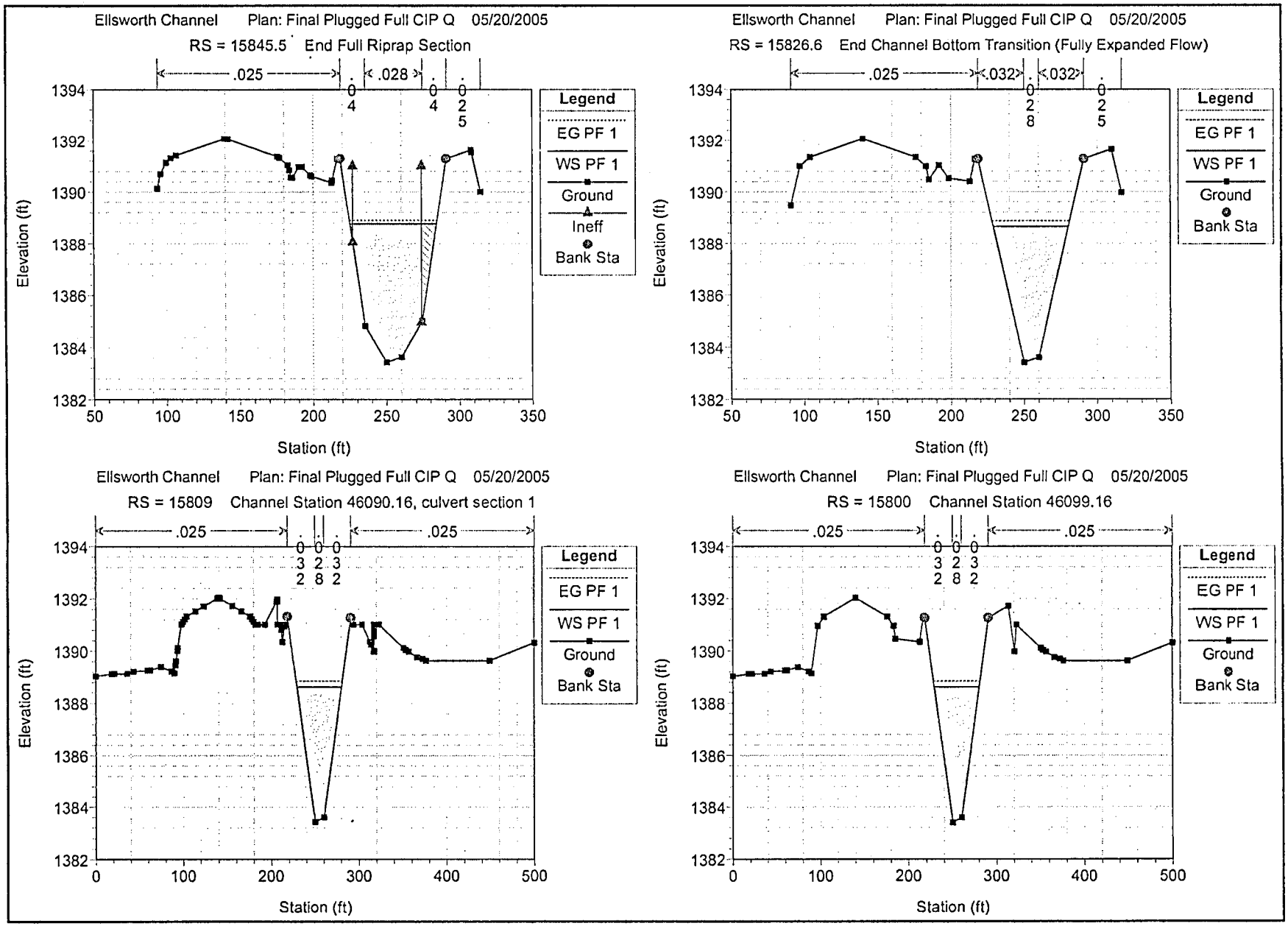


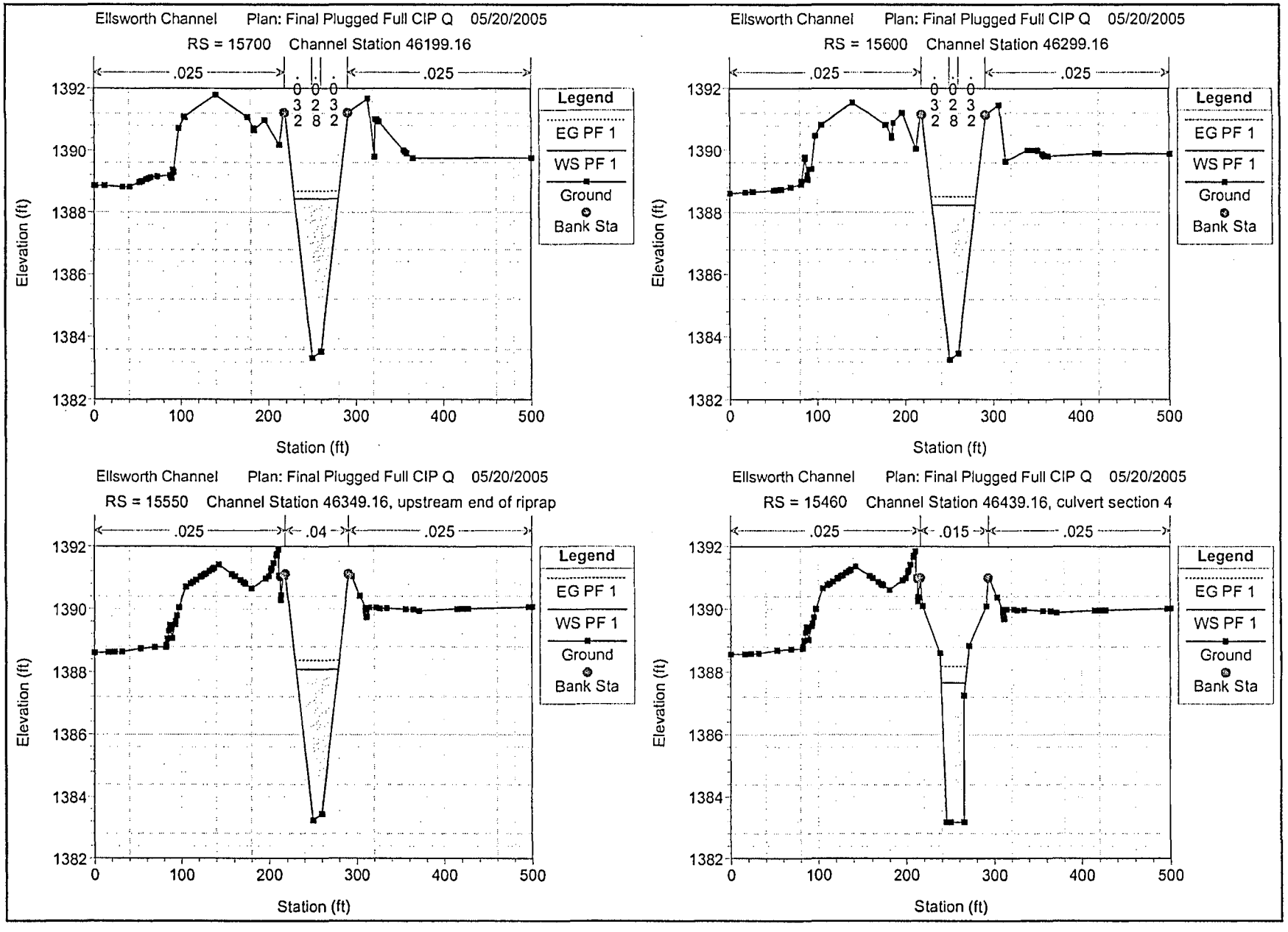
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

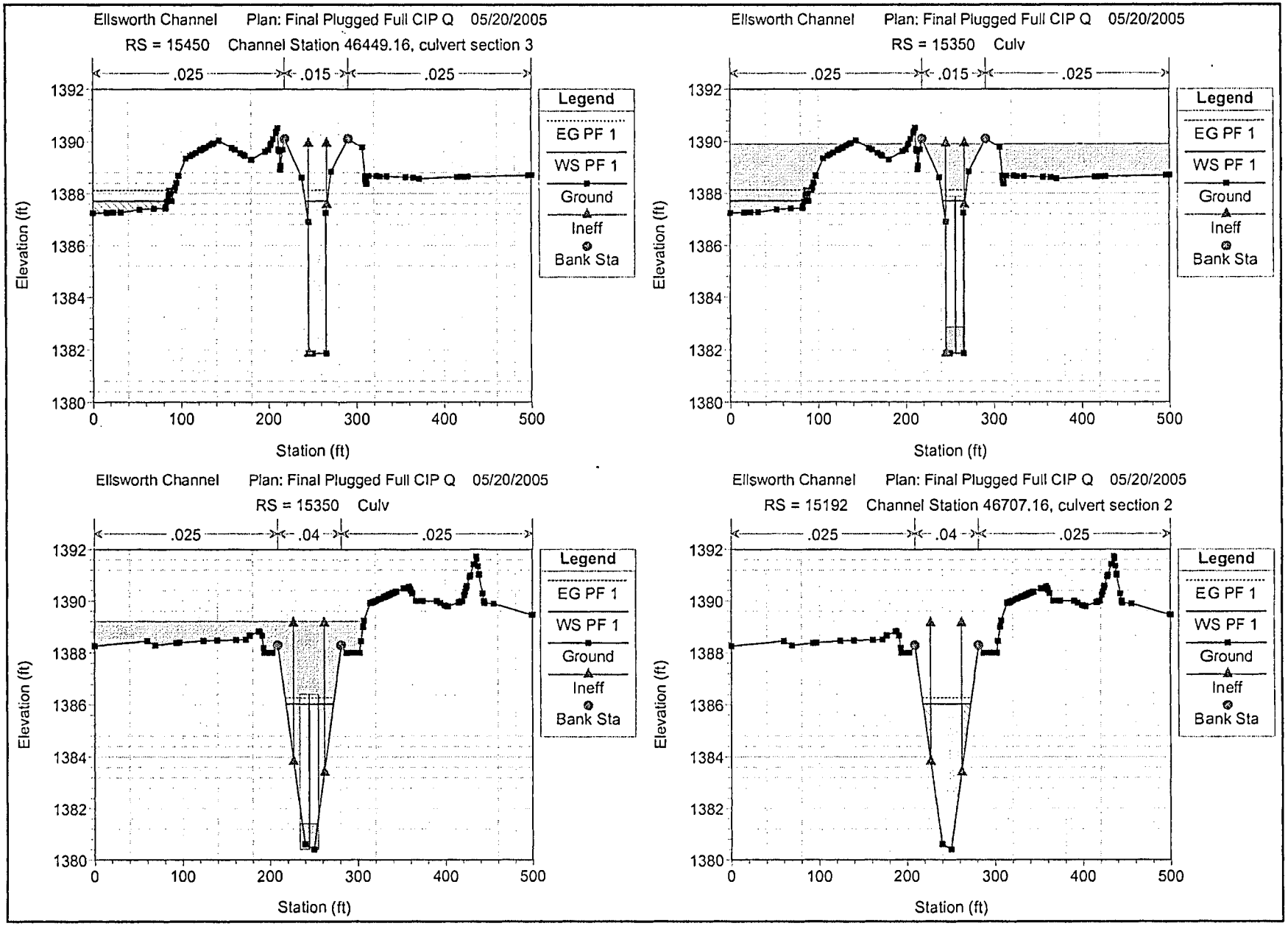
RS = 15920.67 Upstream Face of C3

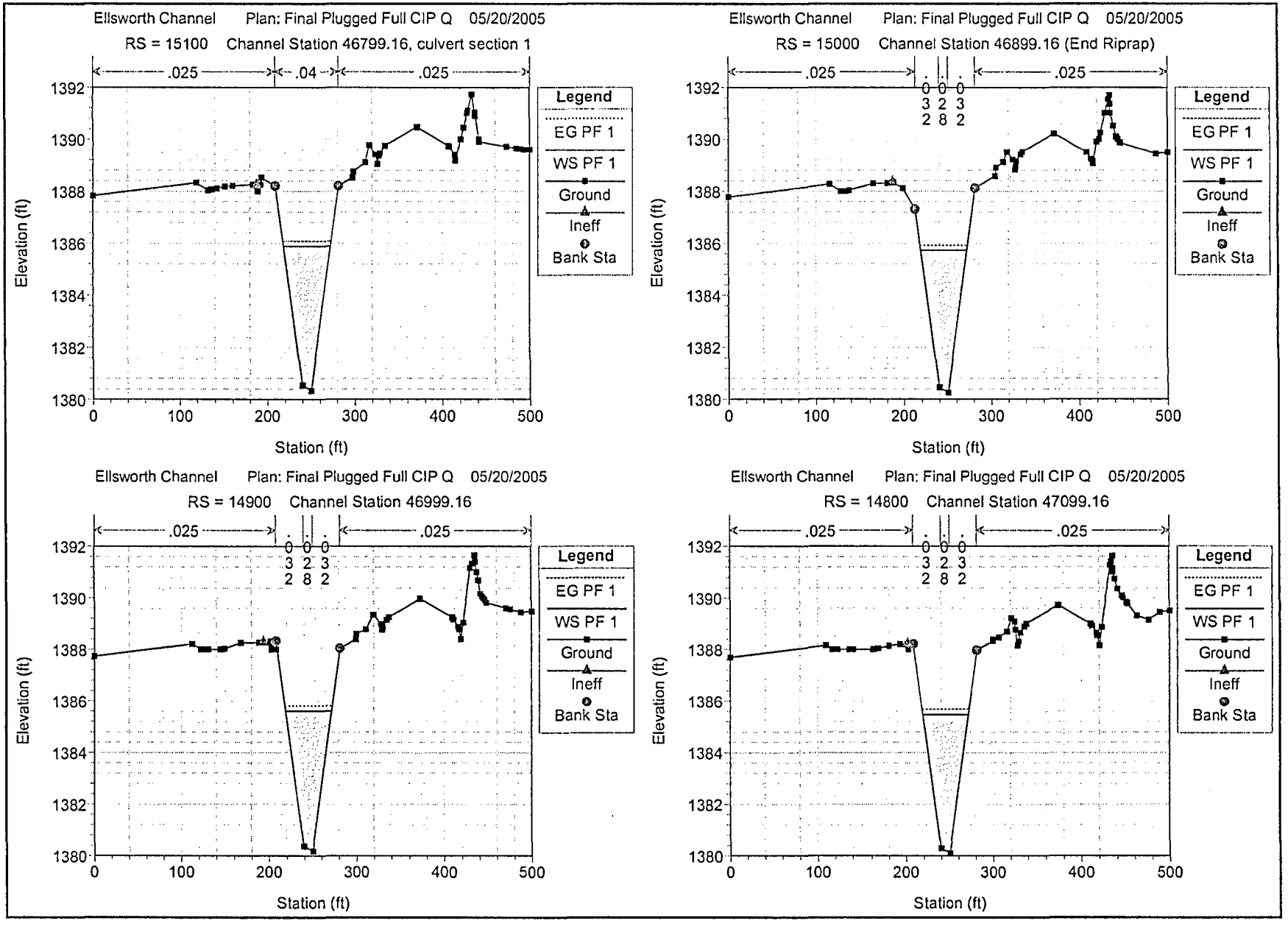


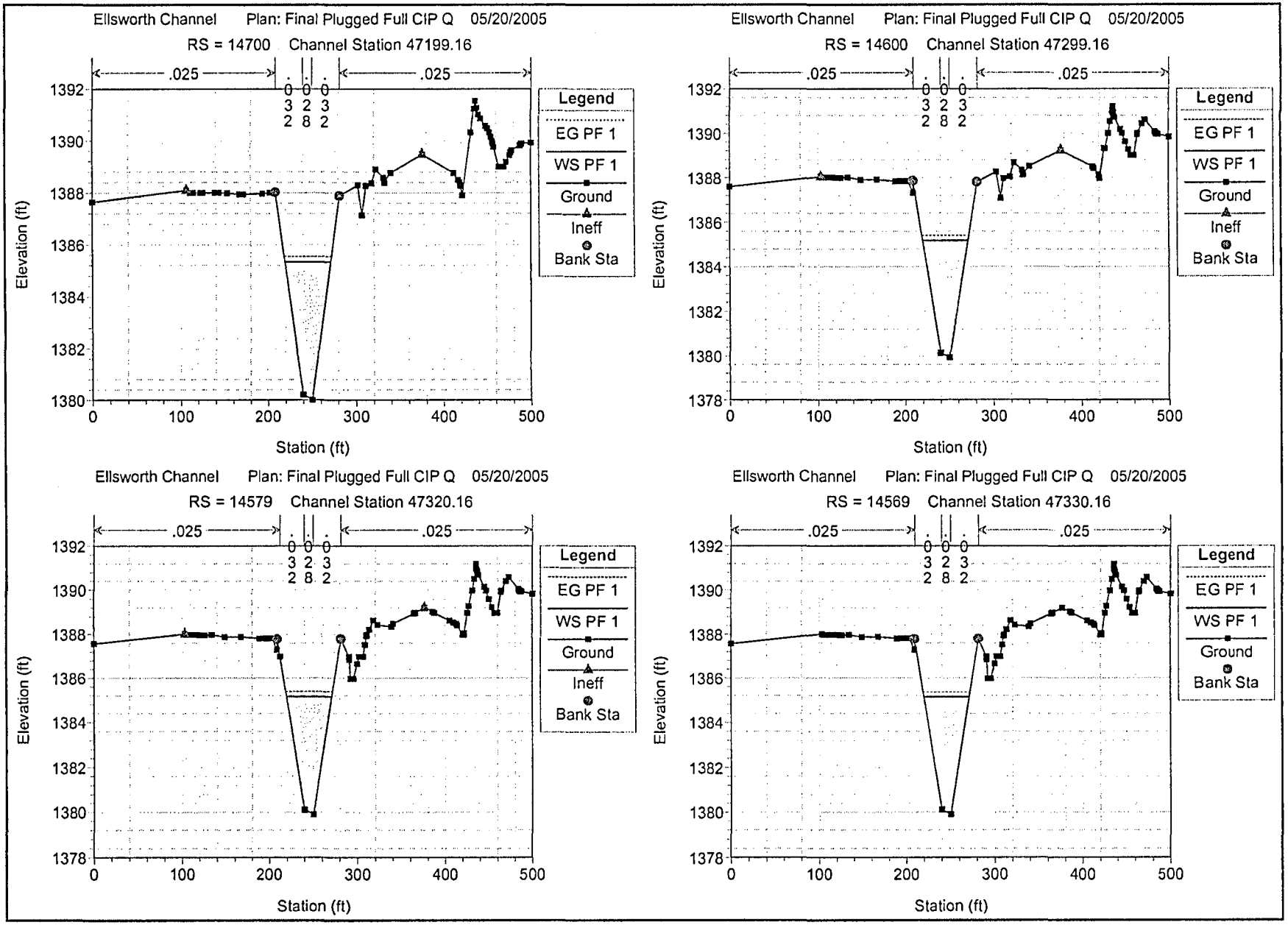

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15895 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15895 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15870.67 Downstream Face of C3
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15855.5 Downstream End of Wingwall (Full Riprap Section)
.025
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

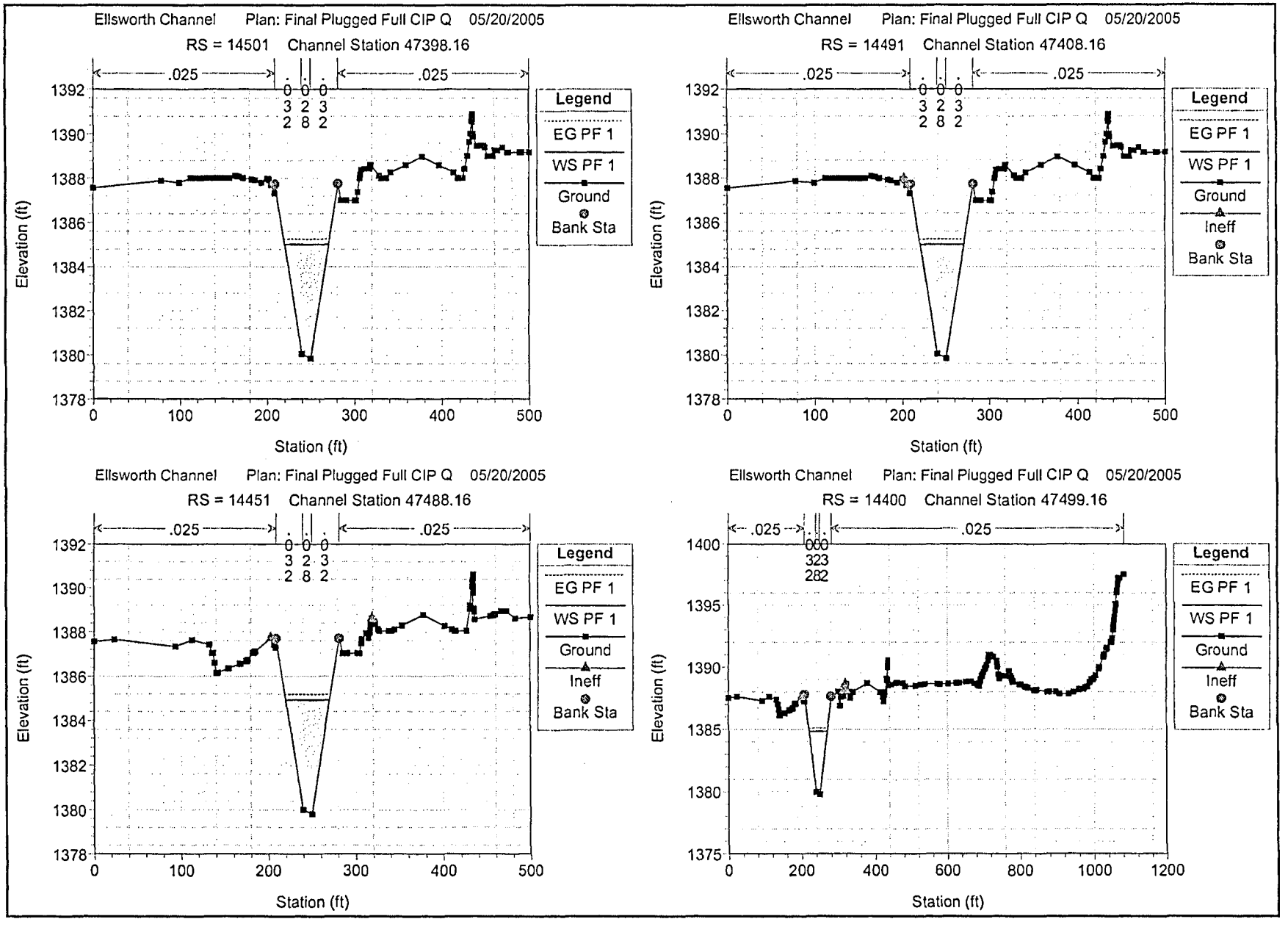

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15845.5 End Full Riprap Section
.025
.028
.04
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15826.6 End Channel Bottom Transition (Fully Expanded Flow)
.025
.032
.032
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15809 Channel Station 46090.16, culvert section 1
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15800 Channel Station 46099.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

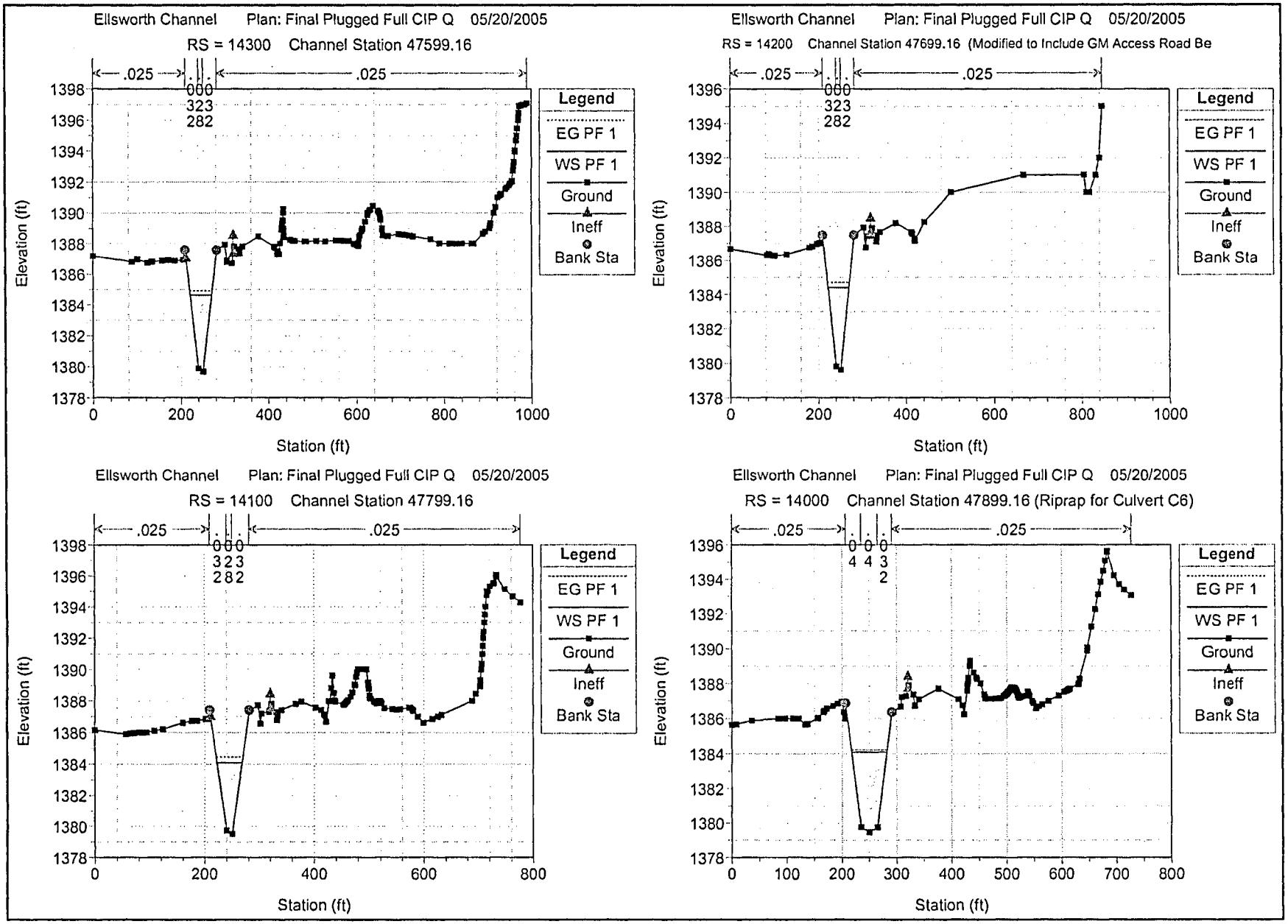

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15700 Channel Station 46199.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15600 Channel Station 46299.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15550 Channel Station 46349.16, upstream end of riprap
.025
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15460 Channel Station 46439.16, culvert section 4
.025
.015
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

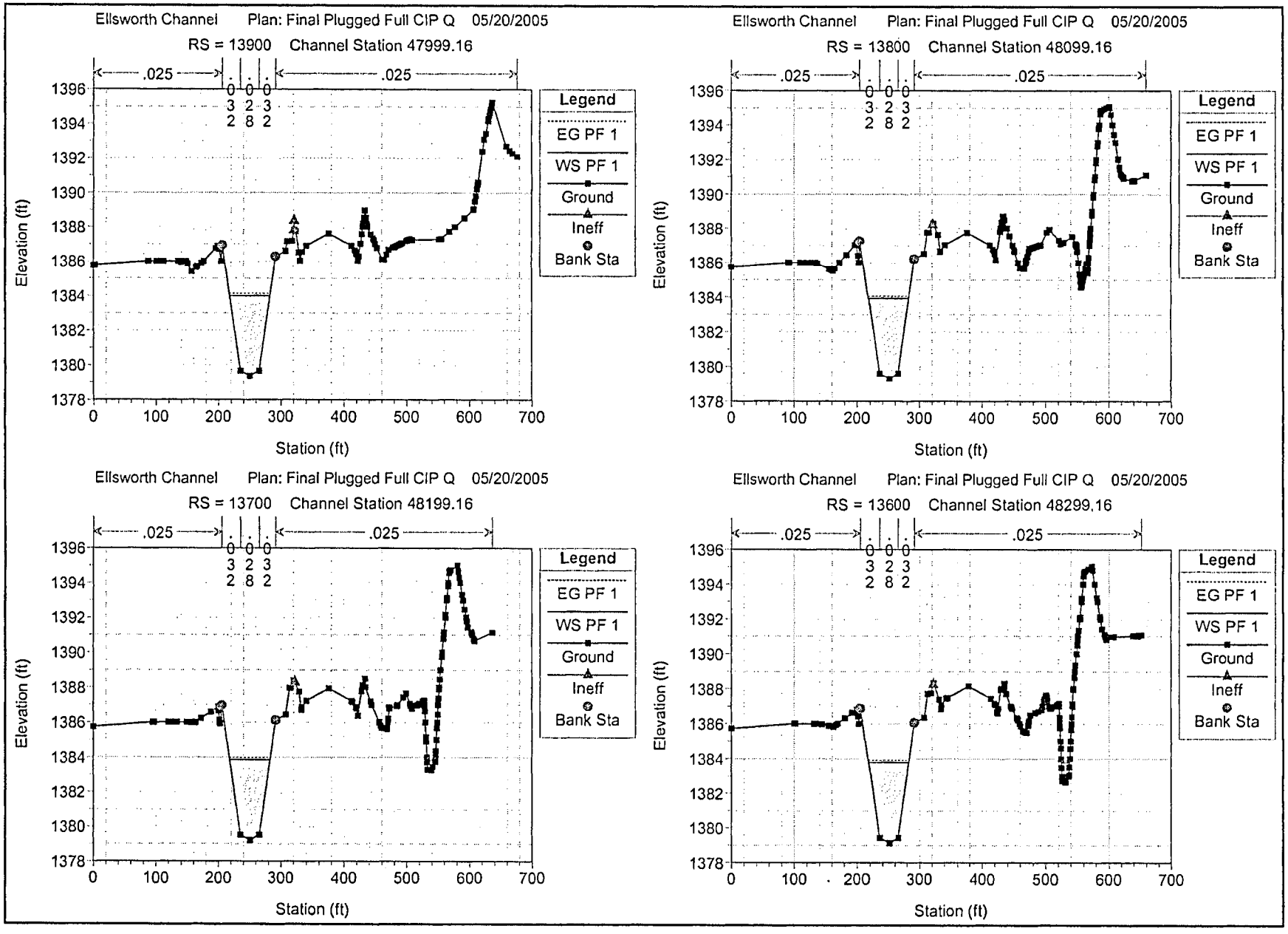

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15450 Channel Station 46449.16, culvert section 3
.025 .015 .025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15350 Culv
.025 .015 .025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15350 Culv
.025 .04 .025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15192 Channel Station 46707.16, culvert section 2
.025 .04 .025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

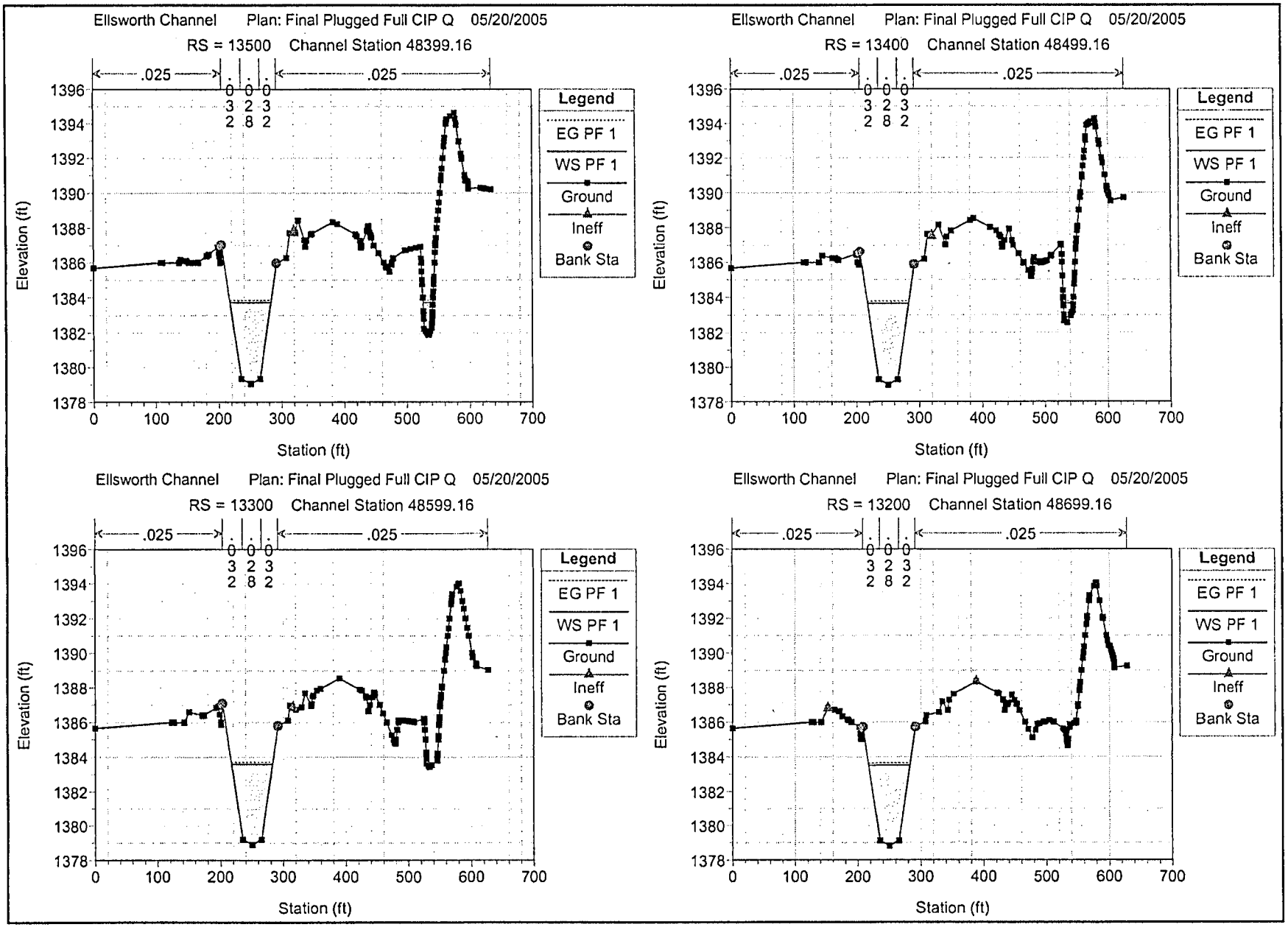

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15100 Channel Station 46799.16, culvert section 1
.025
.04
.025
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 15000 Channel Station 46899.16 (End Riprap)
.025
.032
.025
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14900 Channel Station 46999.16
.025
.032
.025
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14800 Channel Station 47099.16
.025
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1392
1390
1388
1386
1384
1382
1380
0
100
200
300
400
500
Station (ft)

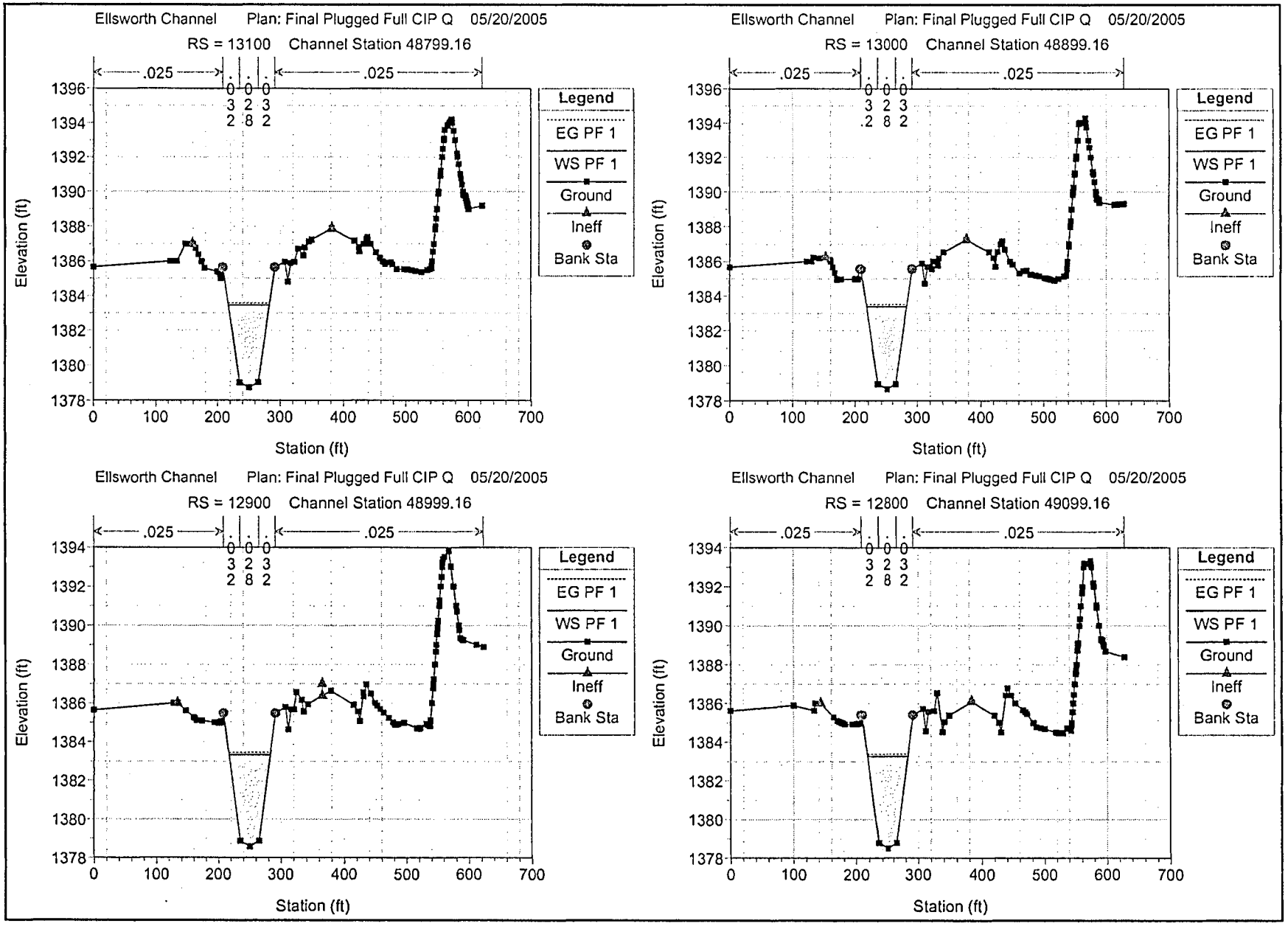

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14700 Channel Station 47199.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14600 Channel Station 47299.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14579 Channel Station 47320.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14569 Channel Station 47330.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

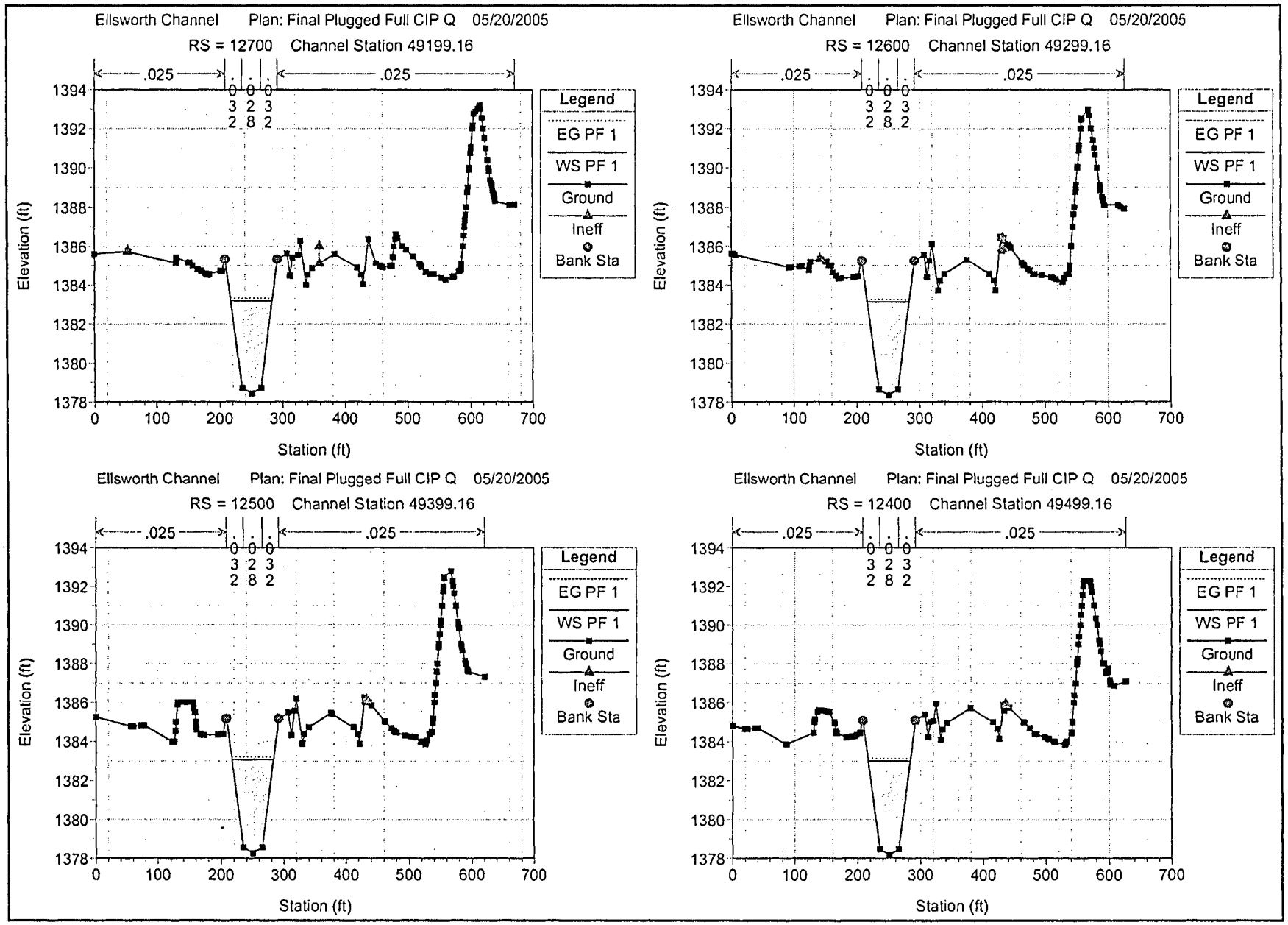

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14501 Channel Station 47398.16
.025
.025
0.032
0.028
0.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14491 Channel Station 47408.16
.025
.025
0.032
0.028
0.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14451 Channel Station 47488.16
.025
.025
0.032
0.028
0.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14400 Channel Station 47499.16
.025
.025
0.032
0.028
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

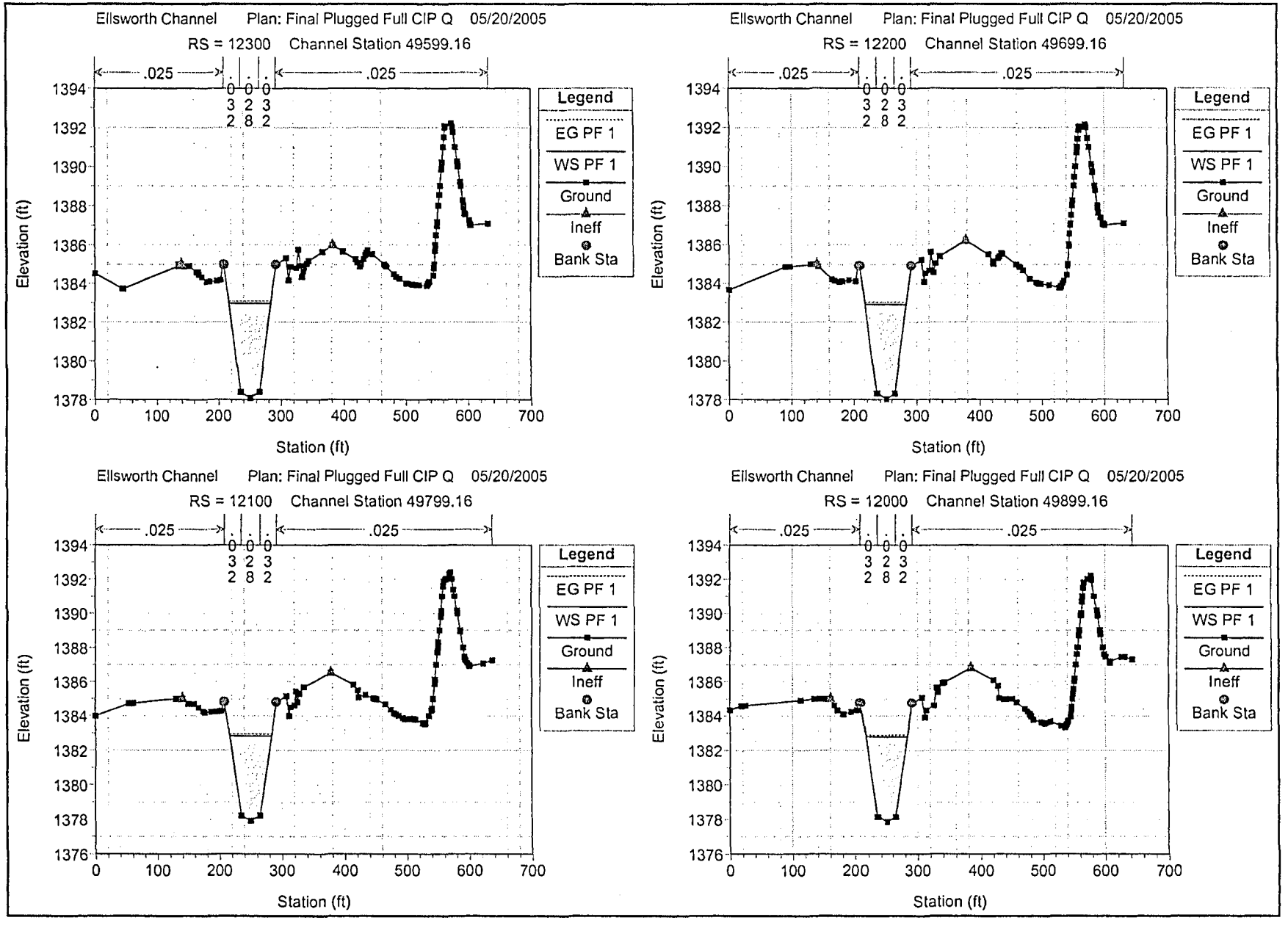

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14300 Channel Station 47599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14200 Channel Station 47699.16 (Modified to Include GM Access Road Be
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14100 Channel Station 47799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 14000 Channel Station 47899.16 (Riprap for Culvert C6)
.025
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

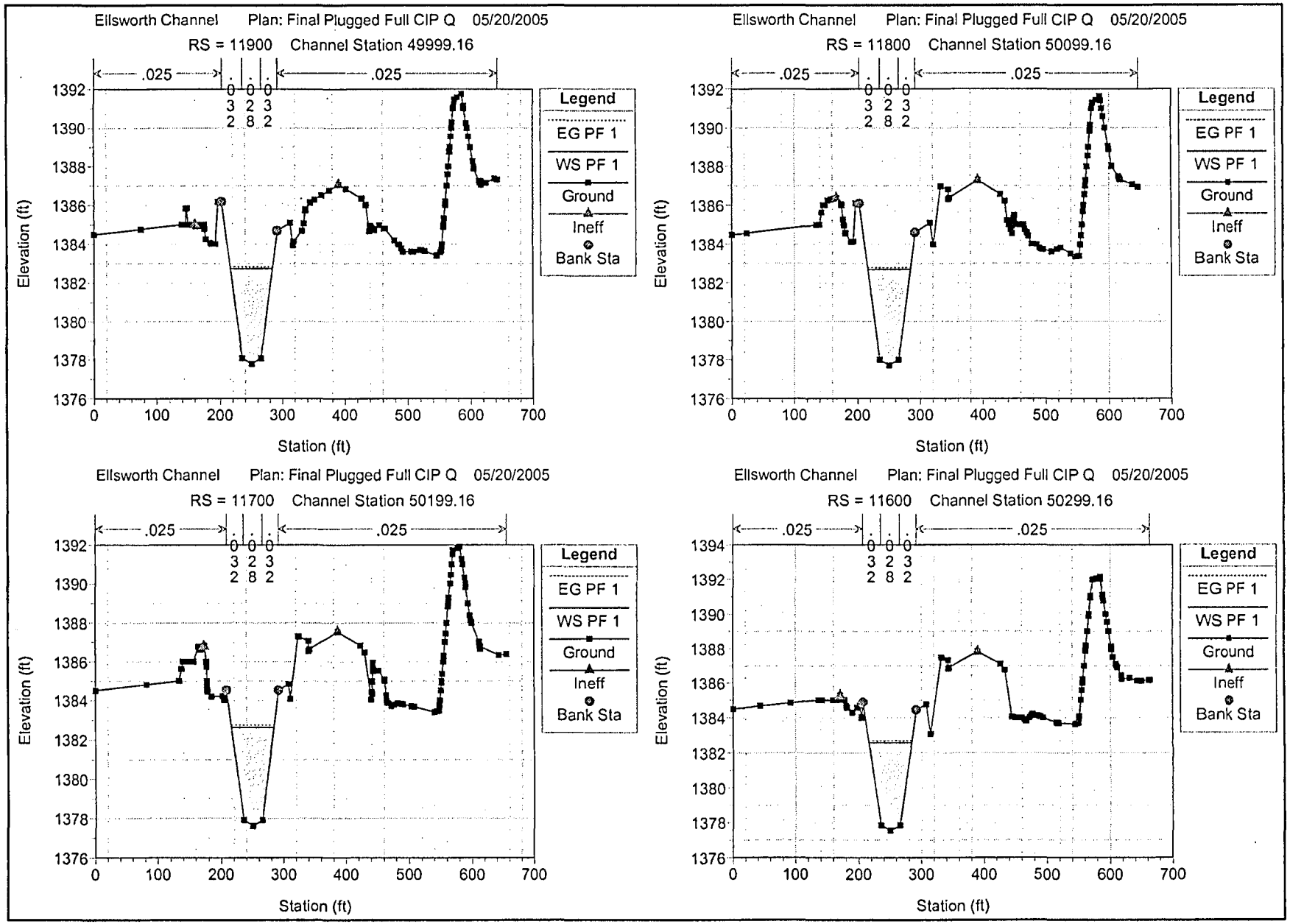

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13900 Channel Station 47999.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13800 Channel Station 48099.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13700 Channel Station 48199.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13600 Channel Station 48299.16
.025
.025
0.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1378
1380
1382
1384
1386
1388
1390
1392
1394
1396
0
100
200
300
400
500
600
700

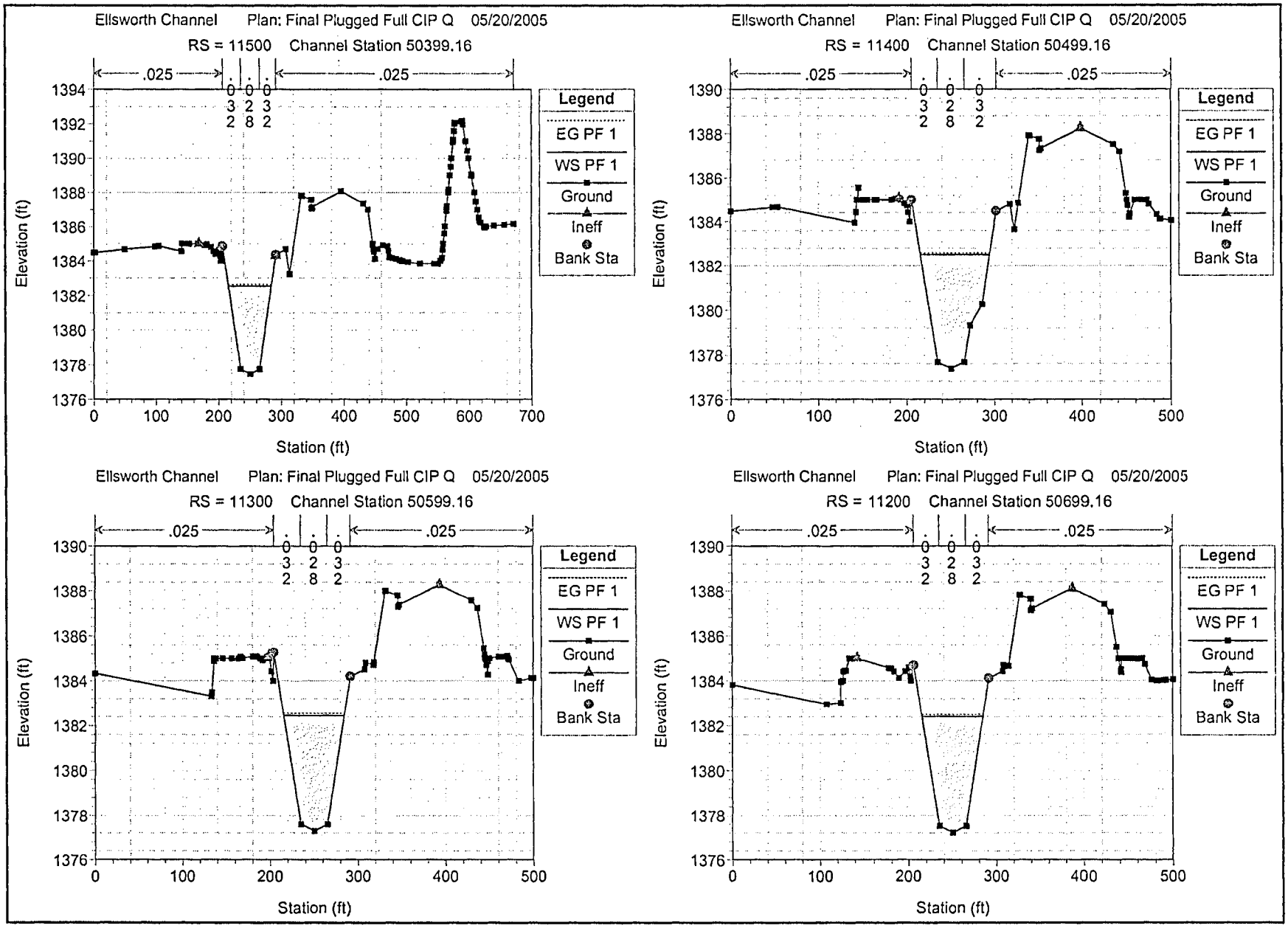

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13500 Channel Station 48399.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13400 Channel Station 48499.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13300 Channel Station 48599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13200 Channel Station 48699.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1378
1380
1382
1384
1386
1388
1390
1392
1394
1396
0
100
200
300
400
500
600
700

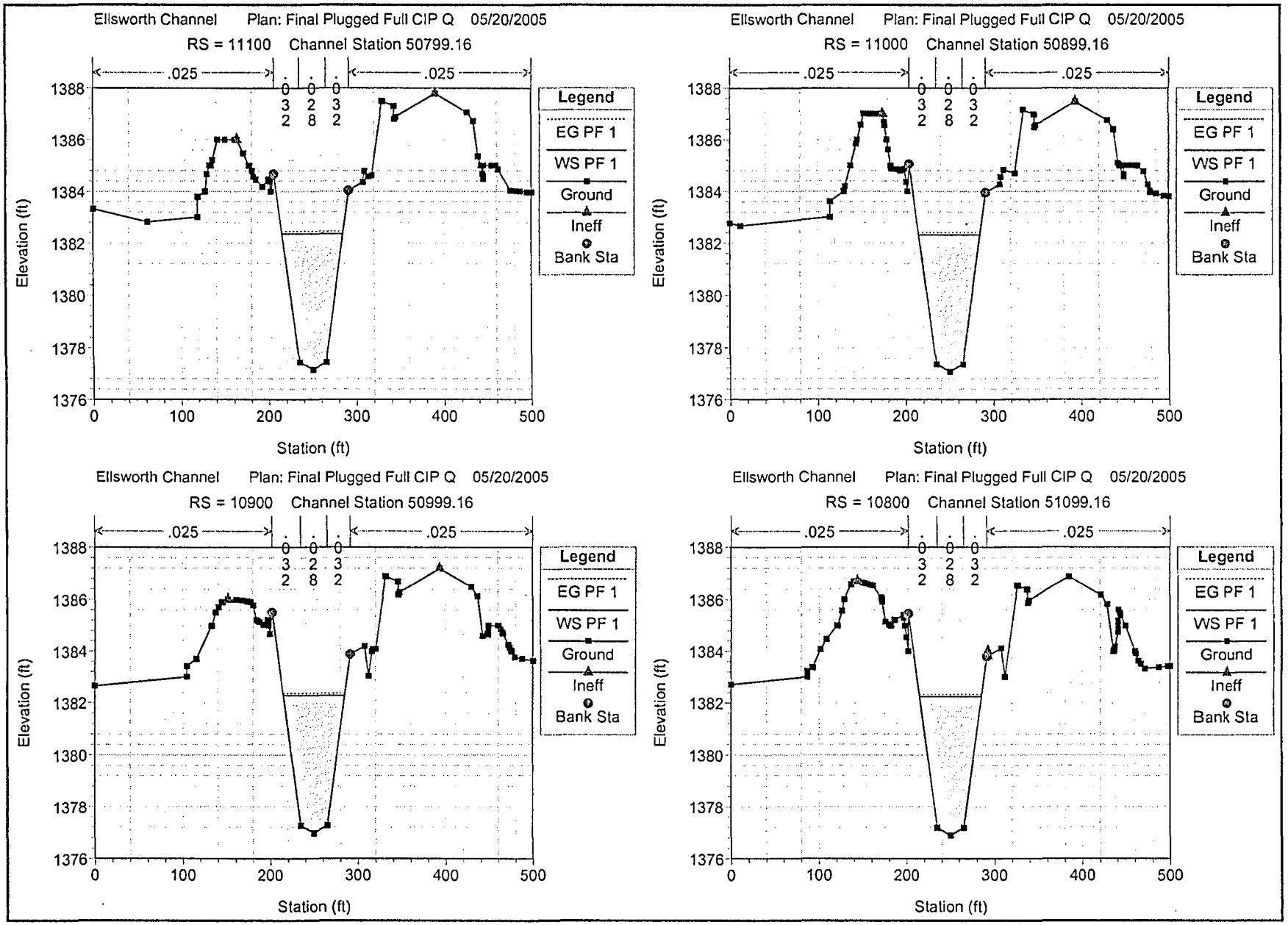

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13100 Channel Station 48799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 13000 Channel Station 48899.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12900 Channel Station 48999.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12800 Channel Station 49099.16
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1378
1380
1382
1384
1386
1388
1390
1392
1394
1396
0
100
200
300
400
500
600
700

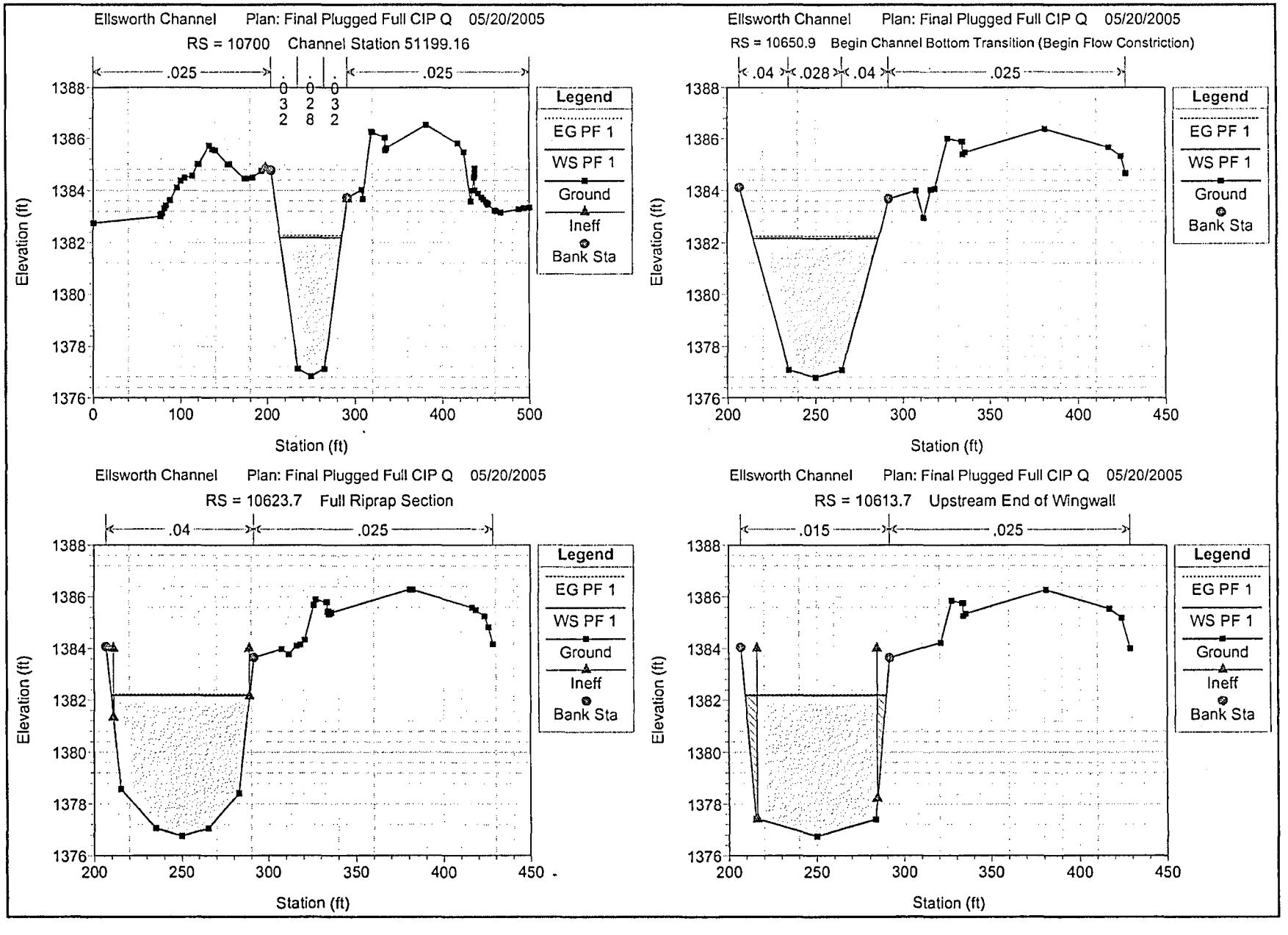

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12700 Channel Station 49199.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12600 Channel Station 49299.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12500 Channel Station 49399.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12400 Channel Station 49499.16
.025
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1378
1380
1382
1384
1386
1388
1390
1392
1394
0
100
200
300
400
500
600
700

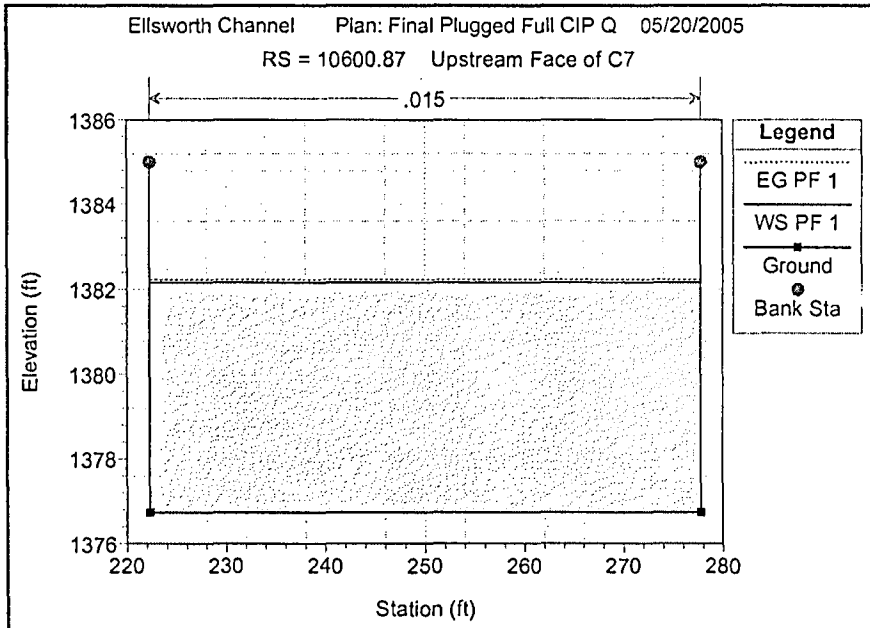

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12300 Channel Station 49599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12200 Channel Station 49699.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12100 Channel Station 49799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 12000 Channel Station 49899.16
.025
.025
0.032
0.028
0.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1394
1392
1390
1388
1386
1384
1382
1380
1378
1376
0
100
200
300
400
500
600
700

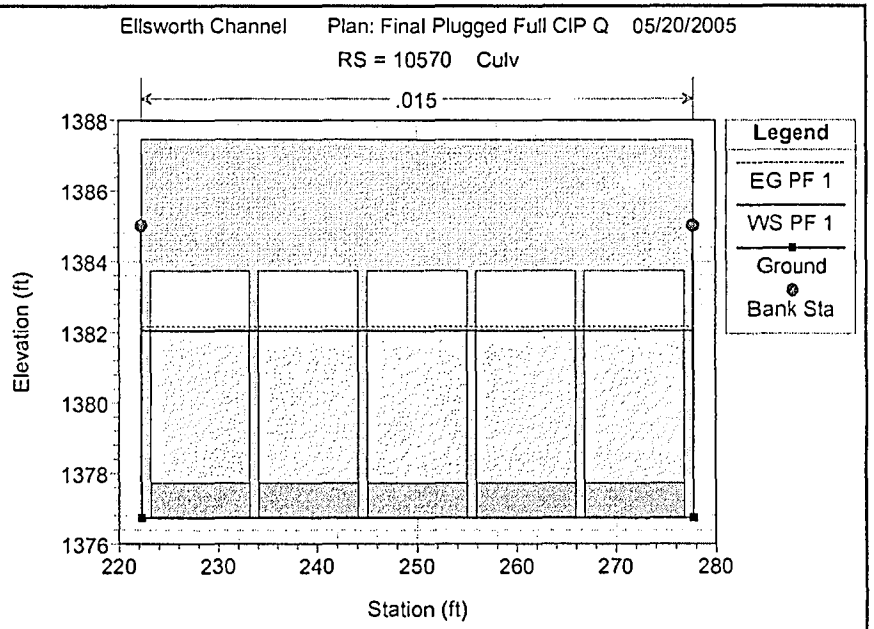

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11900 Channel Station 49999.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11800 Channel Station 50099.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11700 Channel Station 50199.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11600 Channel Station 50299.16
.025
.025
0 0 0
3 2 3
2 8 2
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1392
1390
1388
1386
1384
1382
1380
1378
1376
1394
0
100
200
300
400
500
600
700

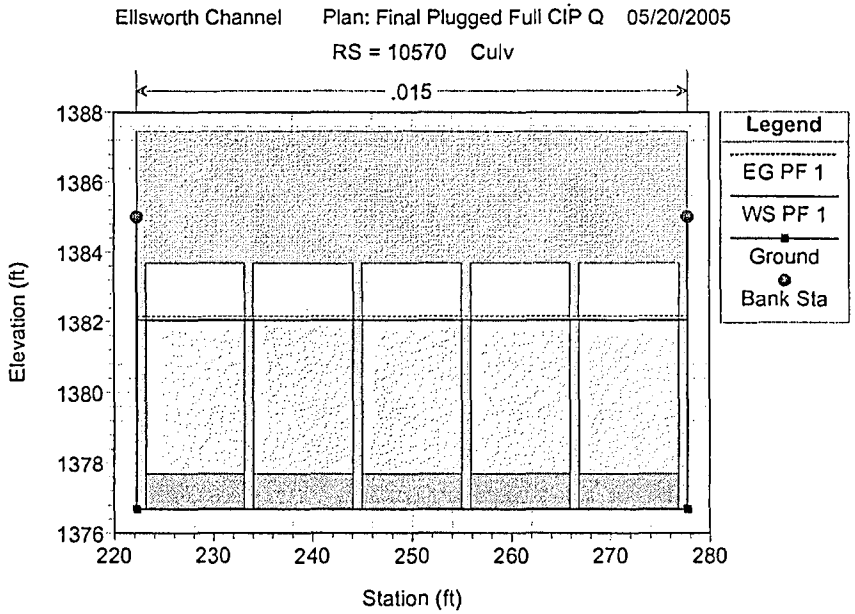

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11500 Channel Station 50399.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11400 Channel Station 50499.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11300 Channel Station 50599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11200 Channel Station 50699.16

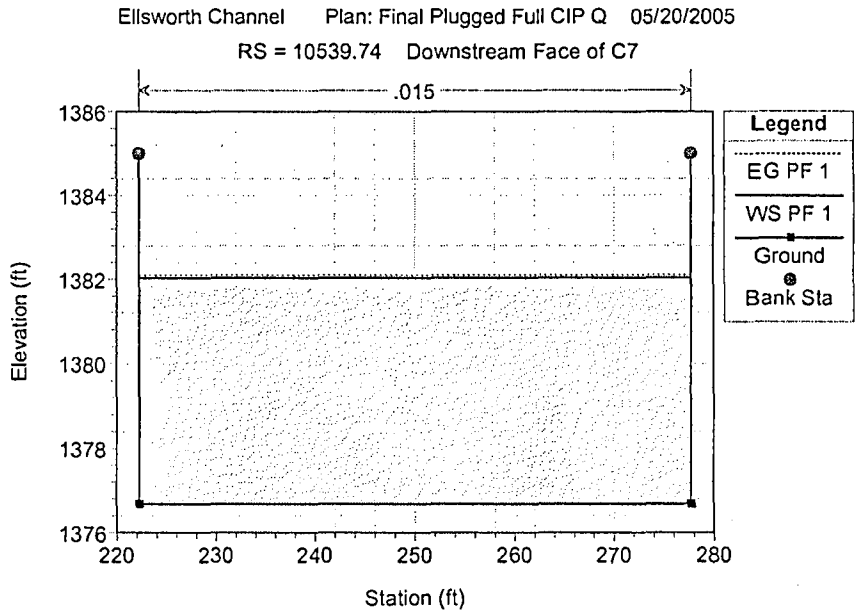

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11100 Channel Station 50799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 11000 Channel Station 50899.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10900 Channel Station 50999.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10800 Channel Station 51099.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1376
1378
1380
1382
1384
1386
1388
0
100
200
300
400
500

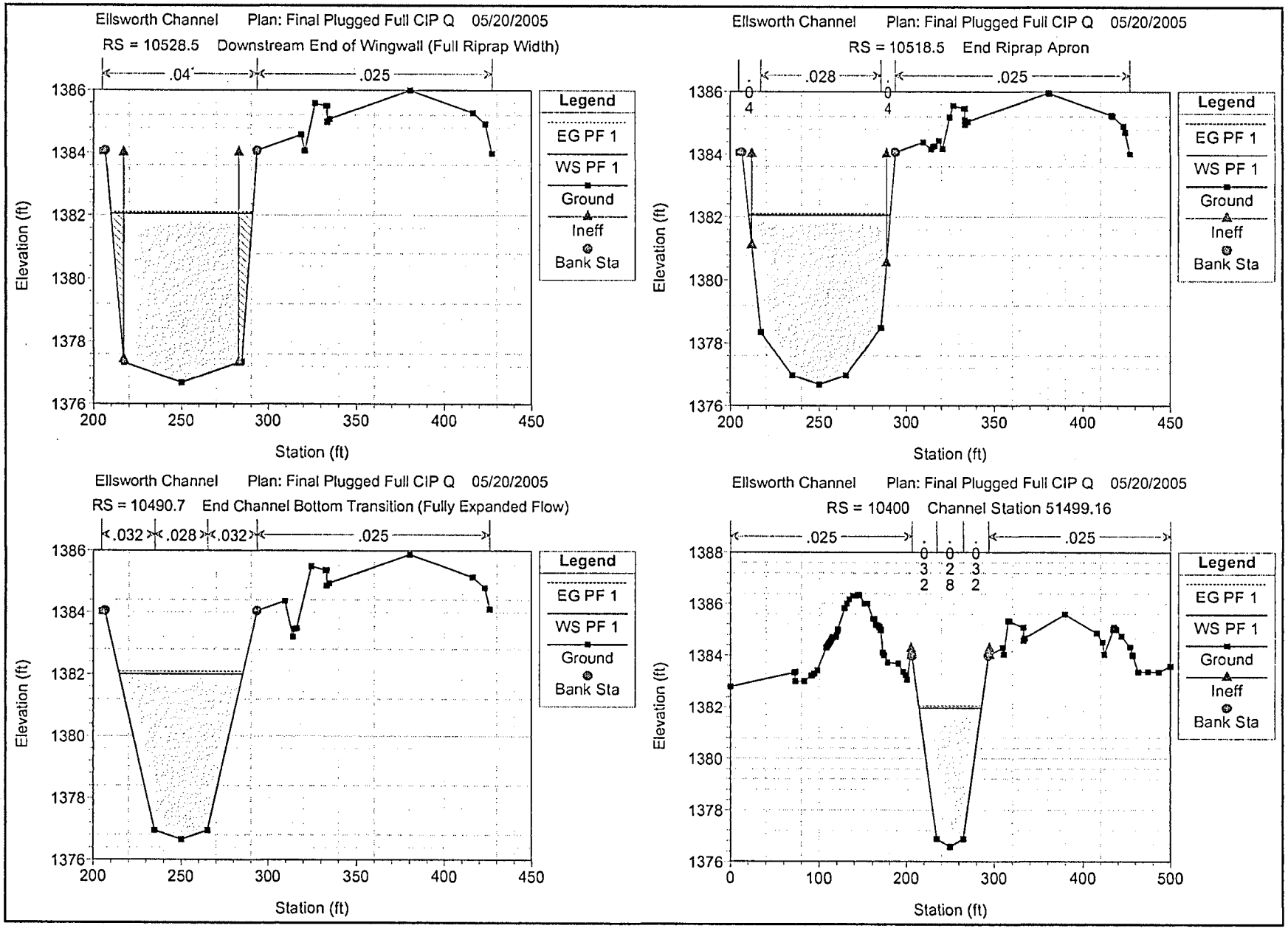

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10700 Channel Station 51199.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10650.9 Begin Channel Bottom Transition (Begin Flow Constriction)
.04
.028
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10623.7 Full Riprap Section
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10613.7 Upstream End of Wingwall
.015
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

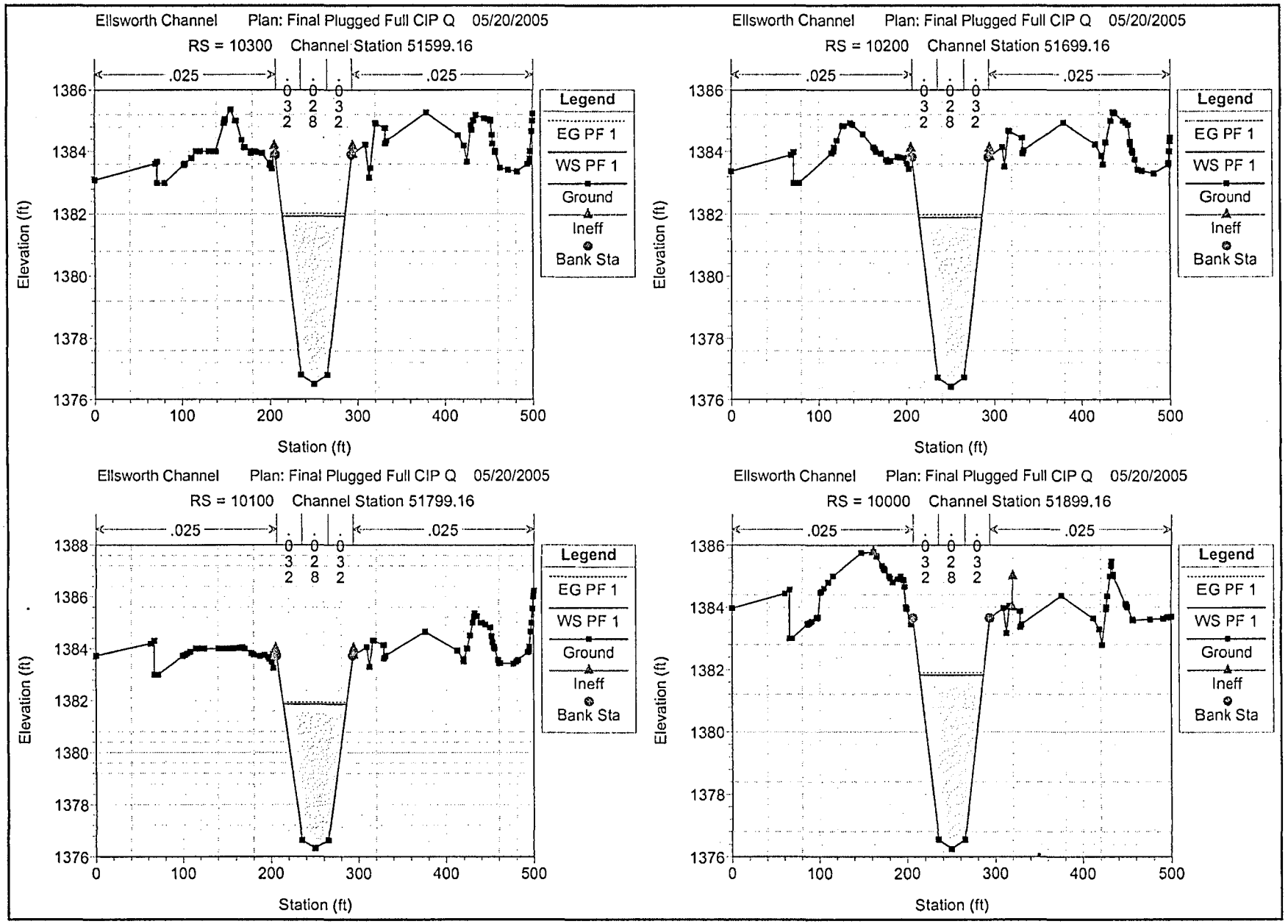

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10600.87 Upstream Face of C7
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
220
230
240
250
260
270
280
Station (ft)

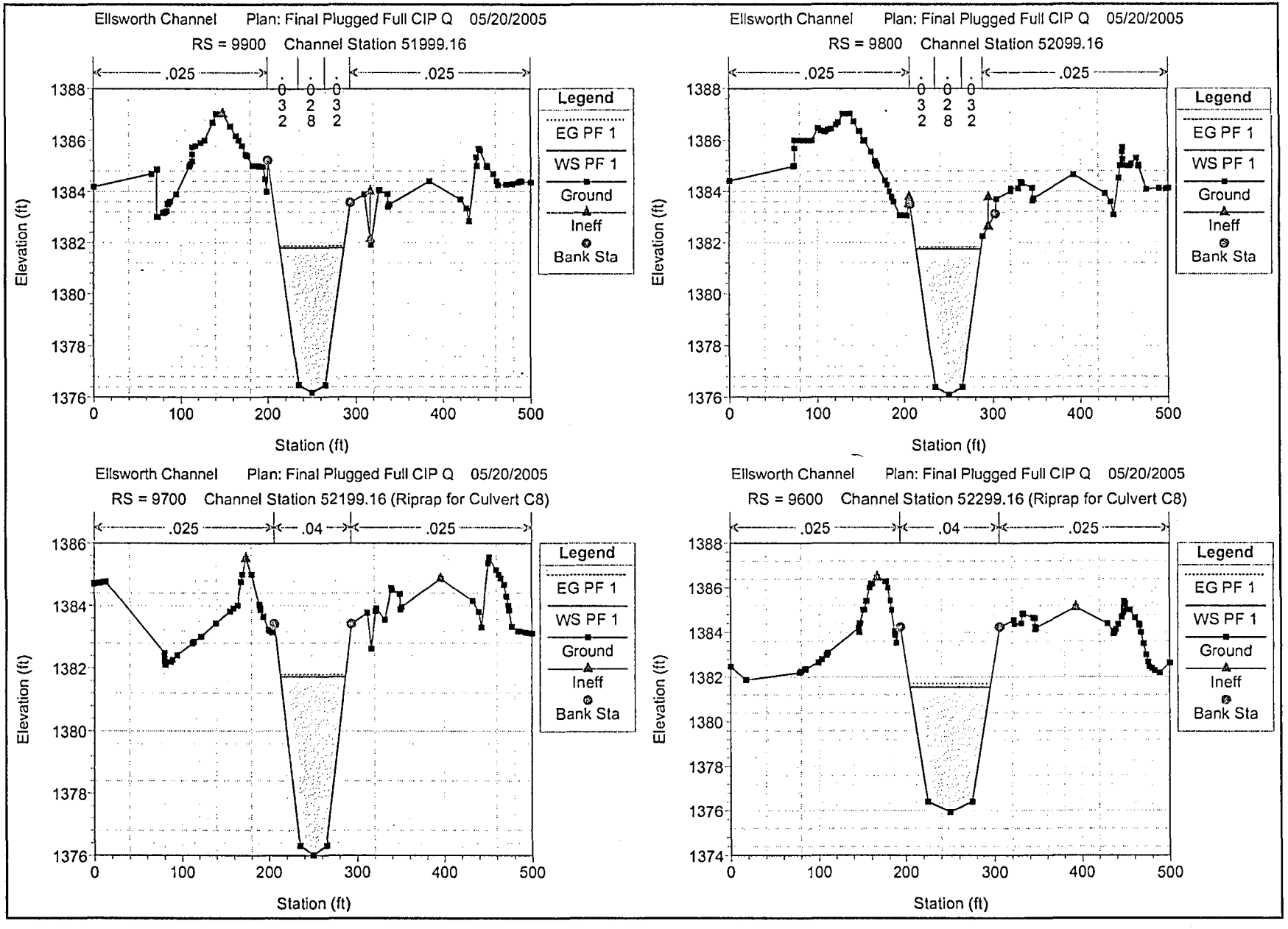

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10570 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1388
1386
1384
1382
1380
1378
1376
220
230
240
250
260
270
280
Station (ft)

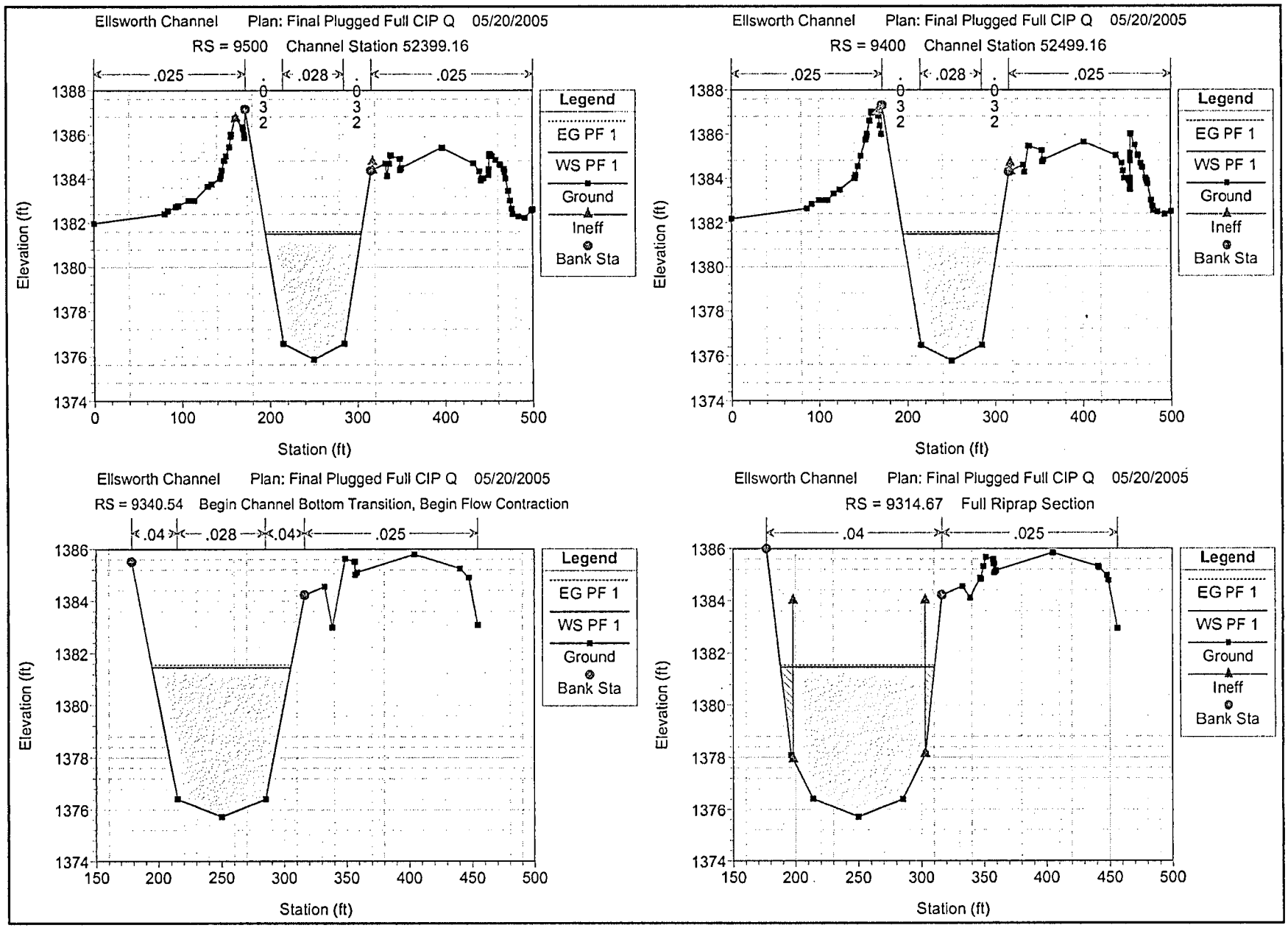

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10570 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1388
1386
1384
1382
1380
1378
1376
220
230
240
250
260
270
280
Station (ft)

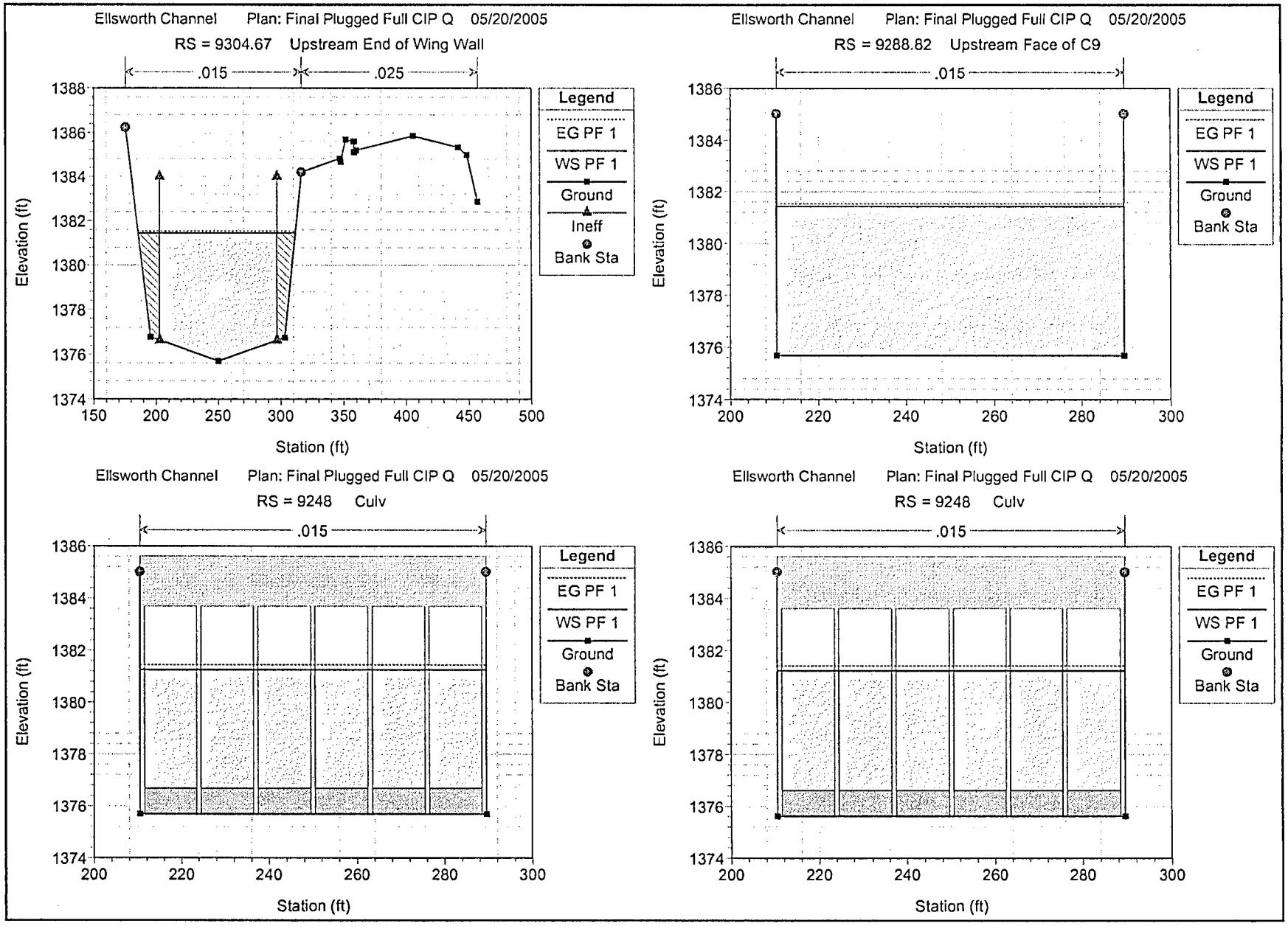

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10539.74 Downstream Face of C7
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
220
230
240
250
260
270
280
Station (ft)

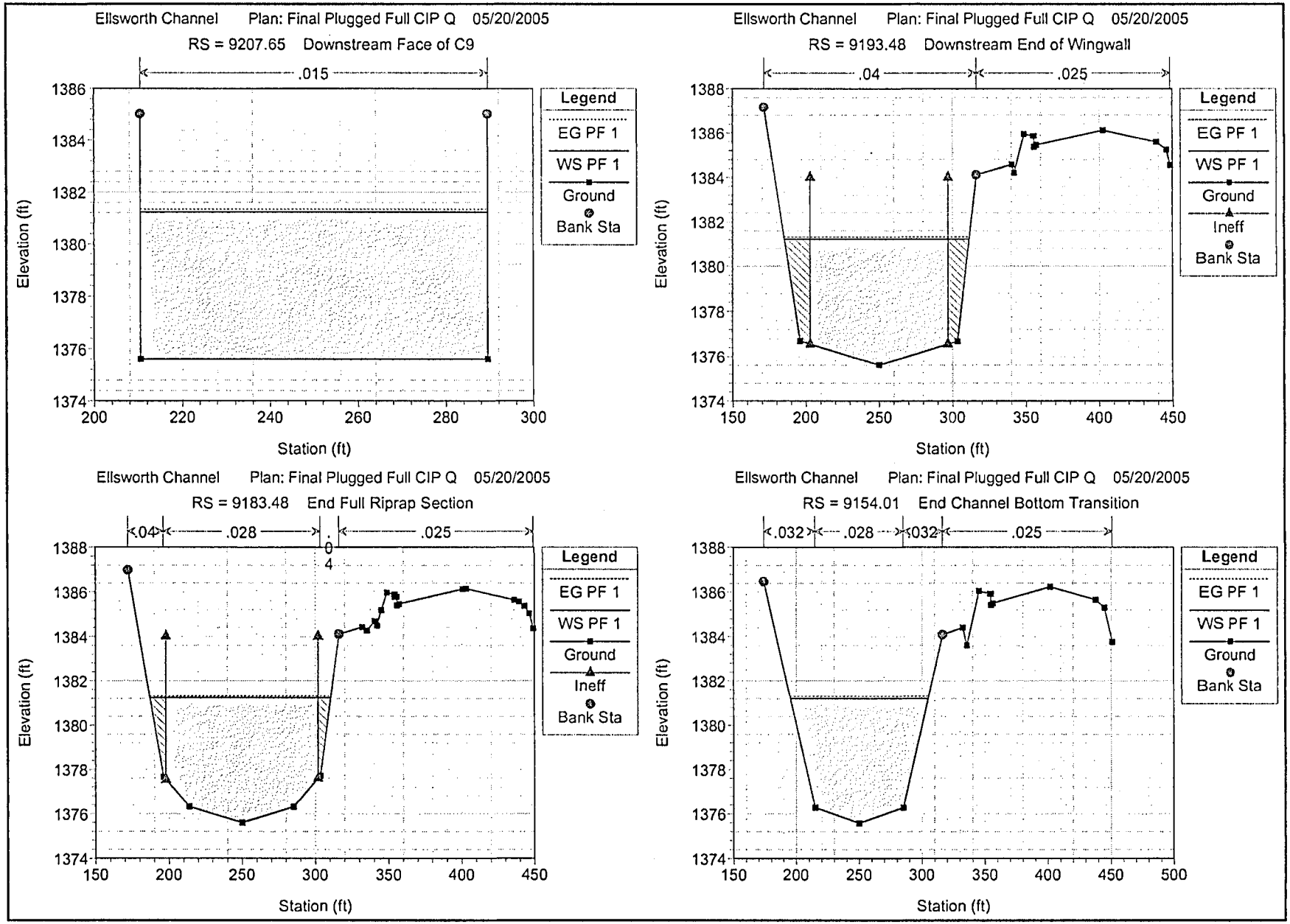

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10528.5 Downstream End of Wingwall (Full Riprap Width)
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10518.5 End Riprap Apron
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10490.7 End Channel Bottom Transition (Fully Expanded Flow)
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10400 Channel Station 51499.16
.025
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

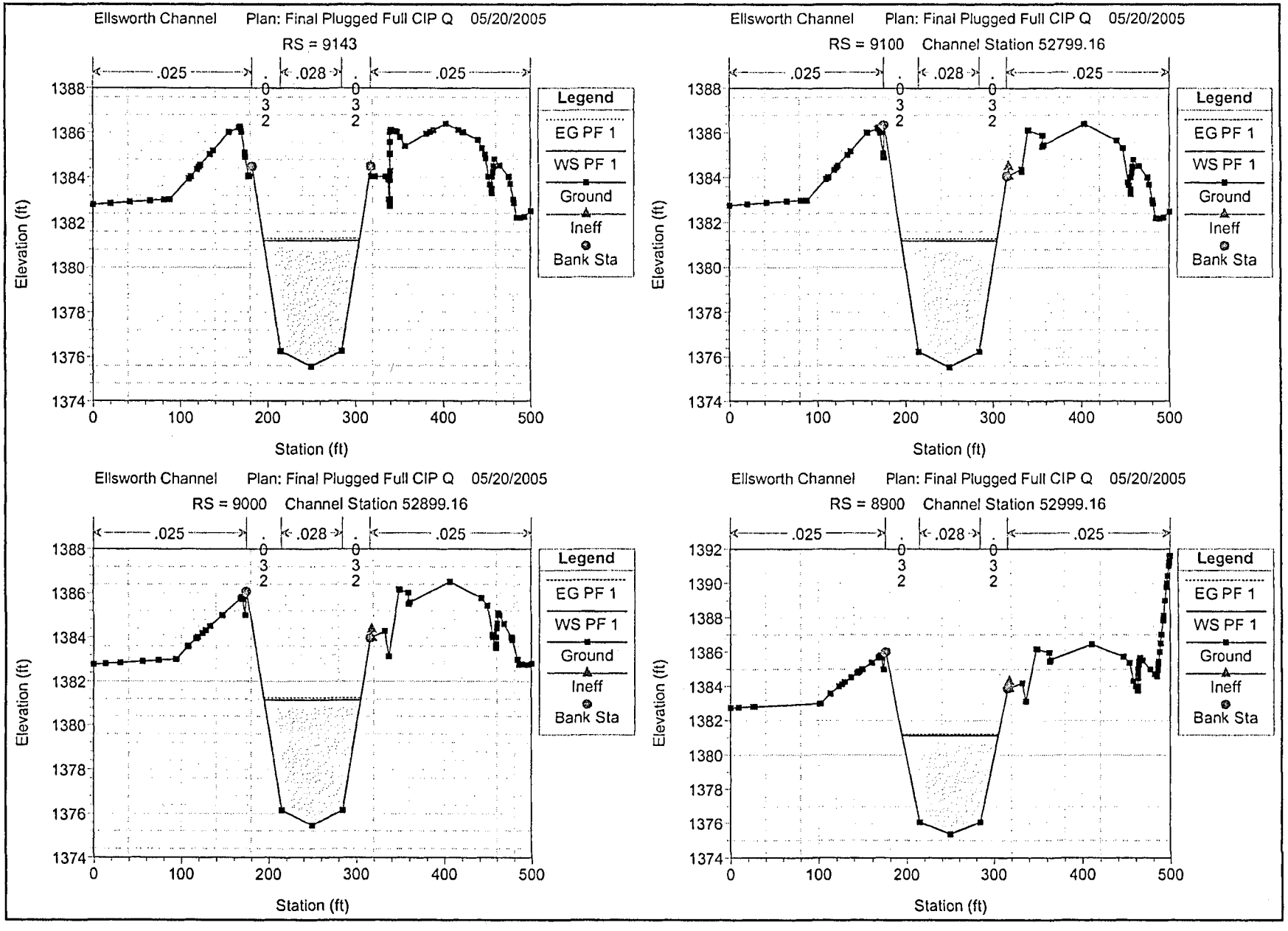

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10300 Channel Station 51599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10200 Channel Station 51699.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10100 Channel Station 51799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 10000 Channel Station 51899.16
.025
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

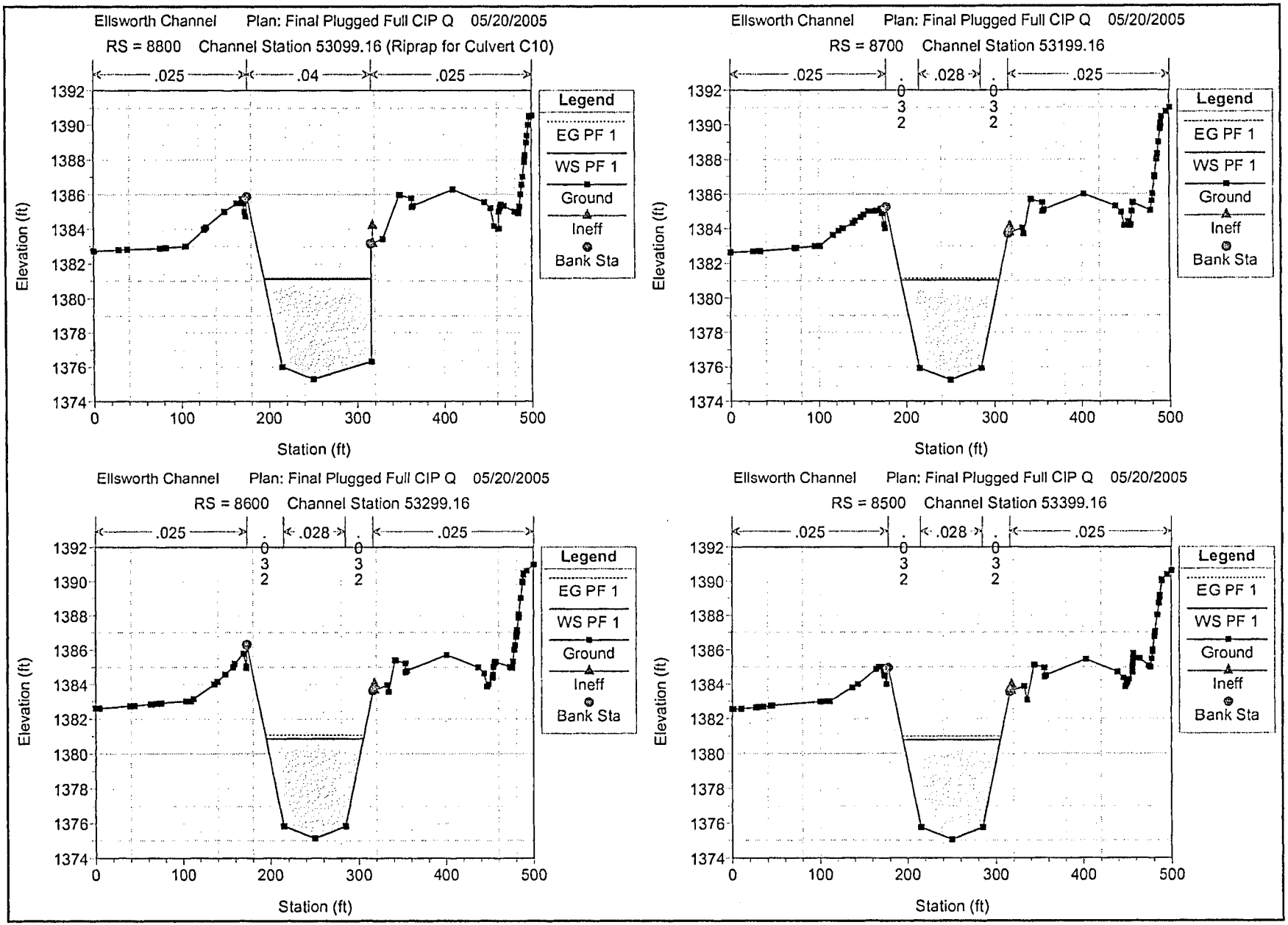

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9900 Channel Station 51999.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9800 Channel Station 52099.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9700 Channel Station 52199.16 (Riprap for Culvert C8)
.025
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9600 Channel Station 52299.16 (Riprap for Culvert C8)
.025
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

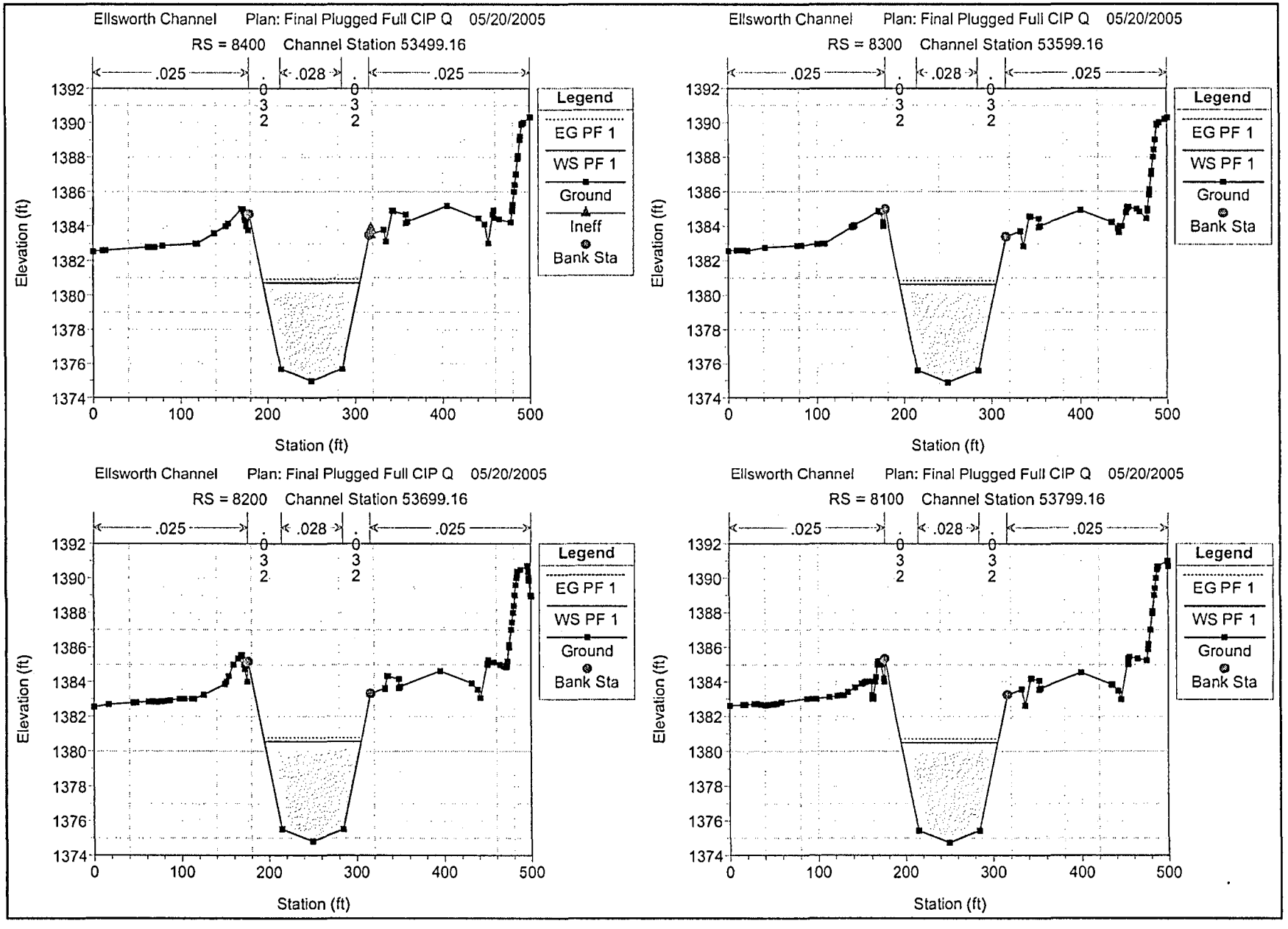

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9500 Channel Station 52399.16
.025
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9400 Channel Station 52499.16
.025
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9340.54 Begin Channel Bottom Transition, Begin Flow Contraction
.04
.028
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9314.67 Full Riprap Section
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

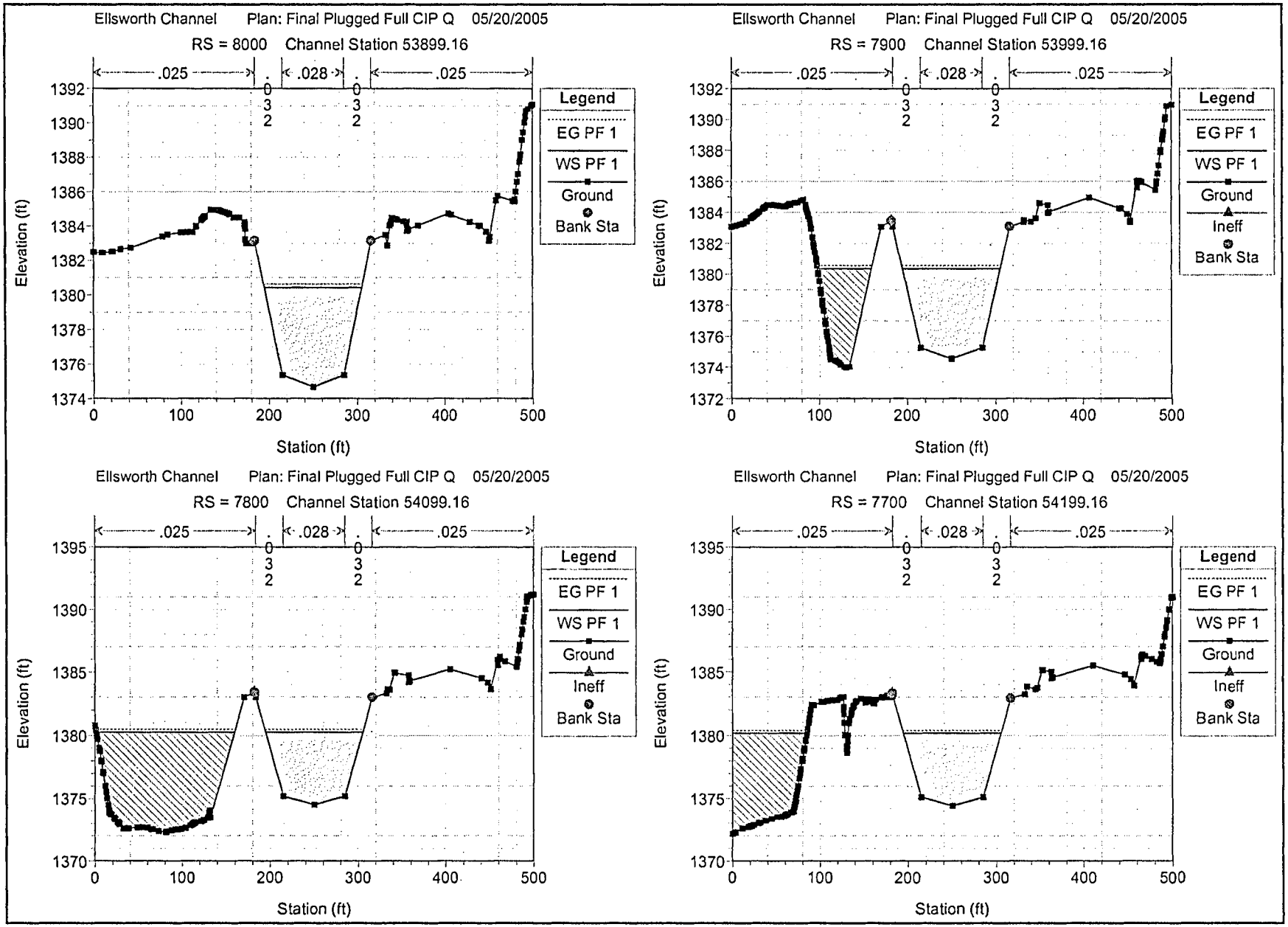

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9304.67 Upstream End of Wing Wall
.015
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9288.82 Upstream Face of C9
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9248 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9248 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

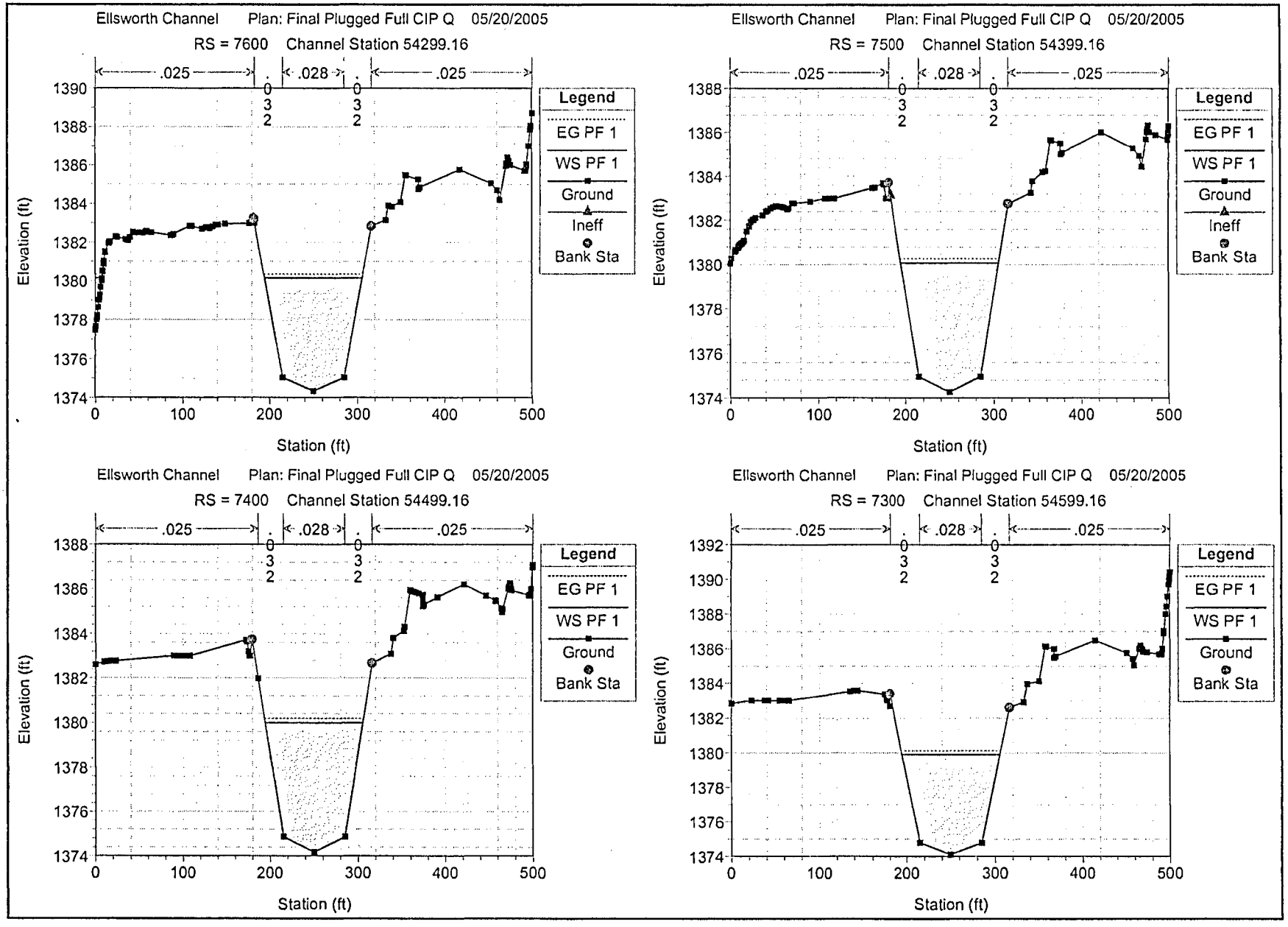

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9207.65 Downstream Face of C9
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9193.48 Downstream End of Wingwall
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9183.48 End Full Riprap Section
.04
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9154.01 End Channel Bottom Transition
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

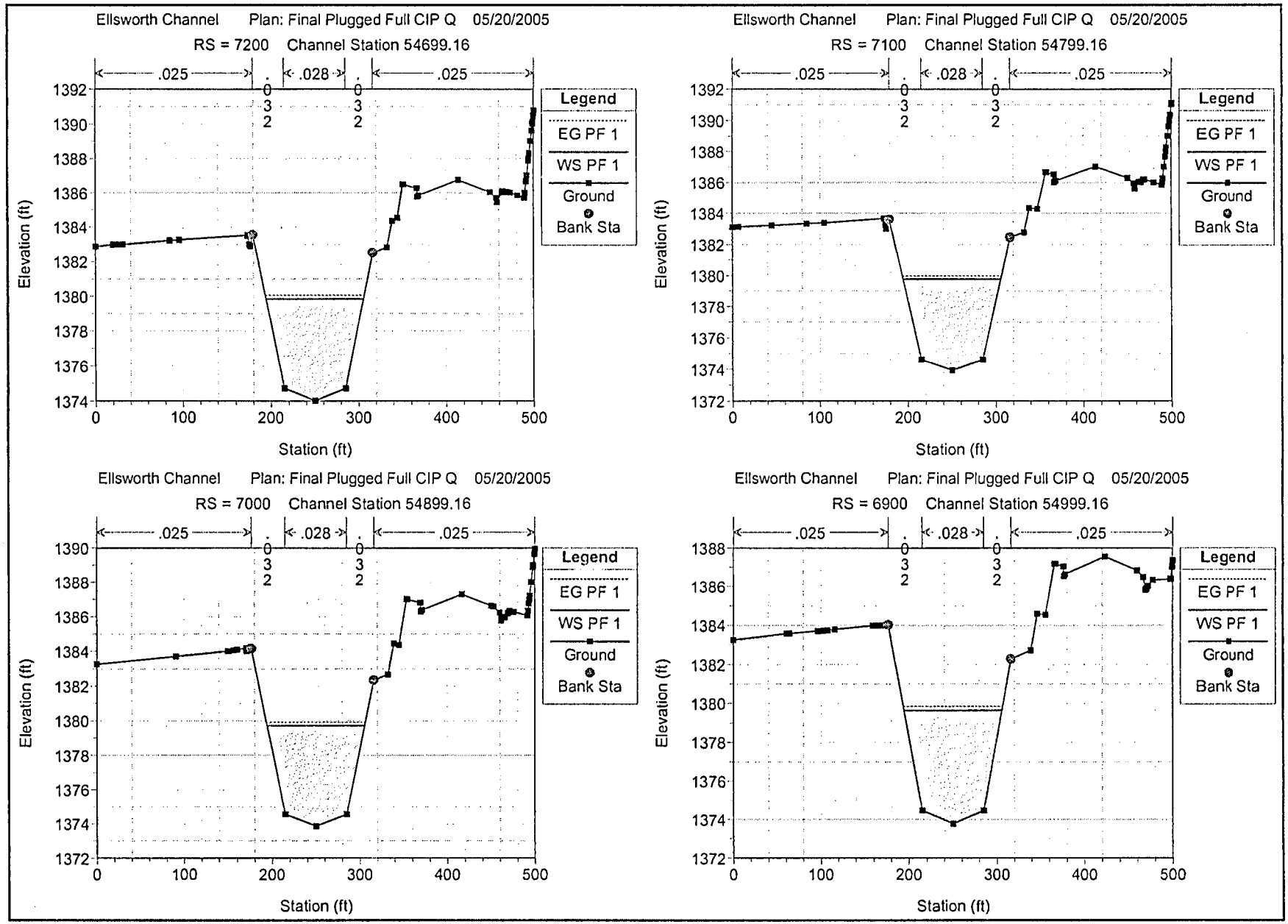

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9143
.025
.028
.025
.032
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9100 Channel Station 52799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 9000 Channel Station 52899.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8900 Channel Station 52999.16

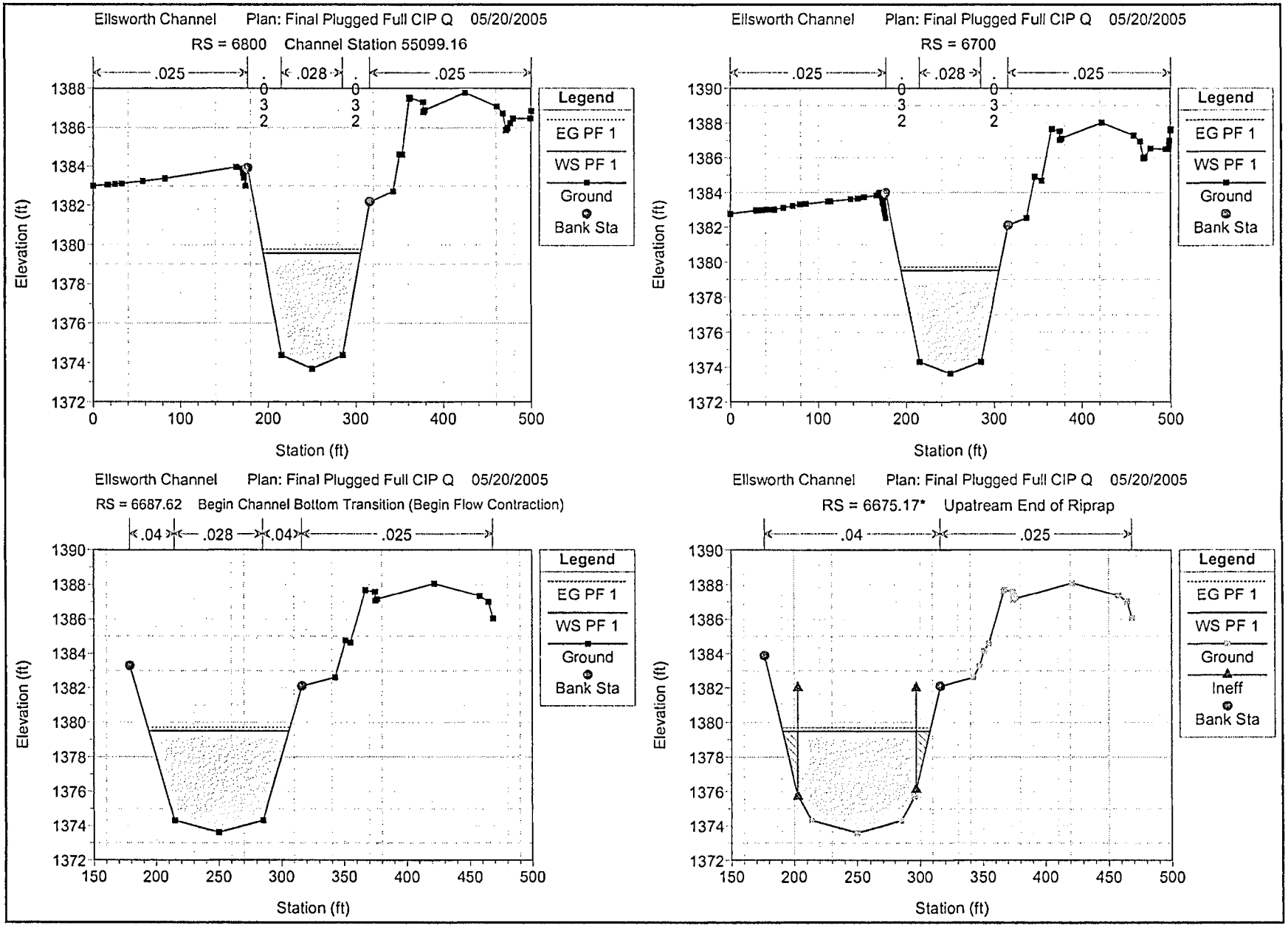

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8800 Channel Station 53099.16 (Riprap for Culvert C10)
.025
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8700 Channel Station 53199.16
.025
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8600 Channel Station 53299.16
.025
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8500 Channel Station 53399.16
.025
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

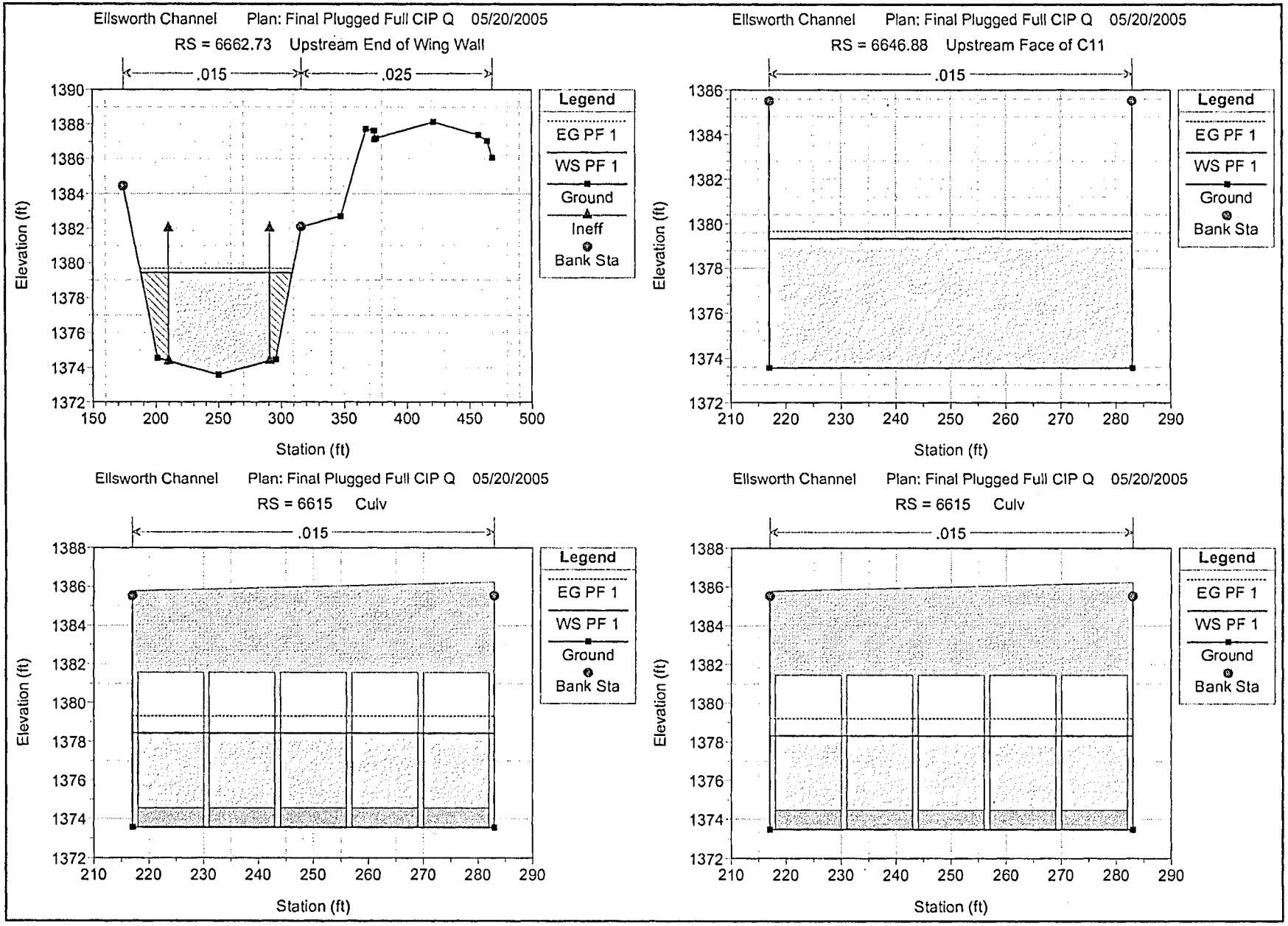

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8400 Channel Station 53499.16
.025
.028
.025
.032
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8300 Channel Station 53599.16
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8200 Channel Station 53699.16
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8100 Channel Station 53799.16
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

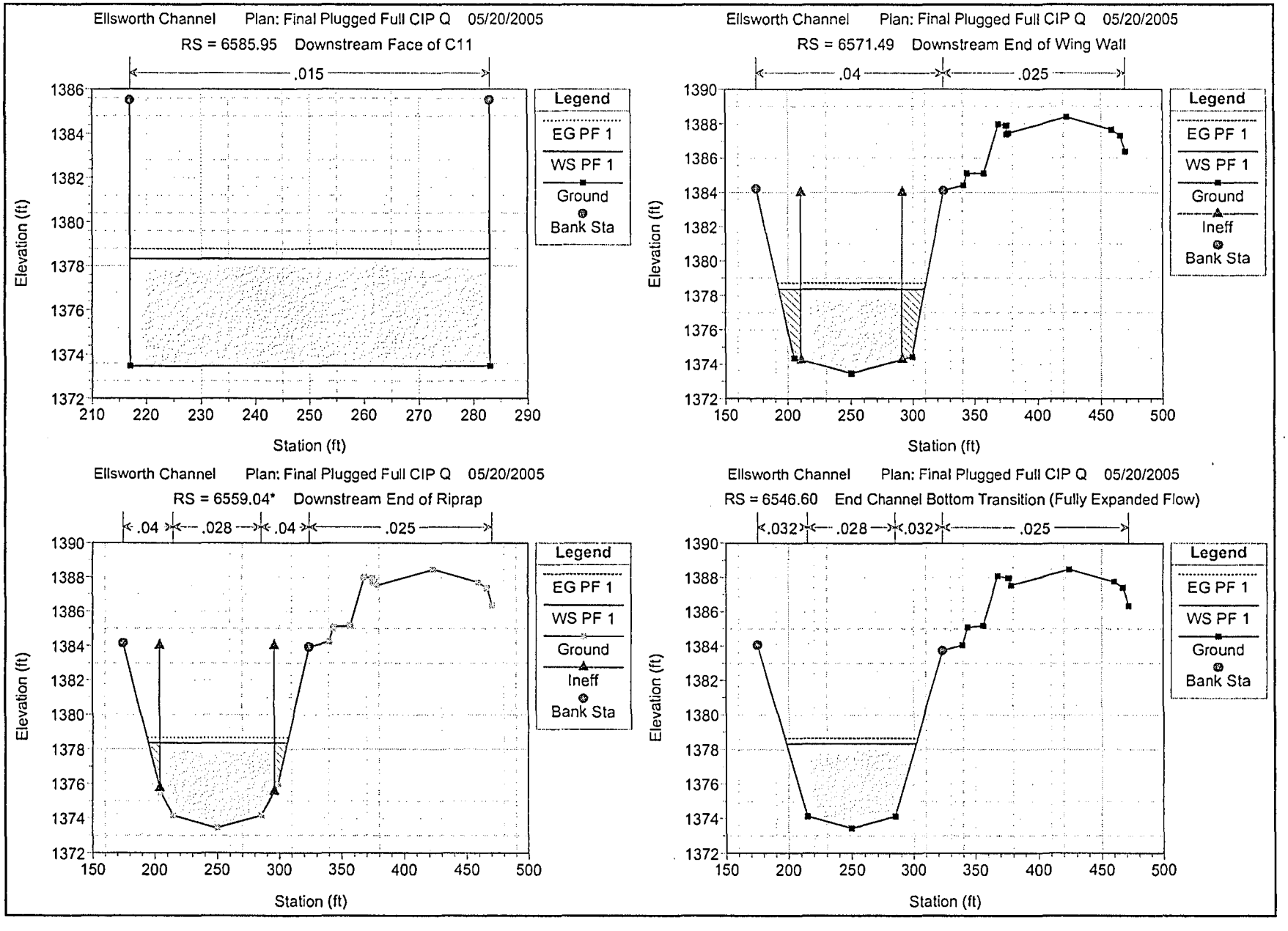

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 8000 Channel Station 53899.16
.025
.028
.025
.032
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7900 Channel Station 53999.16
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7800 Channel Station 54099.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7700 Channel Station 54199.16

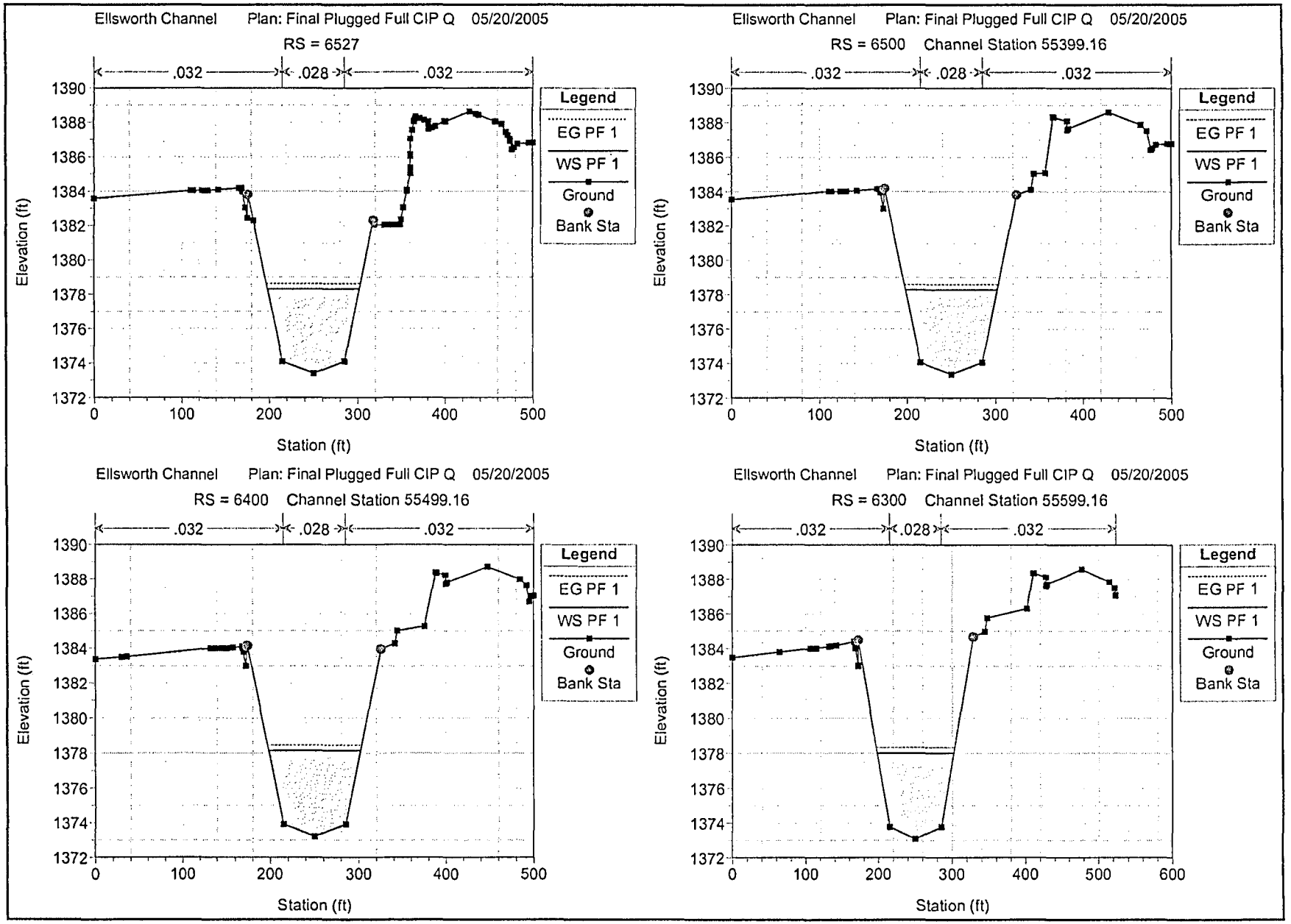

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7600 Channel Station 54299.16
.025
.028
.025
.032
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7500 Channel Station 54399.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7400 Channel Station 54499.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7300 Channel Station 54599.16

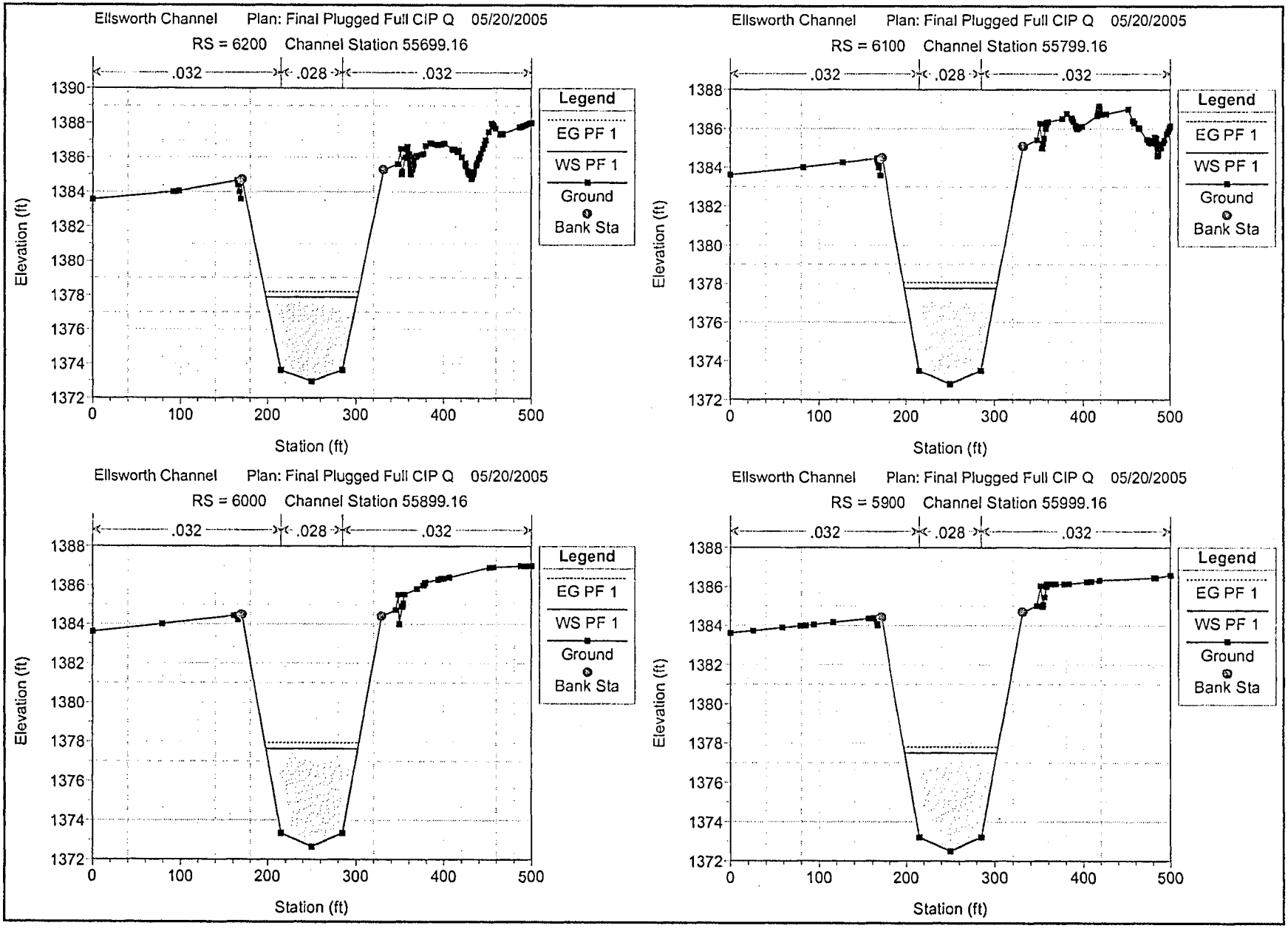

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7200 Channel Station 54699.16
.025
.028
.025
0.32
0.32
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7100 Channel Station 54799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 7000 Channel Station 54899.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6900 Channel Station 54999.16

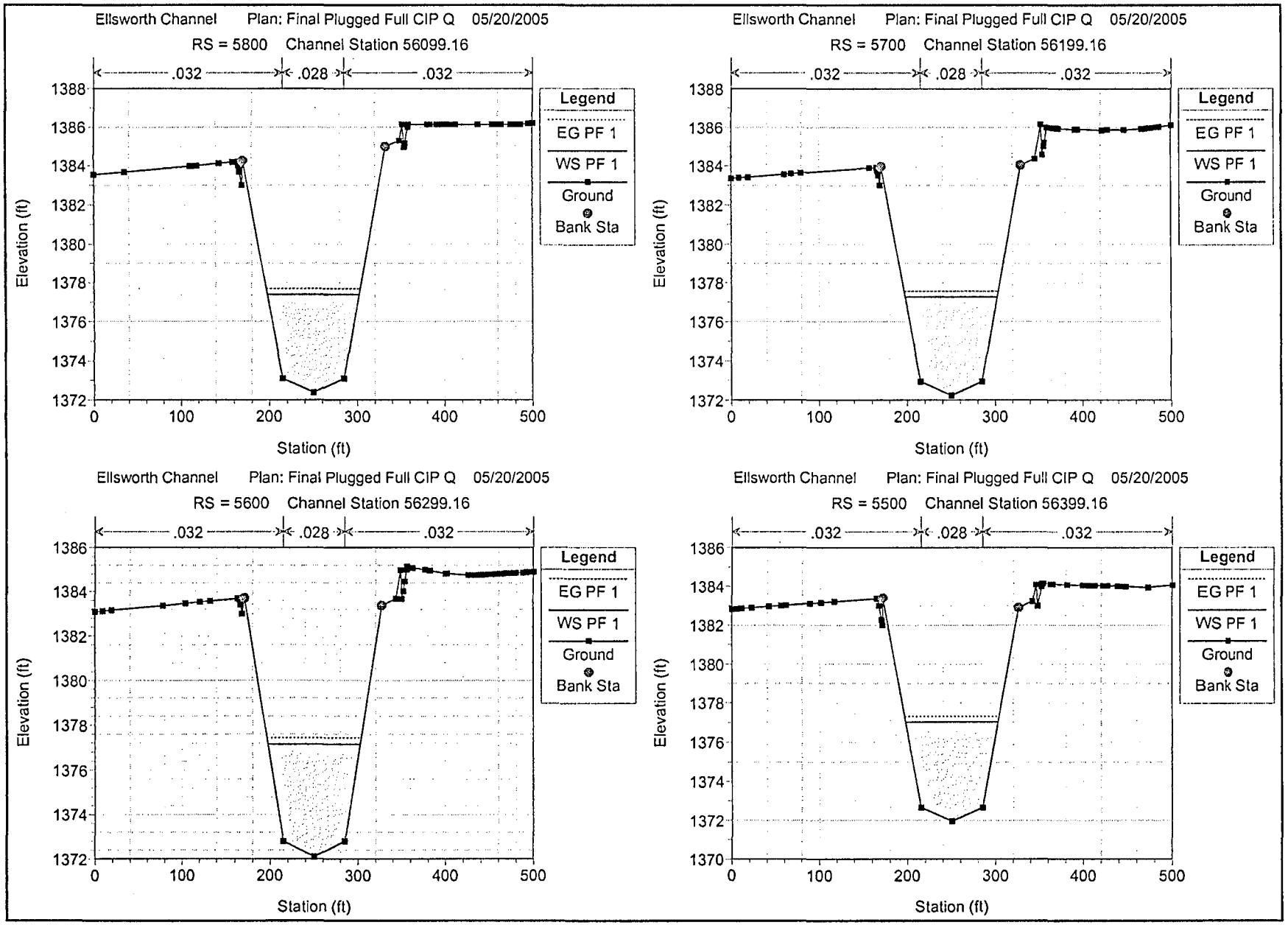

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6800 Channel Station 55099.16
.025
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6700
.025
.028
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6687.62 Begin Channel Bottom Transition (Begin Flow Contraction)
.04
.028
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6675.17* Upatream End of Riprap
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

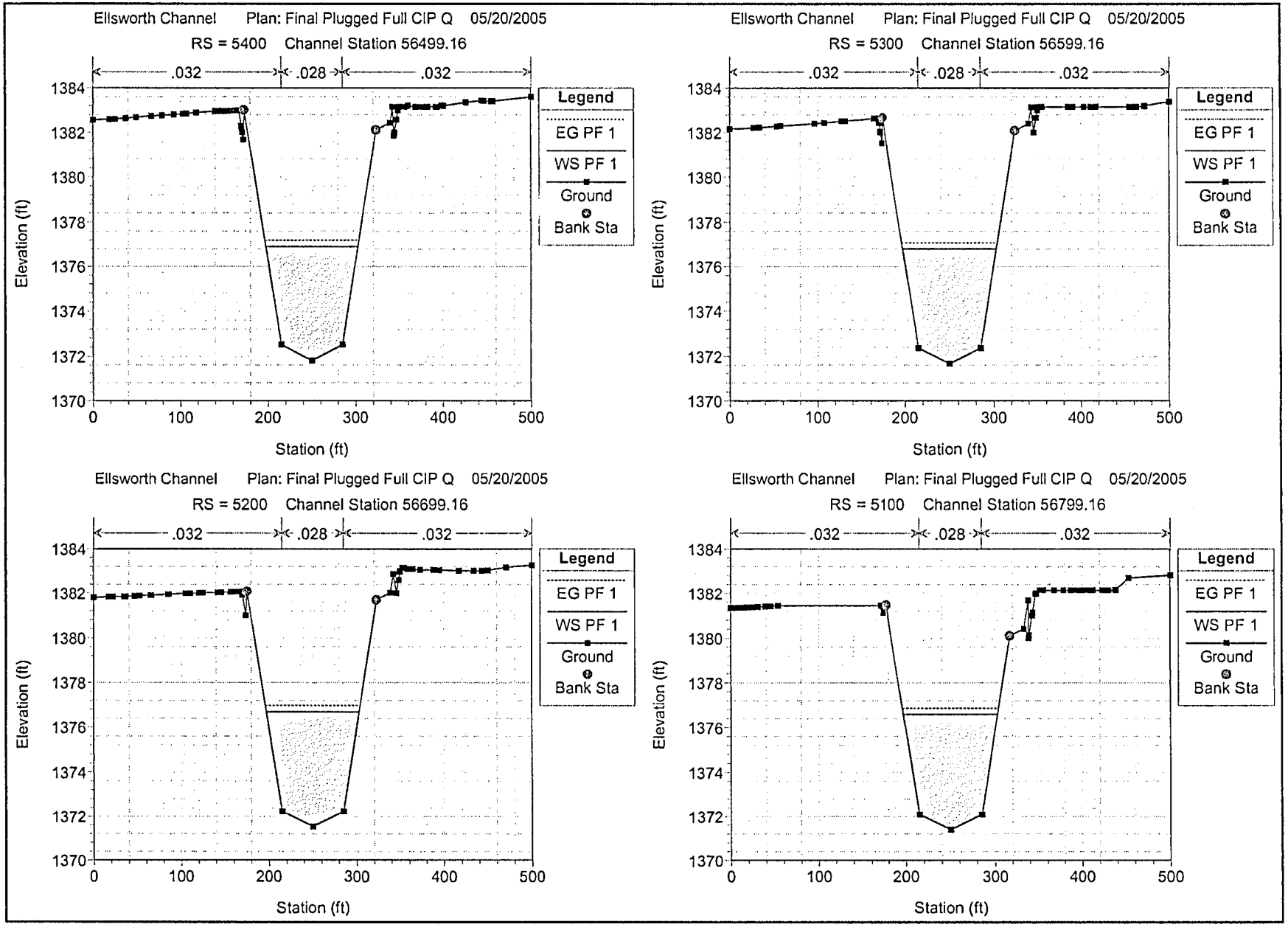

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6662.73 Upstream End of Wing Wall
.015
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6646.88 Upstream Face of C11
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6615 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6615 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

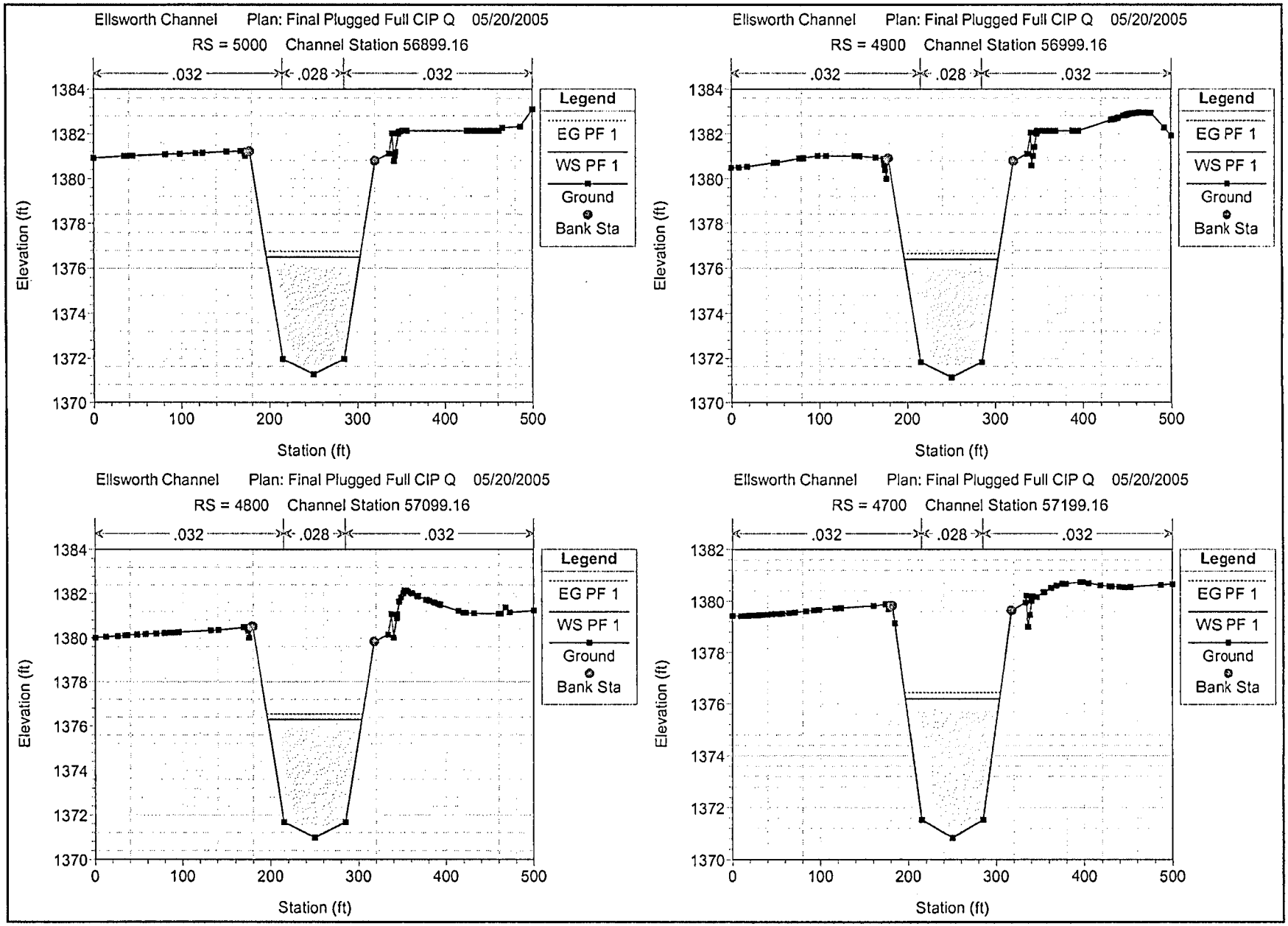

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6585.95 Downstream Face of C11
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6571.49 Downstream End of Wing Wall
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6559.04* Downstream End of Riprap
.04
.028
.04
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6546.60 End Channel Bottom Transition (Fully Expanded Flow)
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

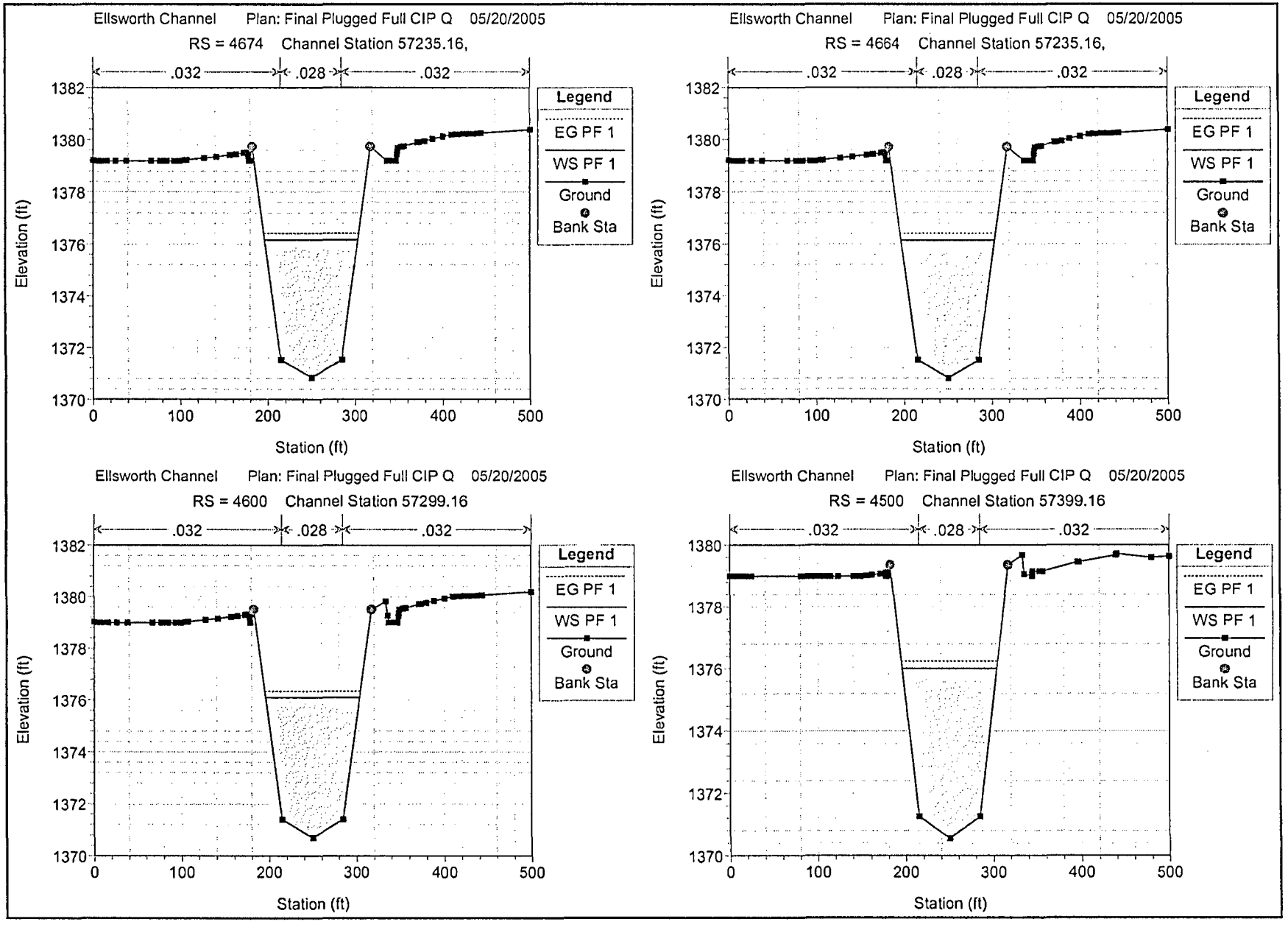

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6527
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6500 Channel Station 55399.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6400 Channel Station 55499.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6300 Channel Station 55599.16

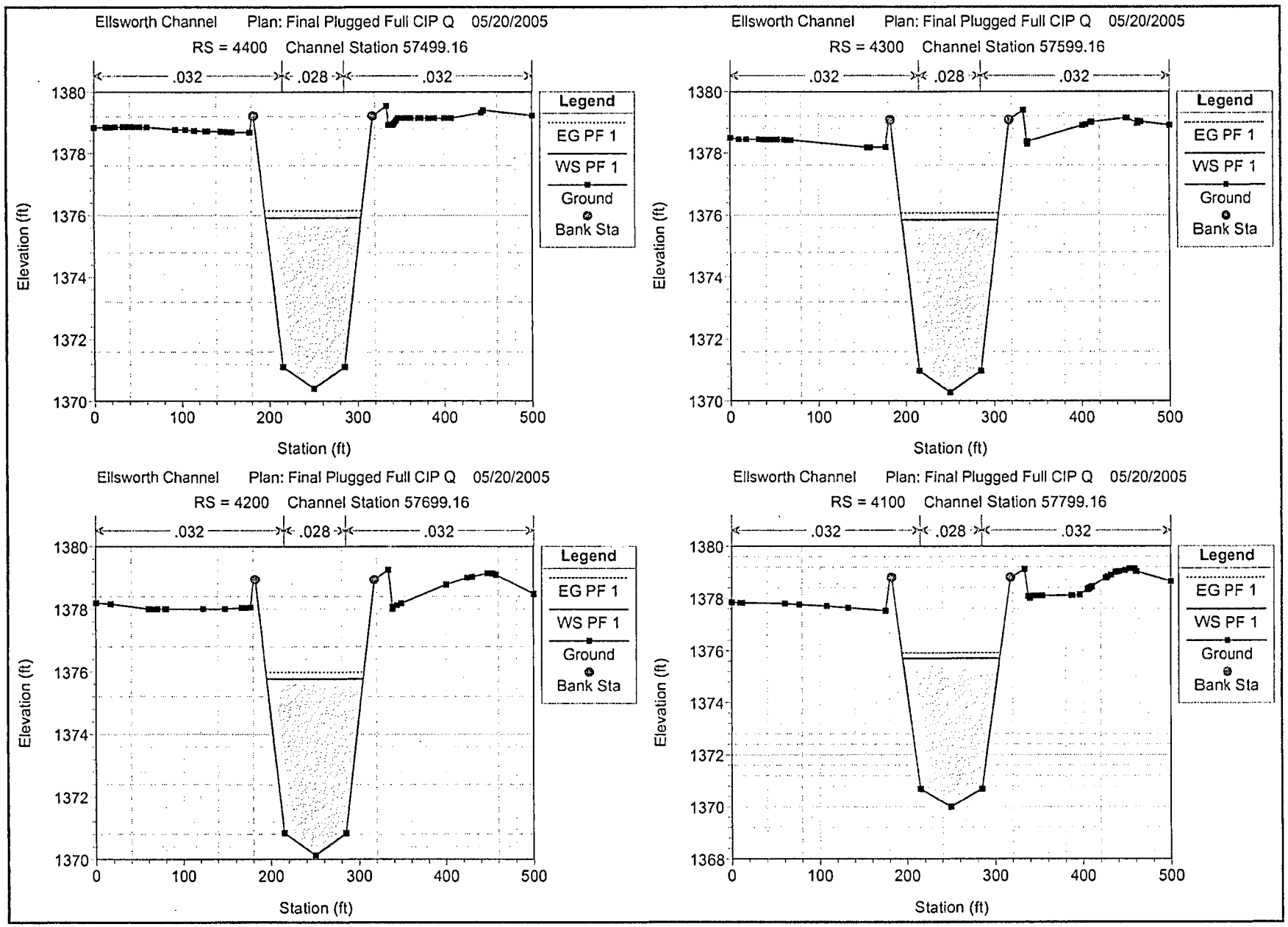

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6200 Channel Station 55699.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6100 Channel Station 55799.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 6000 Channel Station 55899.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5900 Channel Station 55999.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

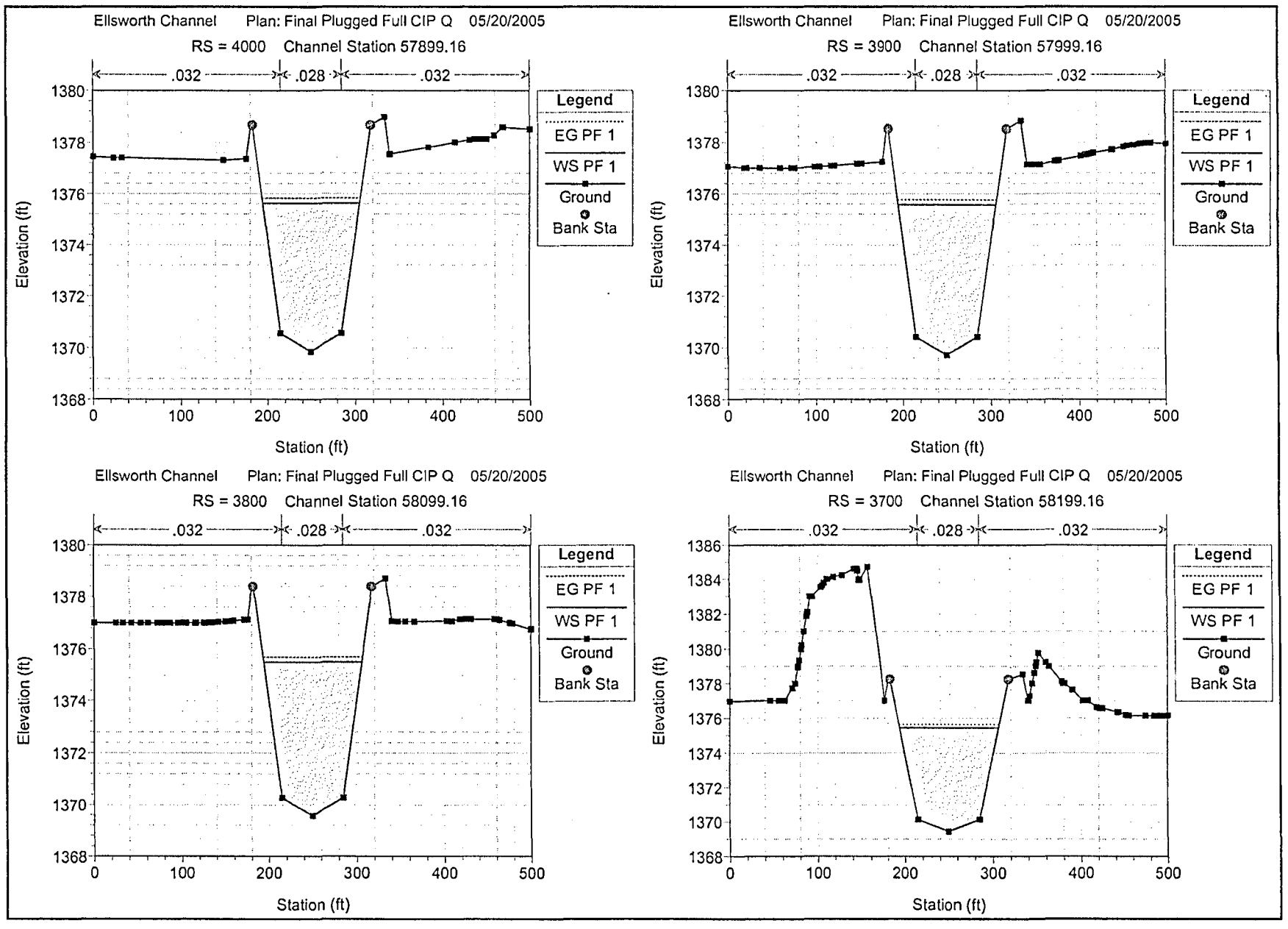

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5800 Channel Station 56099.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5700 Channel Station 56199.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5600 Channel Station 56299.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5500 Channel Station 56399.16

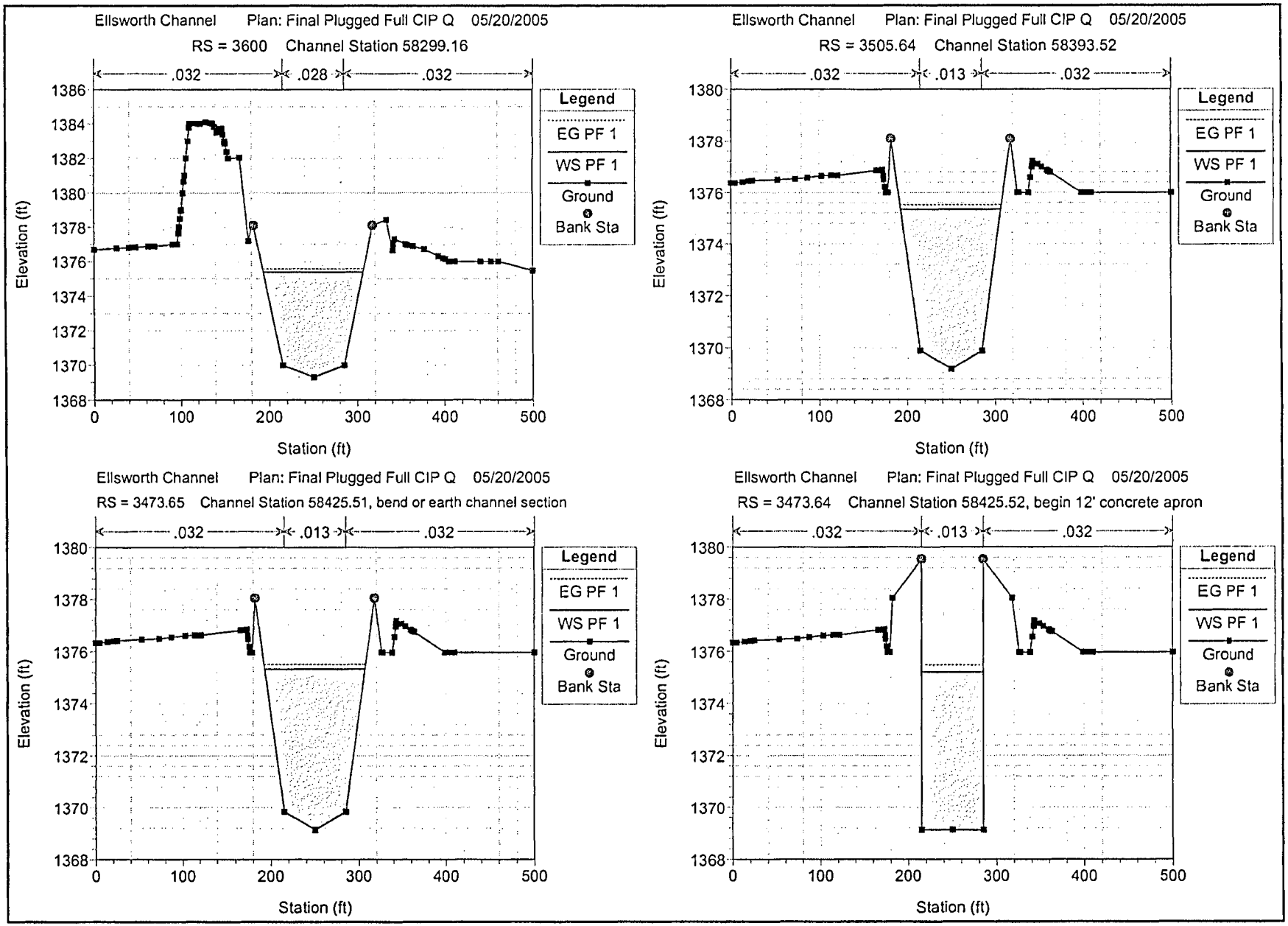

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5400 Channel Station 56499.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5300 Channel Station 56599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5200 Channel Station 56699.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5100 Channel Station 56799.16

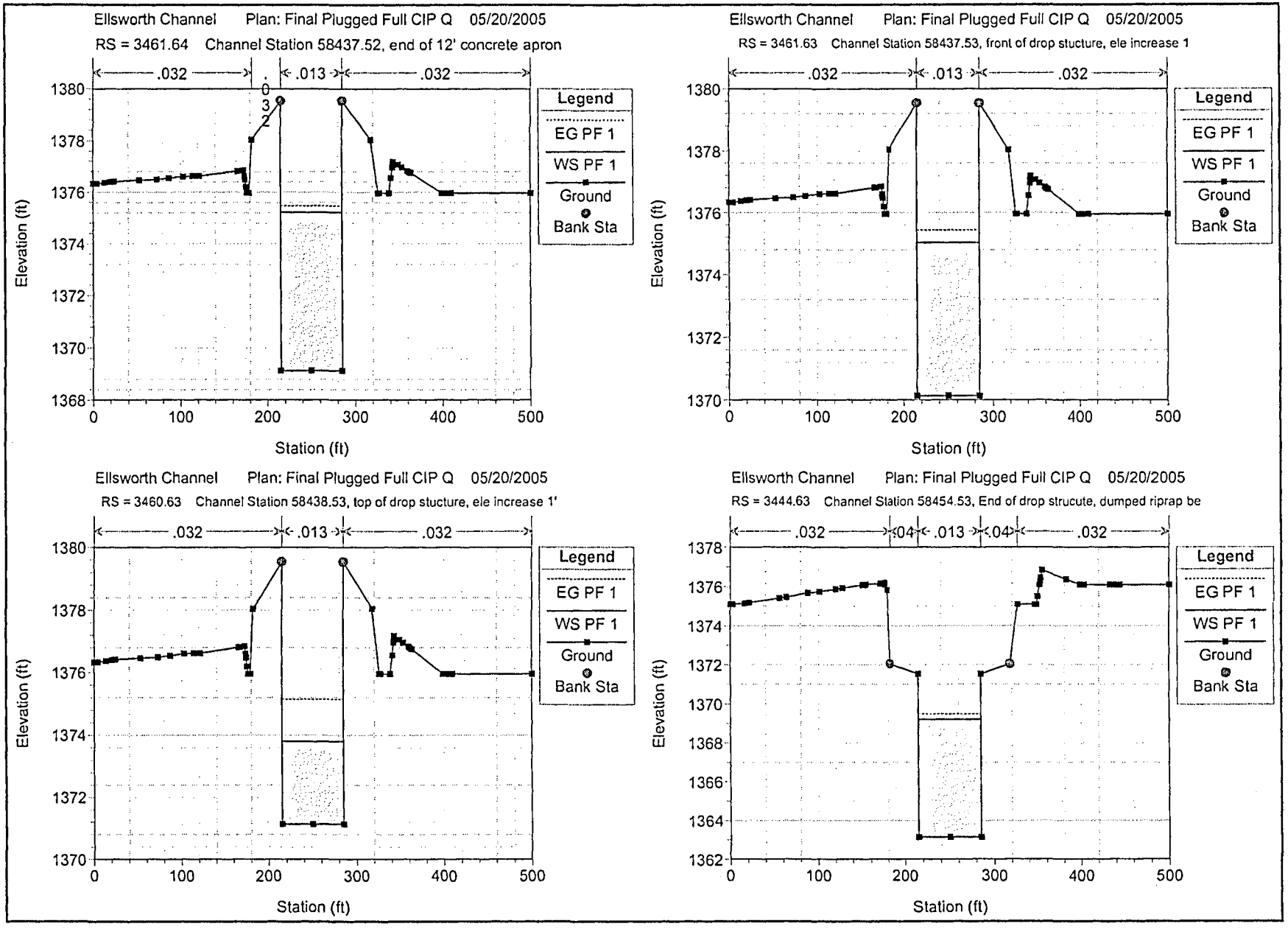

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 5000 Channel Station 56899.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4900 Channel Station 56999.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4800 Channel Station 57099.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4700 Channel Station 57199.16


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4674 Channel Station 57235.16,
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4664 Channel Station 57235.16,
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4600 Channel Station 57299.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4500 Channel Station 57399.16


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4400 Channel Station 57499.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4300 Channel Station 57599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4200 Channel Station 57699.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4100 Channel Station 57799.16

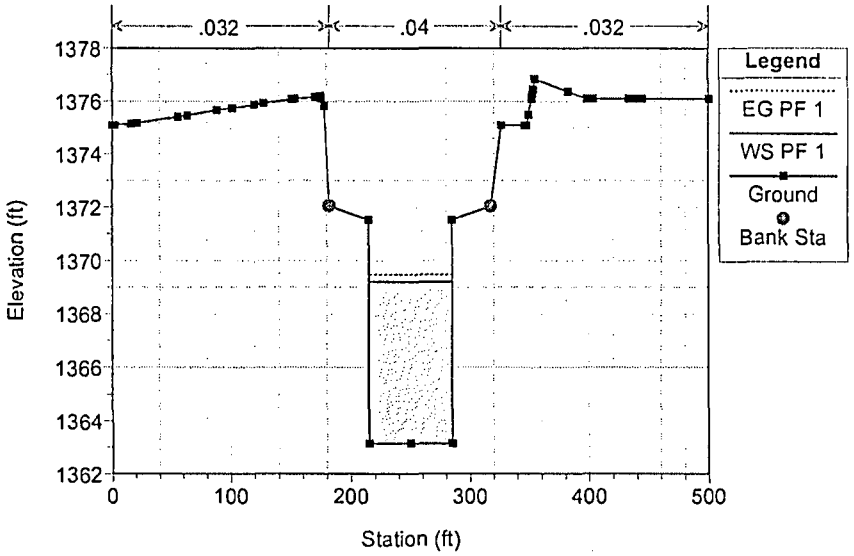

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 4000 Channel Station 57899.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3900 Channel Station 57999.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3800 Channel Station 58099.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3700 Channel Station 58199.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3600 Channel Station 58299.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3505.64 Channel Station 58393.52
.032
.013
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3473.65 Channel Station 58425.51, bend or earth channel section
.032
.013
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3473.64 Channel Station 58425.52, begin 12' concrete apron
.032
.013
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3461.64 Channel Station 58437.52, end of 12' concrete apron
.032
.013
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3461.63 Channel Station 58437.53, front of drop stucture, ele increase 1
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3460.63 Channel Station 58438.53, top of drop stucture, ele increase 1'
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3444.63 Channel Station 58454.53, End of drop strucute, dumped riprap be
.04

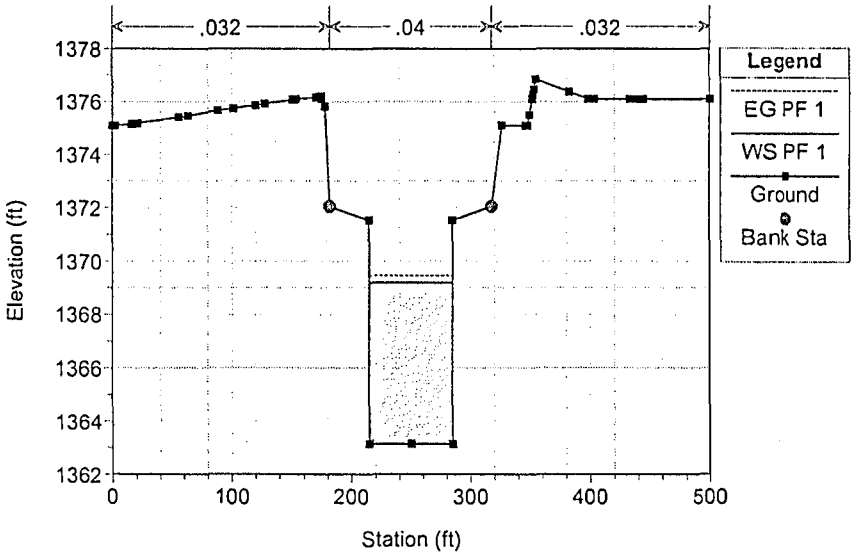
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 3444.62 Channel Station 58454.54, dumped riprap on bottom



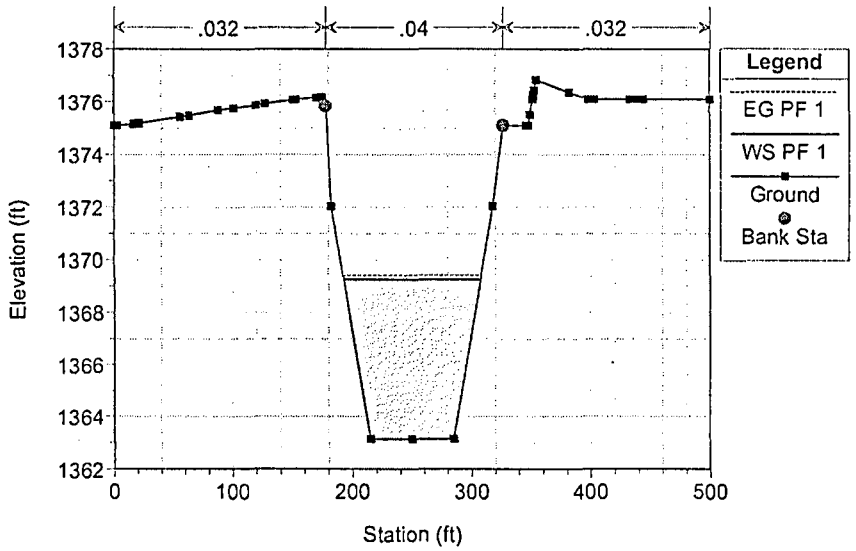
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 3432.91 Channel Station 58466.24, end of vertical walls, dumped riprap



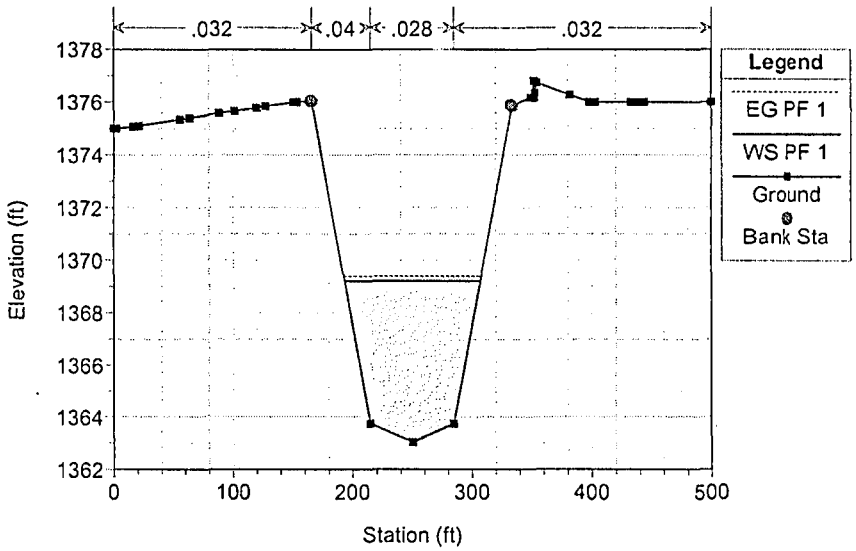
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

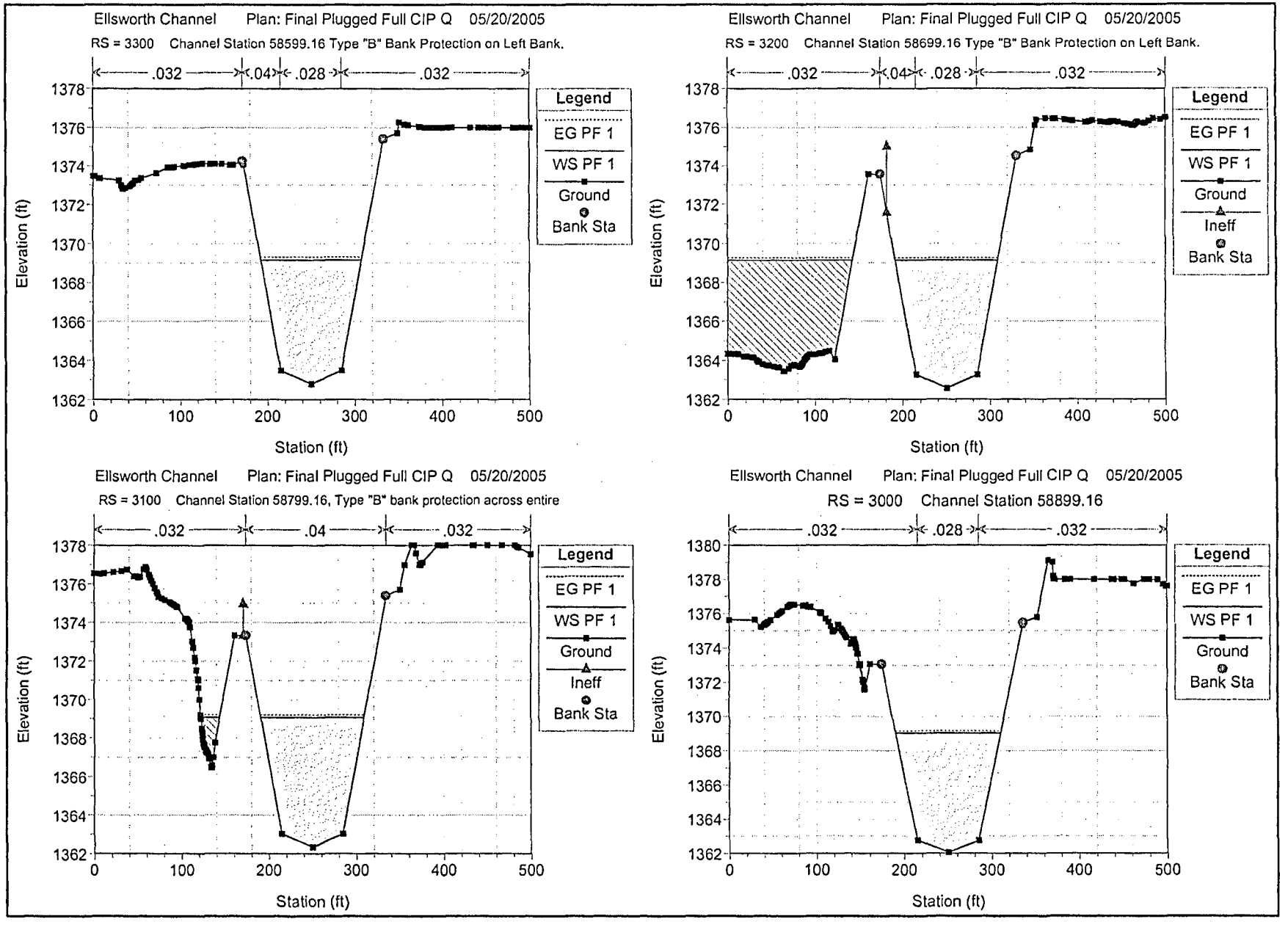
RS = 3425.08 Channel Station 58474.07, end of dumped riprap on bottom

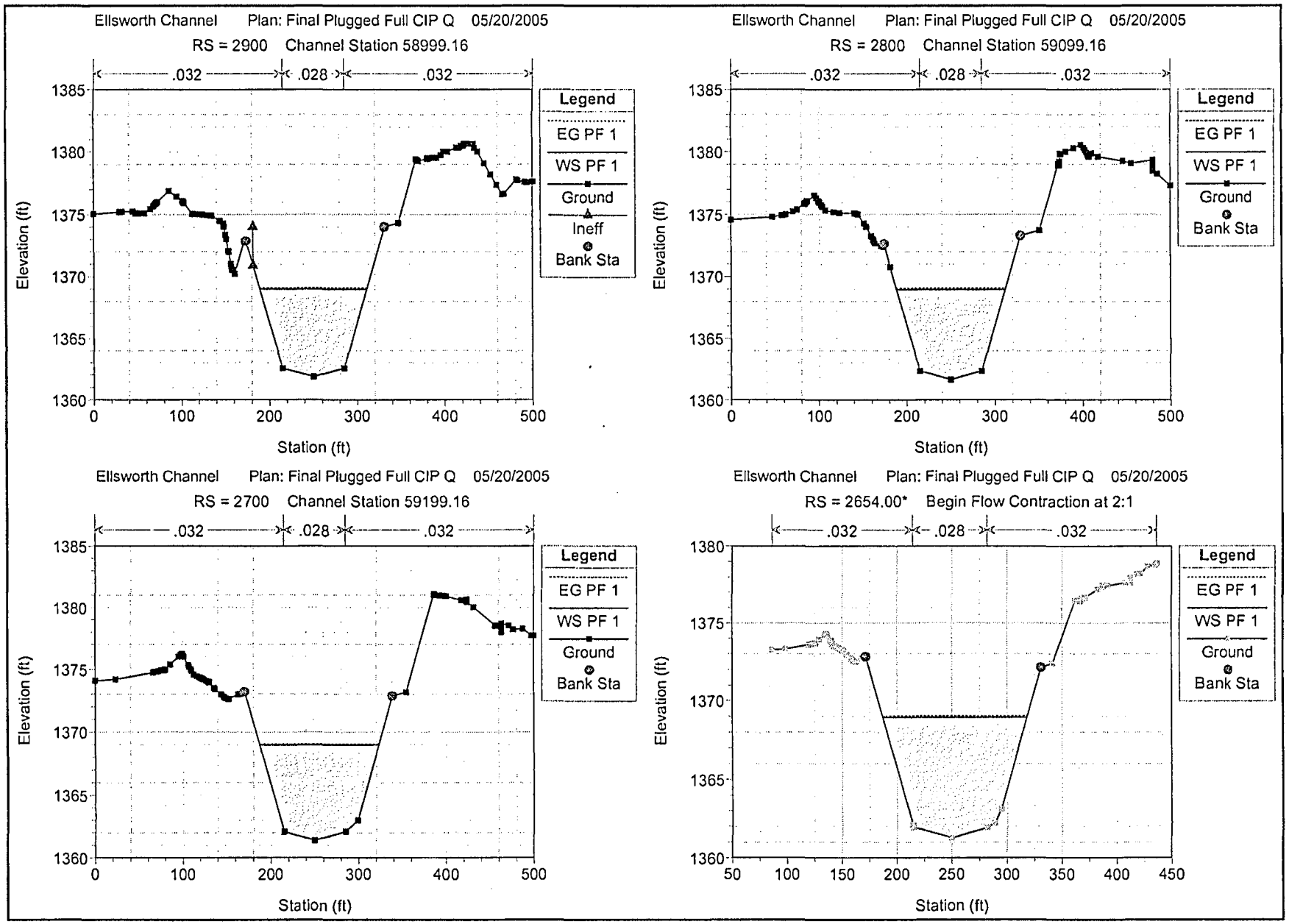


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 3400 Channel Station 58499.16, Type "B" Bank Protection on Left Bank.

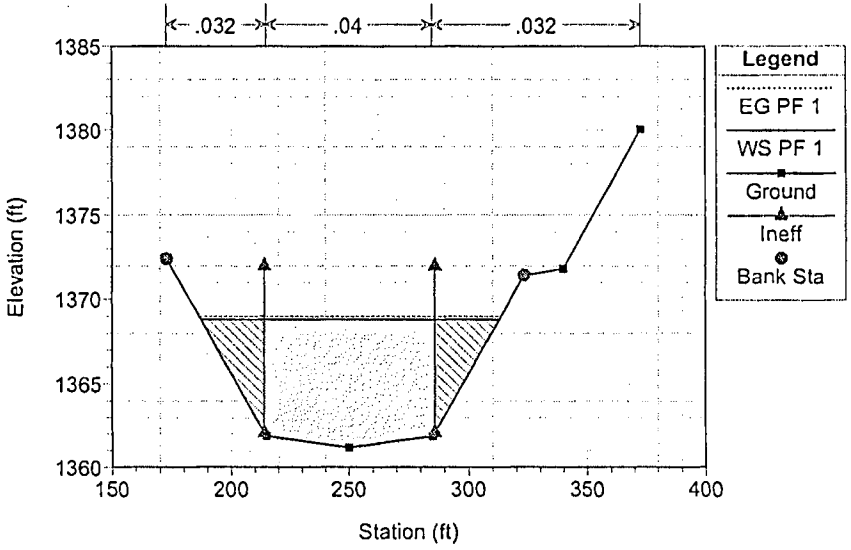



Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3300 Channel Station 58599.16 Type "B" Bank Protection on Left Bank.
.032
.04
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3200 Channel Station 58699.16 Type "B" Bank Protection on Left Bank.
.032
.04
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3100 Channel Station 58799.16, Type "B" bank protection across entire
.032
.04
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 3000 Channel Station 58899.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2900 Channel Station 58999.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2800 Channel Station 59099.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2700 Channel Station 59199.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2654.00* Begin Flow Contraction at 2:1

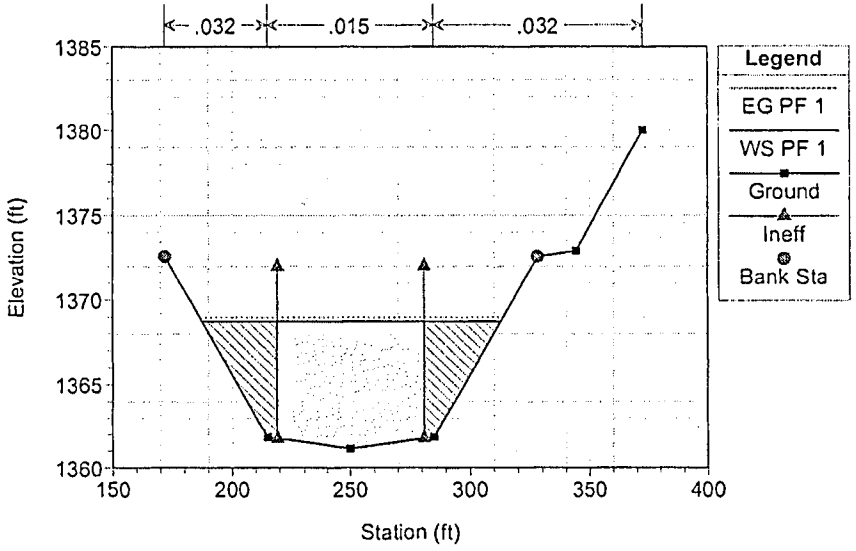
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 2608.01 Begin Channel Bottom Transition & 10' Riprap Apron



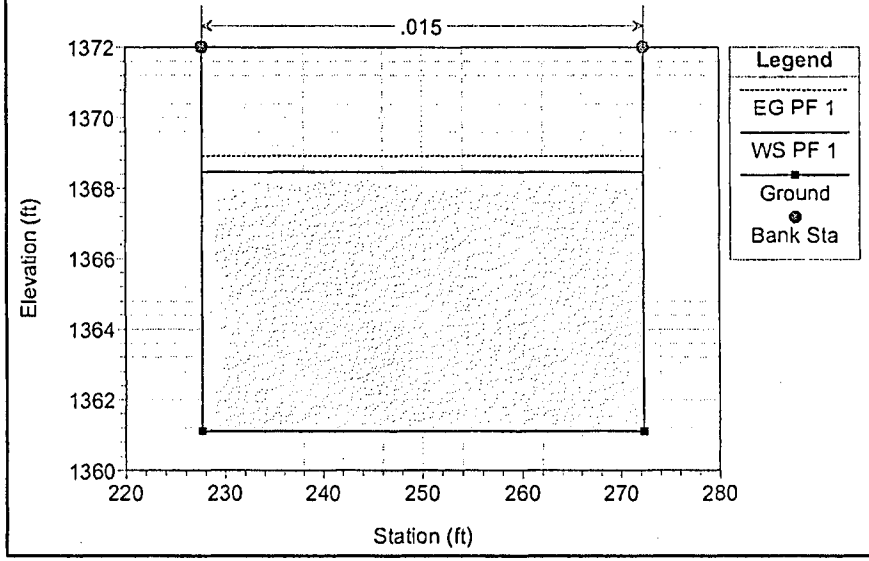
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 2598.02 Upstream End of Wing Wall (Approx Channel Station 59300)



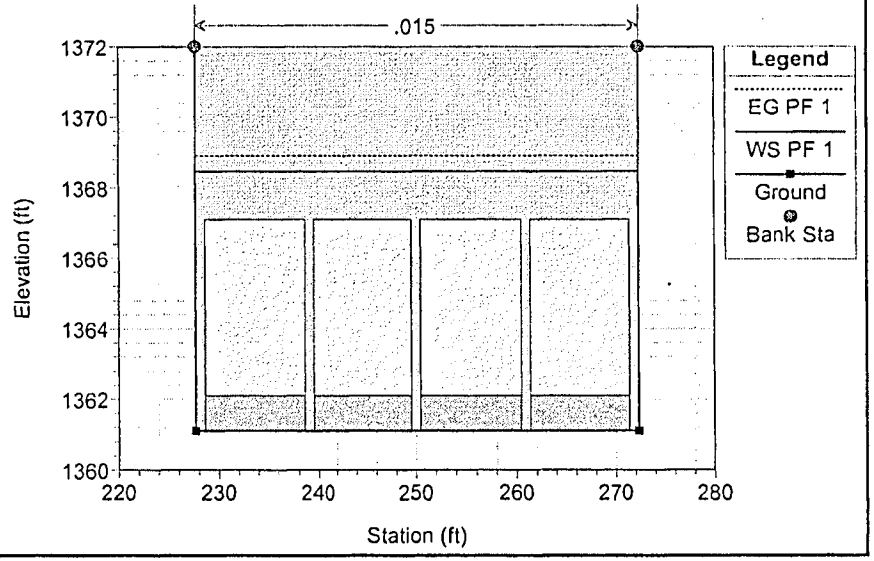
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

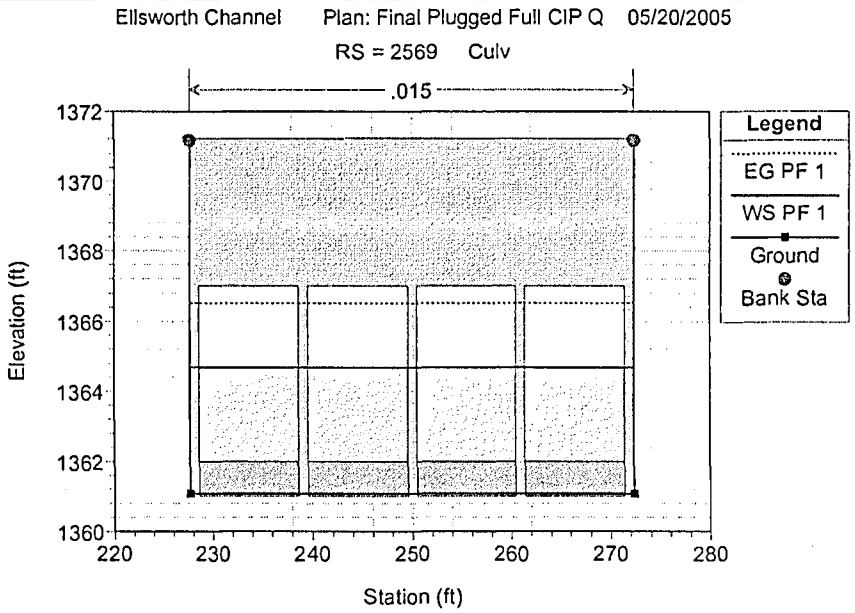
RS = 2581.04 Upstream Face of C12

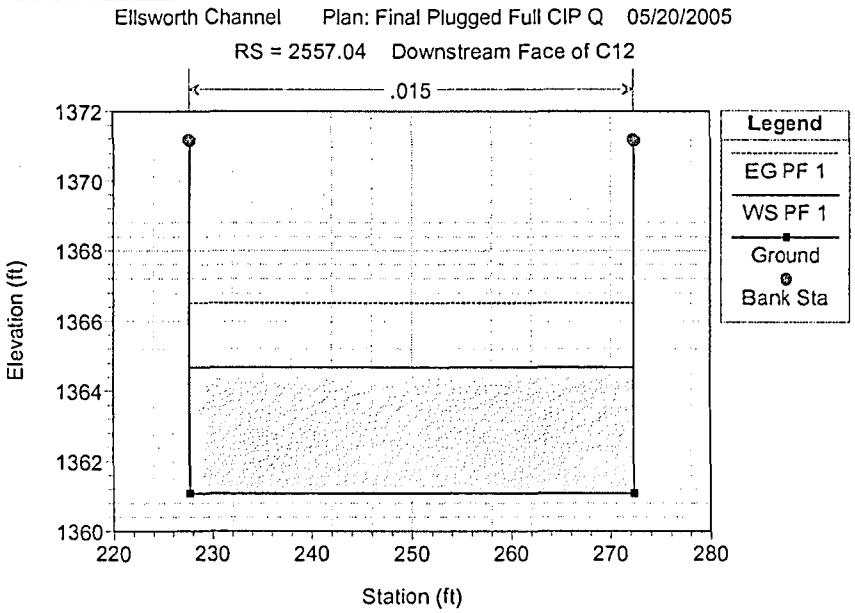


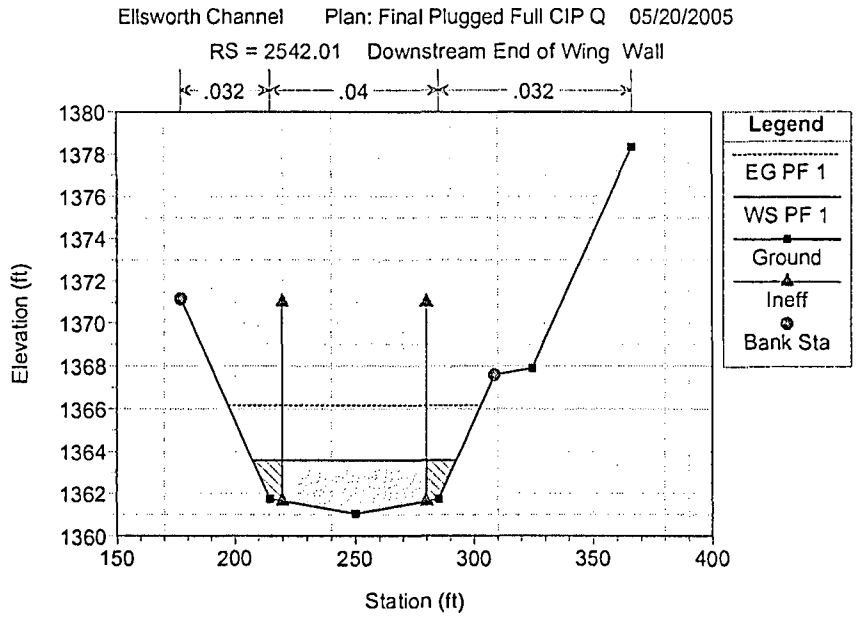
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

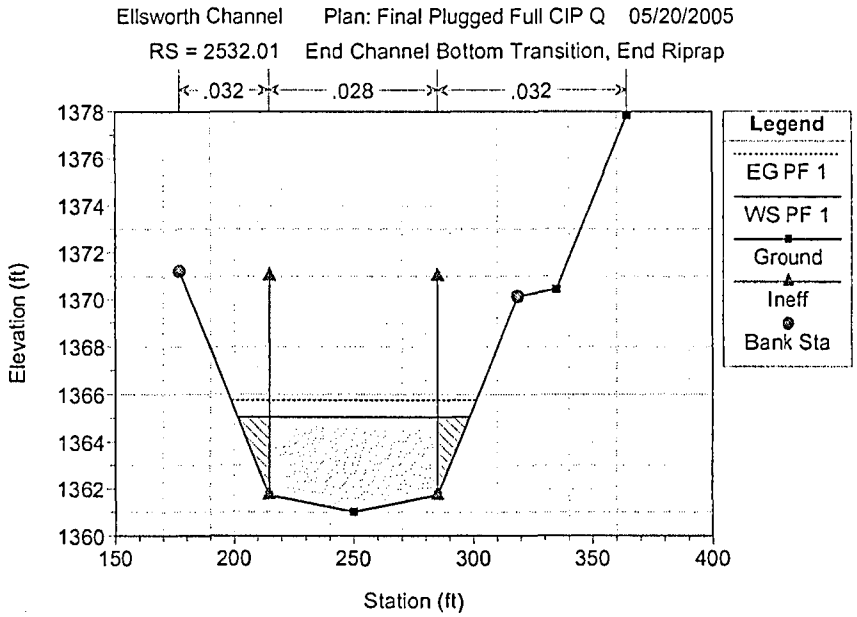
RS = 2569 Culv

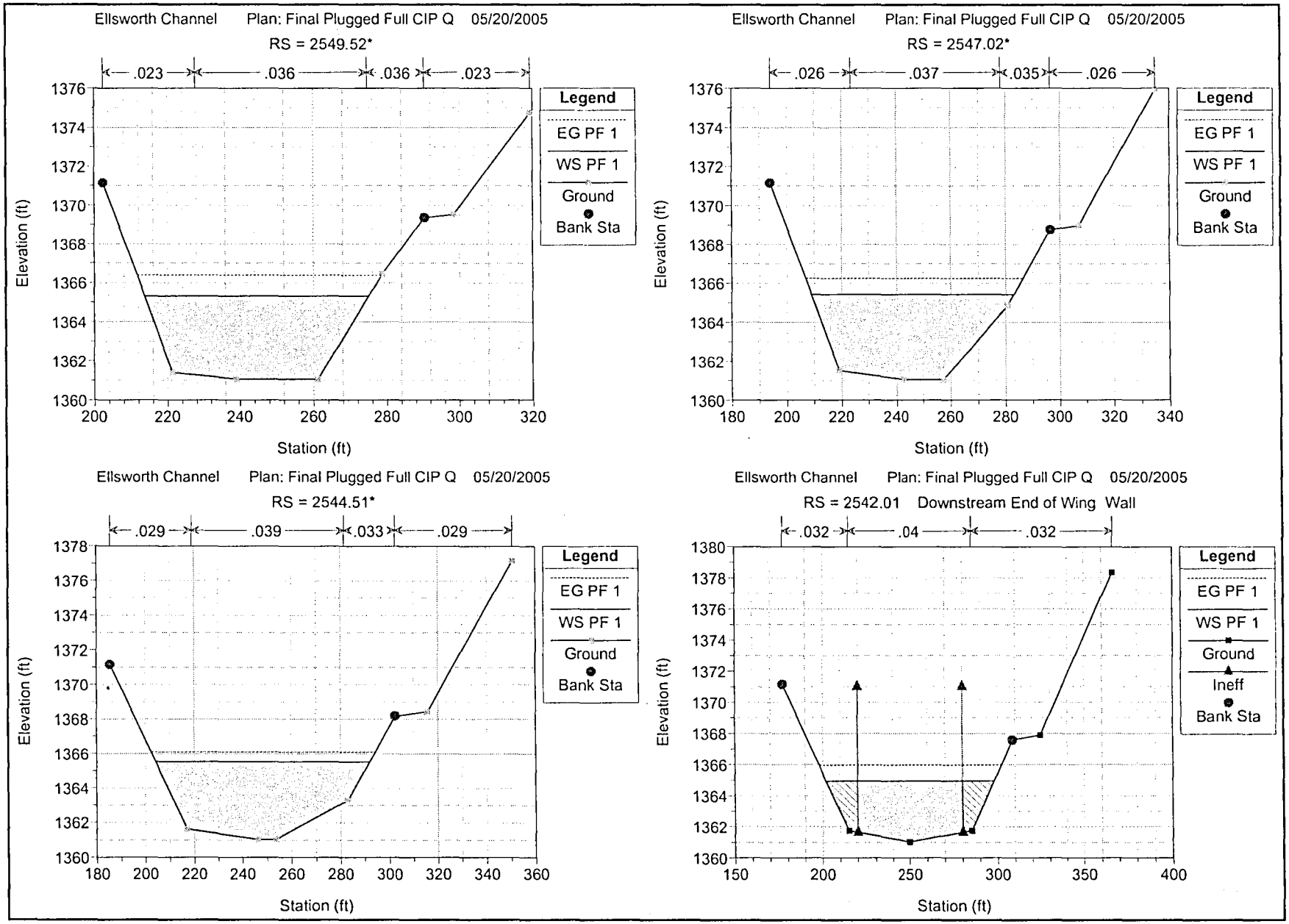


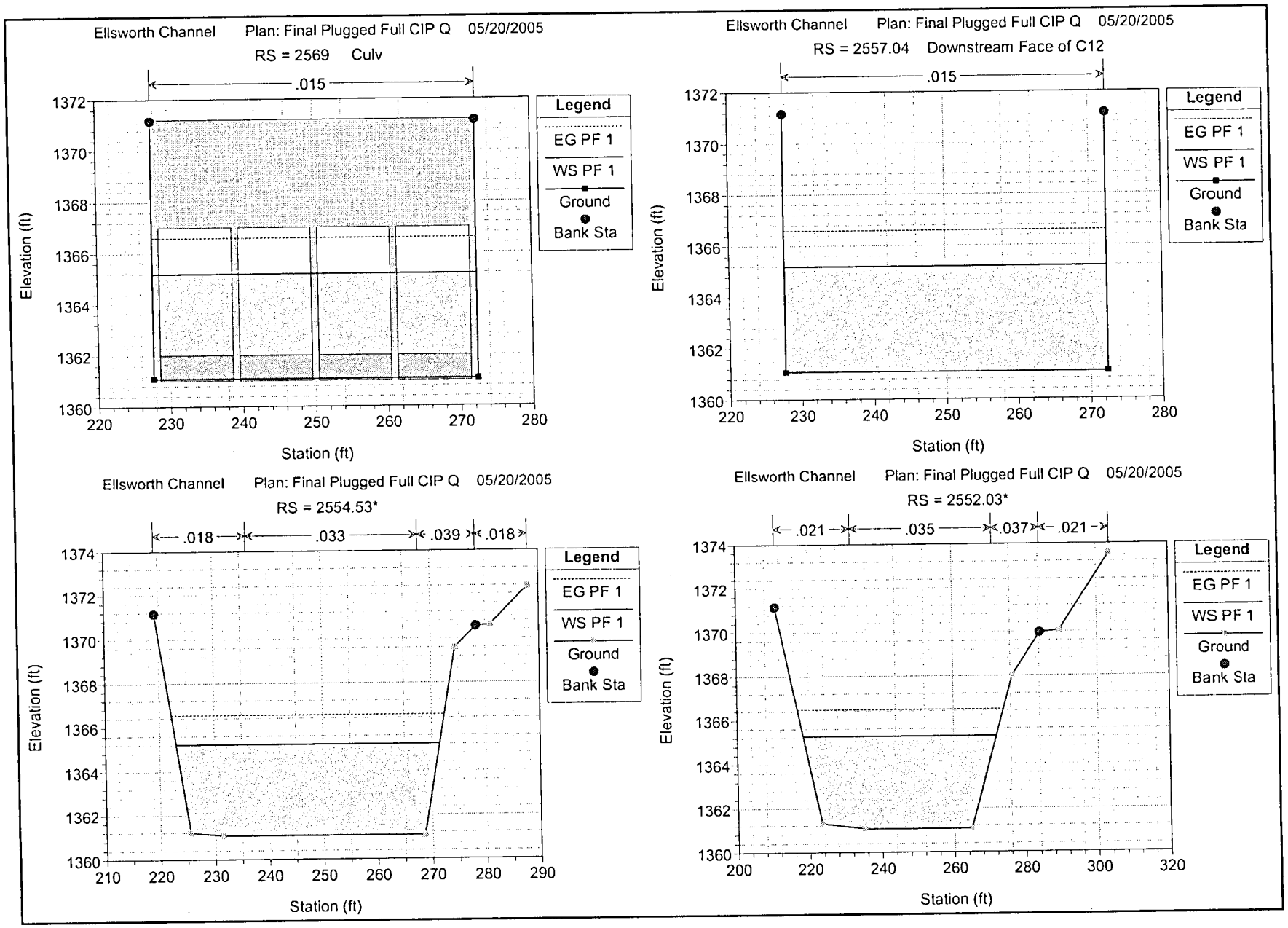

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2569 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

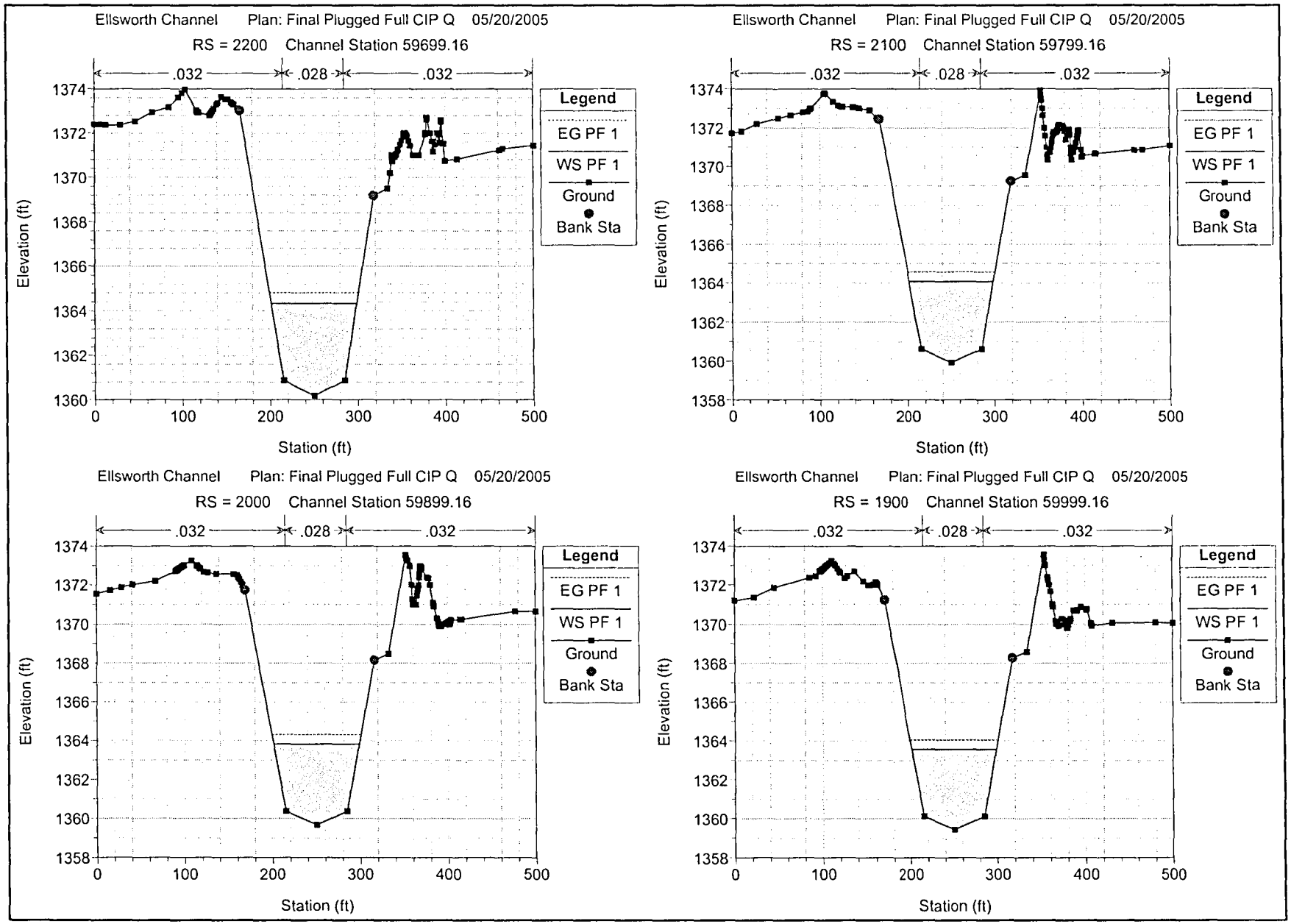

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2557.04 Downstream Face of C12
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

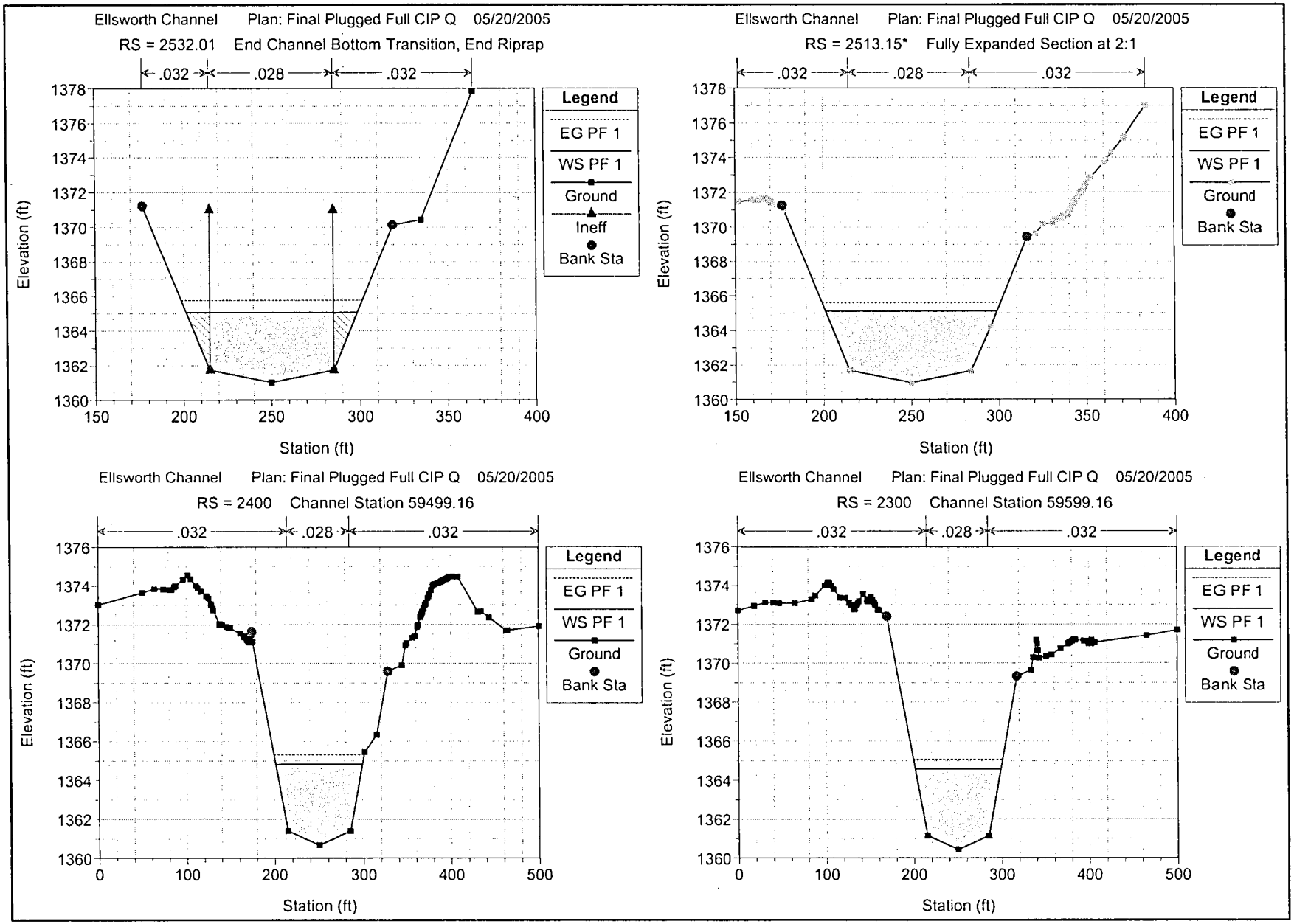

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2542.01 Downstream End of Wing Wall
.032
.04
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

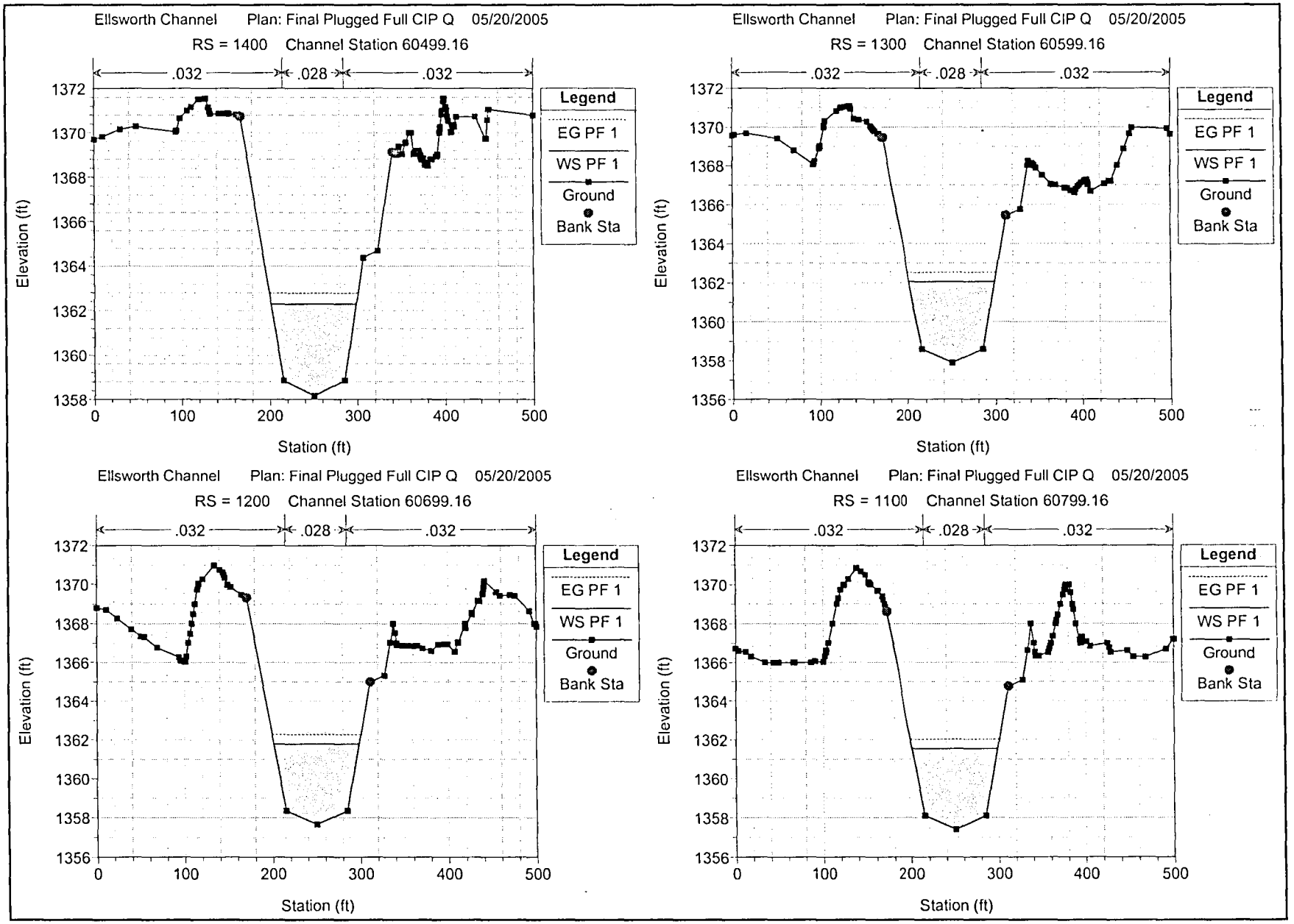

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2532.01 End Channel Bottom Transition, End Riprap
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

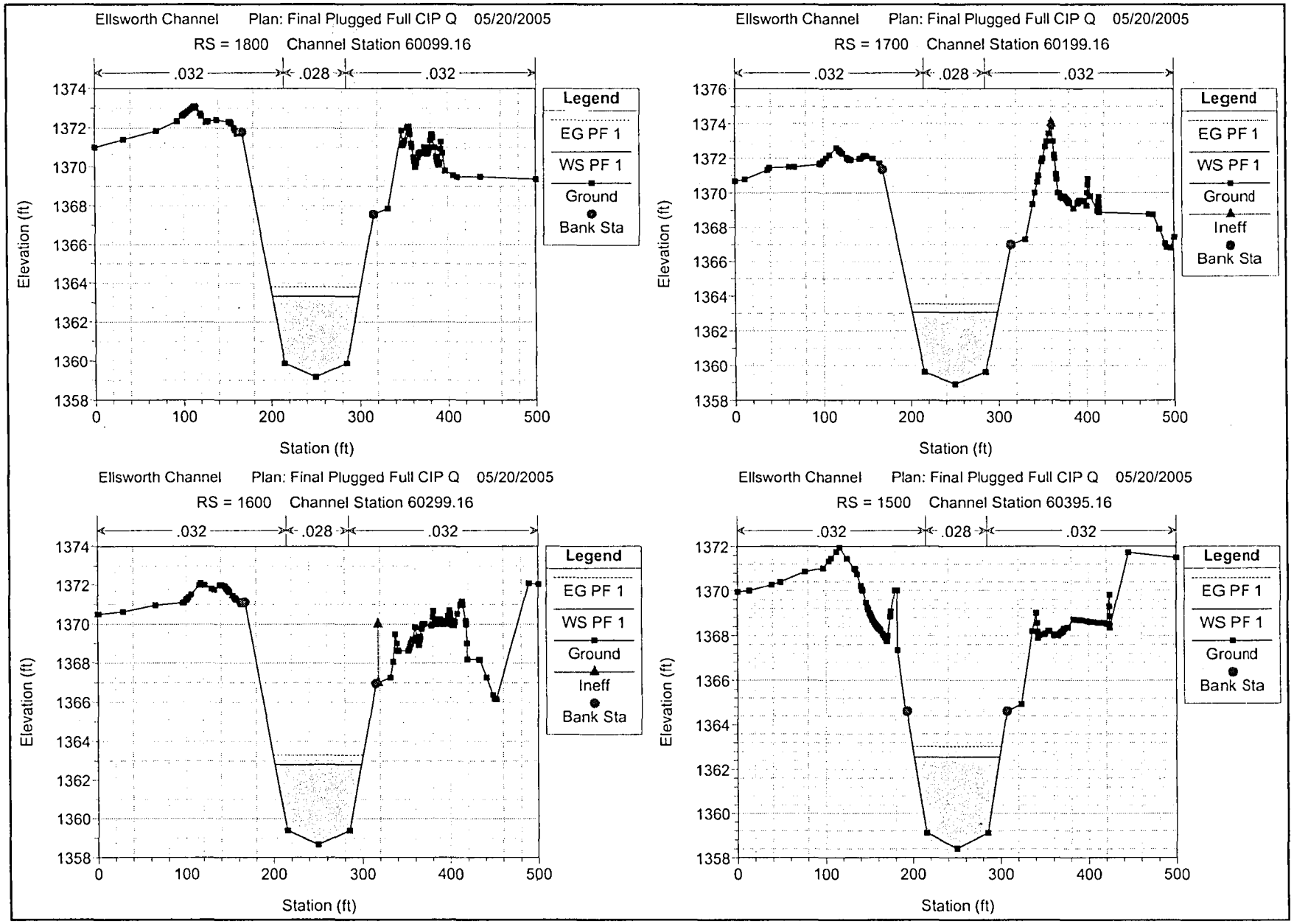

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2549.52*
.023 .036 .036 .023
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2547.02*
.026 .037 .035 .026
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2544.51*
.029 .039 .033 .029
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2542.01 Downstream End of Wing Wall
.032 .04 .032
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta

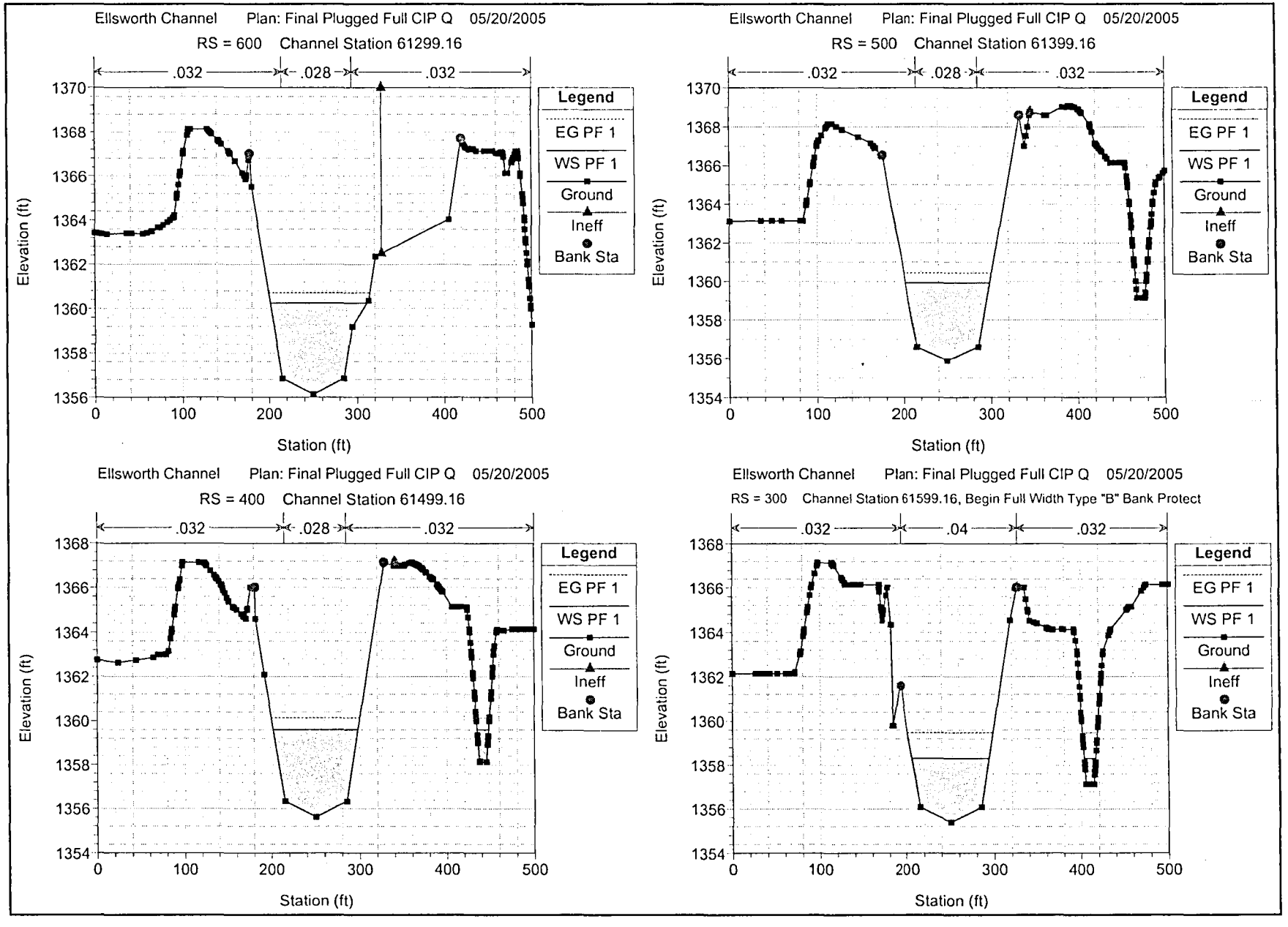

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2569 Culv
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2557.04 Downstream Face of C12
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2554.53*
.018
.033
.039
.018
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2552.03*
.021
.035
.037
.021
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

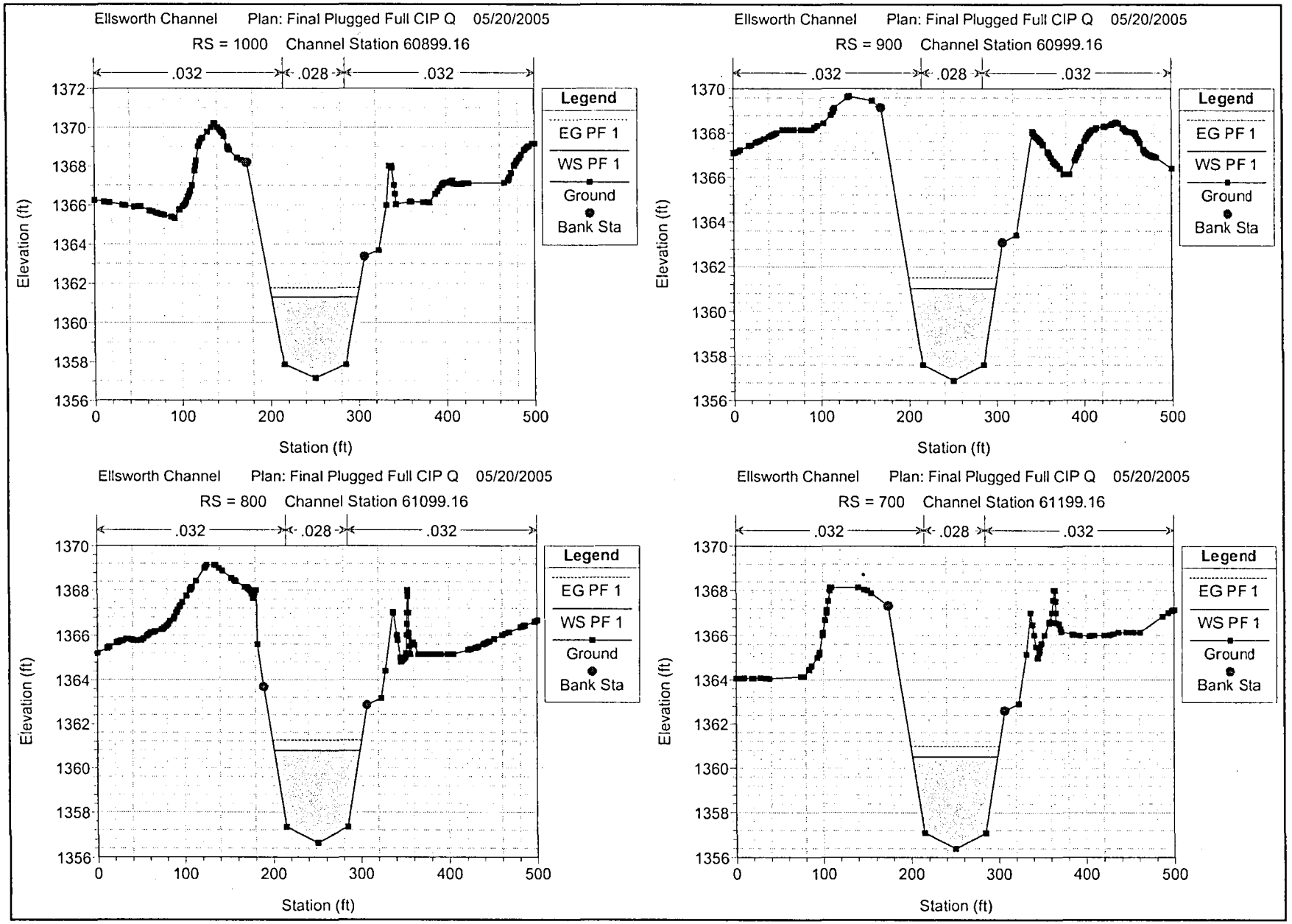

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2200 Channel Station 59699.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2100 Channel Station 59799.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2000 Channel Station 59899.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1900 Channel Station 59999.16

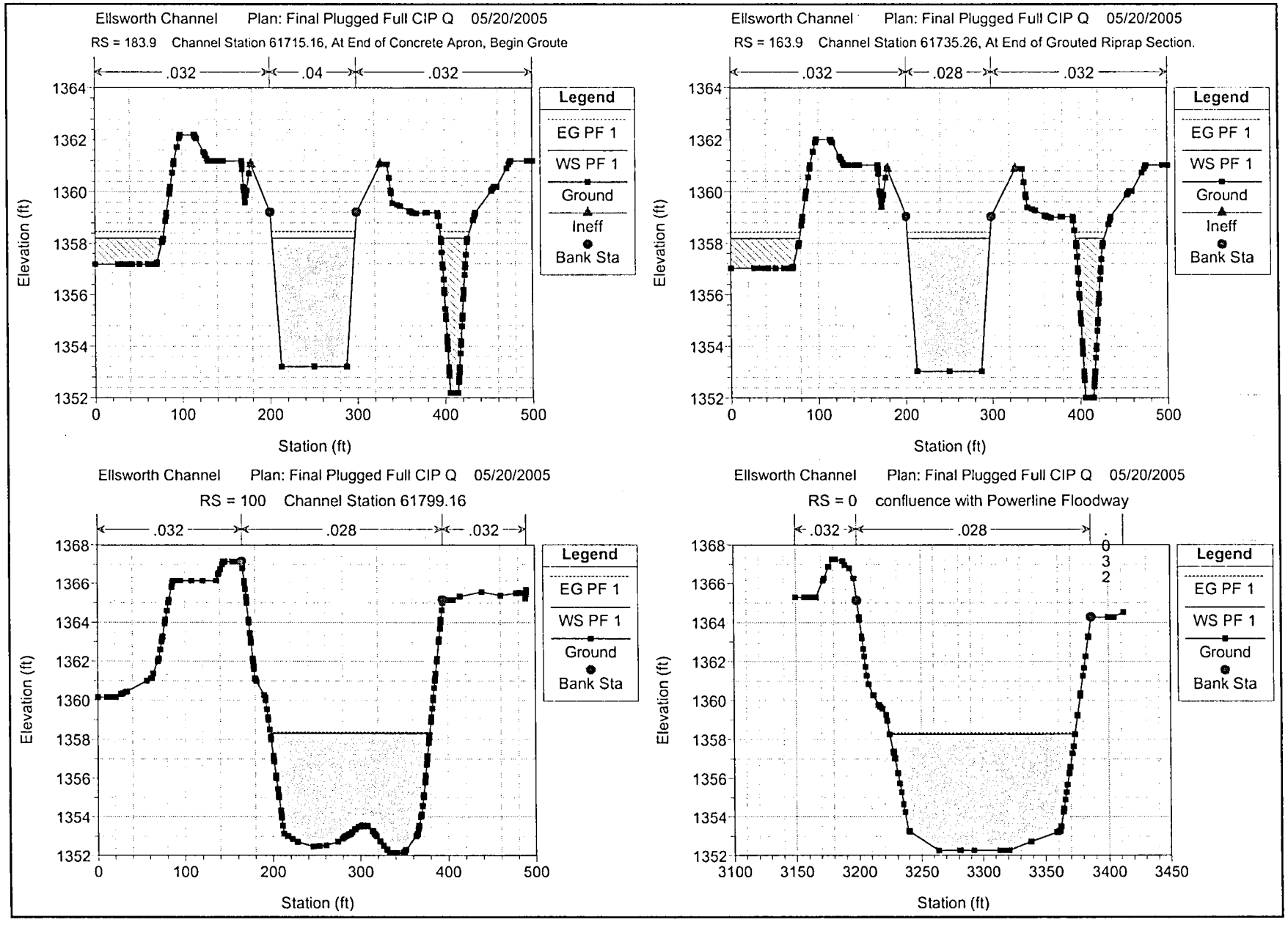

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2532.01 End Channel Bottom Transition, End Riprap
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2513.15* Fully Expanded Section at 2:1
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2400 Channel Station 59499.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 2300 Channel Station 59599.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1400 Channel Station 60499.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1300 Channel Station 60599.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1200 Channel Station 60699.16
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1100 Channel Station 60799.16


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1800 Channel Station 60099.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1700 Channel Station 60199.16
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1600 Channel Station 60299.16
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1500 Channel Station 60395.16
Legend
EG PF 1
WS PF 1
Ground
Bank Sta

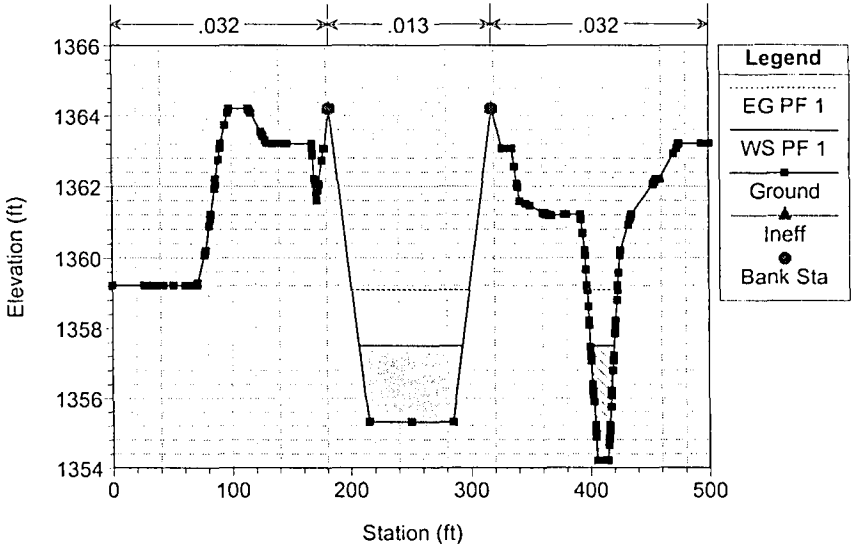

Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 600 Channel Station 61299.16
.032 .028 .032
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 500 Channel Station 61399.16
.032 .028 .032
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 400 Channel Station 61499.16
.032 .028 .032
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 300 Channel Station 61599.16, Begin Full Width Type "B" Bank Protect
.032 .04 .032
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 1000 Channel Station 60899.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 900 Channel Station 60999.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 800 Channel Station 61099.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 700 Channel Station 61199.16
.032 .028 .032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 183.9 Channel Station 61715.16, At End of Concrete Apron, Begin Groute
.032
.04
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 163.9 Channel Station 61735.26, At End of Grouted Riprap Section.
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 100 Channel Station 61799.16
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
RS = 0 confluence with Powerline Floodway
.032
.028
.032
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

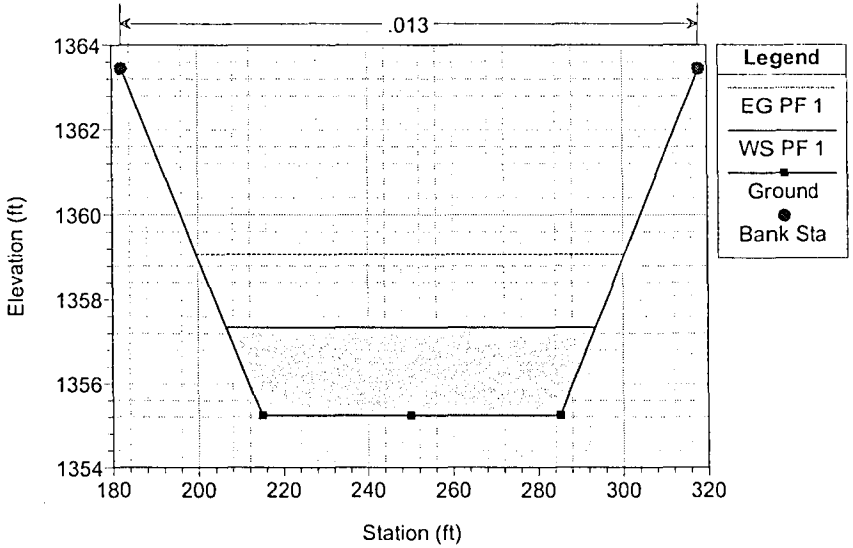
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 244 Channel Station 61655.16, Upstream end of Concrete Cutoff Wall.



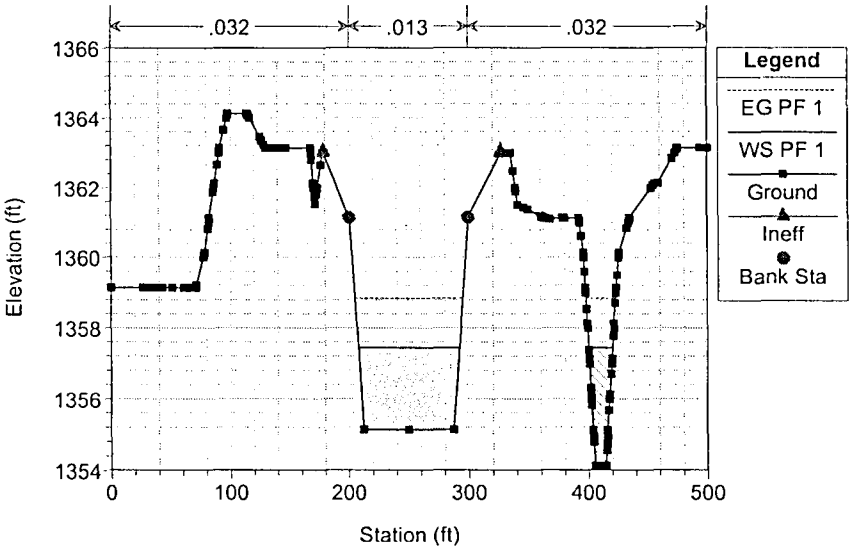
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 243 Channel Station 61656.16, Downstream end of Concrete Cutoff Wall



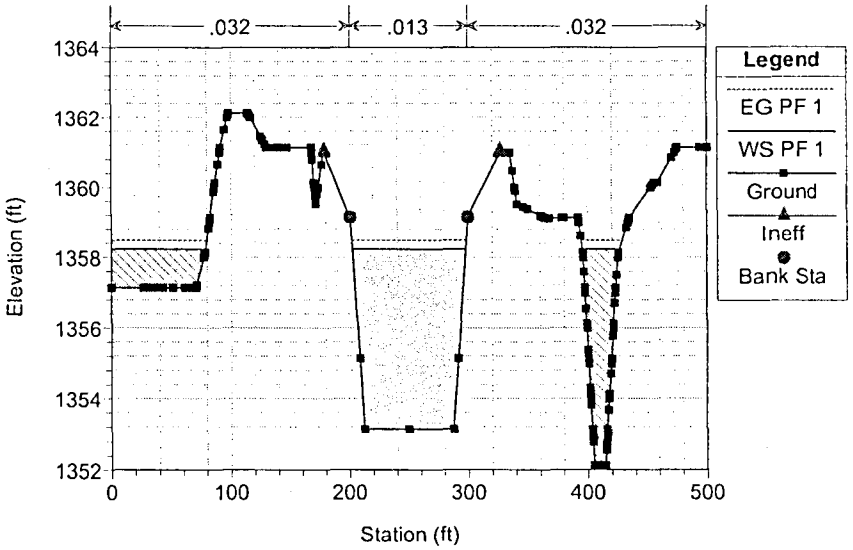
Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

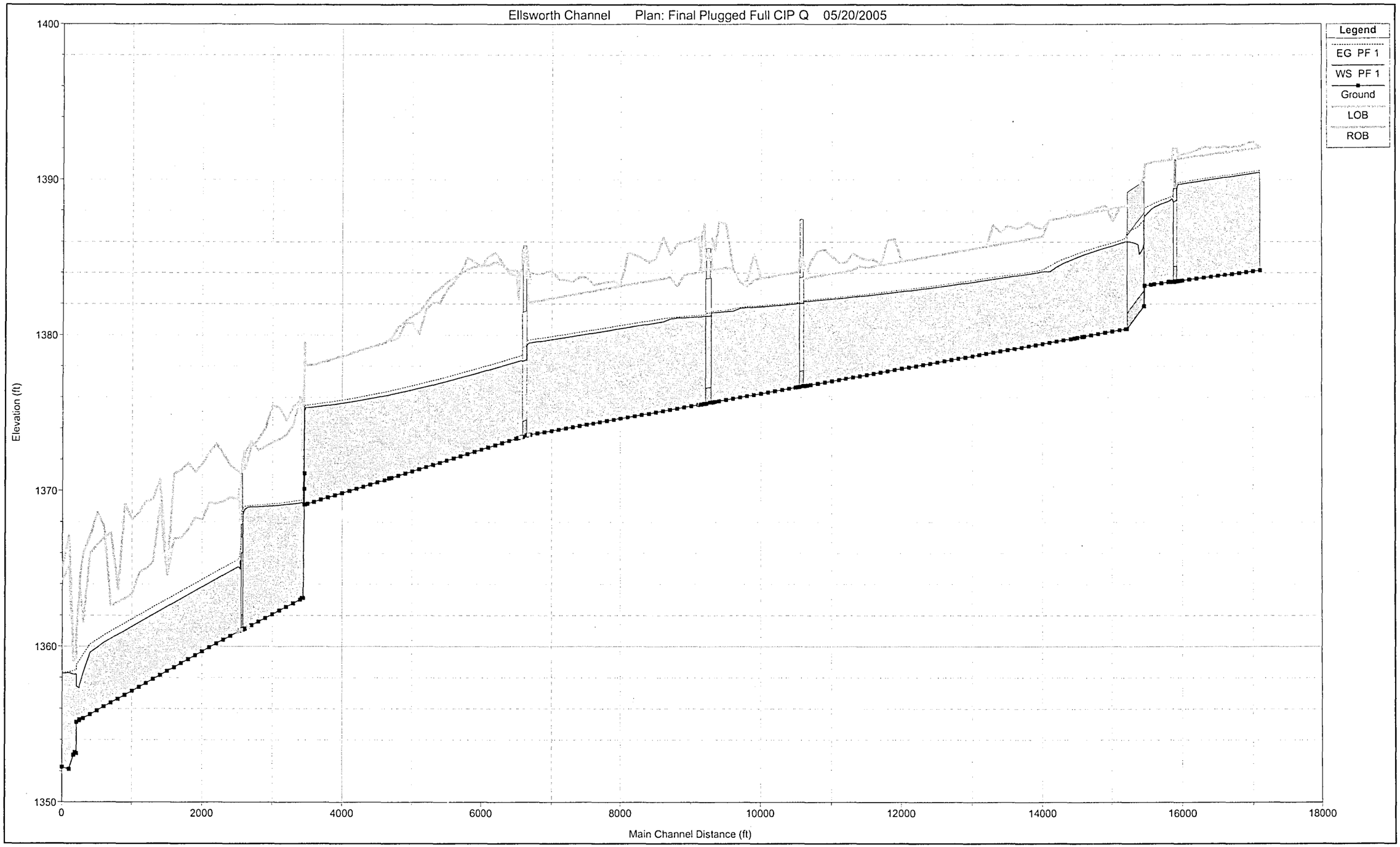
RS = 204 Channel Station 61695.16, Tie in With Existing 2' Drop Structure



Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005

RS = 203.9 Channel Station 61695.16, At D.S. Face of Existing 2' Drop Struc




Ellsworth Channel Plan: Final Plugged Full CIP Q 05/20/2005
Legend
EG PF 1
WS PF 1
Ground
LOB
ROB
Elevation (ft)
1400
1390
1380
1370
1360
1350
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
Main Channel Distance (ft)

APPENDIX J

Culvert Calculations

- **Existing Flow Conditions at G.M. Property Schematic**

Pecos North culvert
Design Condition, 50% Clogging, Q=600 cfs

PECO_PRP.LST
C-6

1

CURRENT DATE: 01-22-2005 FILE DATE: 01-22-2005
CURRENT TIME: 12:55:04 FILE NAME: PECO_PRP

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CU NO.	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1380.31	1379.51	246.39	3 RCB	10.00	2.50	.012	CONVENTIONAL
2								
3								
4								
5								
6								

Clogging, size reduced 50%

SUMMARY OF CULVERT FLOWS (cfs) FILE: PECO_PRP DATE: 01-22-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1384.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1384.74	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1386.63	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1388.40	900.0	783.8	0.0	0.0	0.0	0.0	0.0	112.36	7
1388.64	1200.0	804.2	0.0	0.0	0.0	0.0	0.0	387.79	6
1388.80	1500.0	818.6	0.0	0.0	0.0	0.0	0.0	670.11	5
1388.93	1800.0	830.4	0.0	0.0	0.0	0.0	0.0	962.37	5
1389.04	2100.0	839.8	0.0	0.0	0.0	0.0	0.0	1247.80	4
1389.14	2400.0	848.0	0.0	0.0	0.0	0.0	0.0	1545.89	4
1389.22	2700.0	854.8	0.0	0.0	0.0	0.0	0.0	1828.55	3
1389.29	3000.0	861.5	0.0	0.0	0.0	0.0	0.0	2122.38	3
1388.00	746.2	746.2	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: PECO_PRP DATE: 01-22-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1384.10	0.000	0.00	0.00	0.00
1384.74	0.000	300.00	0.00	0.00
1386.63	0.000	600.00	0.00	0.00
1388.40	-0.003	900.00	3.89	0.43
1388.64	-0.006	1200.00	8.01	0.67
1388.80	-0.008	1500.00	11.28	0.75
1388.93	-0.005	1800.00	7.27	0.40
1389.04	-0.009	2100.00	12.41	0.59
1389.14	-0.005	2400.00	6.08	0.25
1389.22	-0.004	2700.00	16.60	0.61
1389.29	-0.003	3000.00	16.15	0.54

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 01-22-2005 FILE DATE: 01-22-2005
CURRENT TIME: 12:55:04 FILE NAME: PECO_PRP

PERFORMANCE CURVE FOR CULVERT 1 - 3(10.00 (ft) BY 2.50 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1384.10	0.00	3.79	0-NF	0.00	0.00	0.00	4.59	0.00	0.00
300.00	1384.74	2.47	4.43	4-FFt	1.36	1.46	2.50	4.59	4.00	0.00
600.00	1386.62	4.52	6.31	4-FFt	2.16	2.32	2.50	4.59	8.00	0.00
783.75	1388.40	6.36	8.09	4-FFt	2.50	2.50	2.50	4.59	10.45	0.00
804.20	1388.63	6.60	8.32	4-FFt	2.50	2.50	2.50	4.59	10.72	0.00
818.61	1388.79	6.77	8.48	4-FFt	2.50	2.50	2.50	4.59	10.91	0.00
830.36	1388.93	6.91	8.62	4-FFt	2.50	2.50	2.50	4.59	11.07	0.00

839.78	1389.03	7.03	8.72	4-FFt	2.50	2.50	2.50	4.59	11.20	0.00
848.03	1389.13	7.13	8.82	4-FFt	2.50	2.50	2.50	4.59	11.31	0.00
854.85	1389.21	7.22	8.90	4-FFt	2.50	2.50	2.50	4.59	11.40	0.00
861.46	1389.29	7.30	8.98	4-FFt	2.50	2.50	2.50	4.59	11.49	0.00

El. inlet face invert 1380.31 ft El. outlet invert 1379.51 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1380.31 ft
OUTLET STATION	246.39 ft
OUTLET ELEVATION	1379.51 ft
NUMBER OF BARRELS	3
SLOPE (V/H)	0.0032
CULVERT LENGTH ALONG SLOPE	246.39 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	2.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

3

CURRENT DATE: 01-22-2005 FILE DATE: 01-22-2005
CURRENT TIME: 12:55:04 FILE NAME: PECO_PRP

TAILWATER

CONSTANT WATER SURFACE ELEVATION
1384.10

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	76.00 ft

***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X ft	Y ft
1	0.00	1389.00
2	110.00	1388.80
3	110.00	1388.30
4	210.00	1388.00
5	210.10	1388.50
6	300.00	1388.30
7	400.00	1388.10
8	500.00	1388.20
9	960.00	1389.10

Pecos North culvert
check for existing condition: Q = 2816 cfs

PECOS_EX.LST
C-6

1

CURRENT DATE: 12-07-2004
CURRENT TIME: 10:18:08

FILE DATE: 12-07-2004
FILE NAME: PECOS_EX

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

C U L V NO.	SITE DATA INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1380.31	1379.51	246.39	3 RCB	10.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: PECOS_EX DATE: 12-07-2004

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1386.96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1387.10	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1387.47	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1388.09	900.0	893.8	0.0	0.0	0.0	0.0	0.0	0.79	5
1388.45	1200.0	1030.4	0.0	0.0	0.0	0.0	0.0	160.35	6
1388.64	1500.0	1093.1	0.0	0.0	0.0	0.0	0.0	394.58	5
1388.79	1800.0	1140.6	0.0	0.0	0.0	0.0	0.0	650.25	5
1388.91	2100.0	1174.8	0.0	0.0	0.0	0.0	0.0	904.86	4
1389.01	2400.0	1209.1	0.0	0.0	0.0	0.0	0.0	1177.95	4
1389.11	2700.0	1237.5	0.0	0.0	0.0	0.0	0.0	1455.66	4
1389.19	3000.0	1259.8	0.0	0.0	0.0	0.0	0.0	1724.13	3
1388.00	858.6	858.6	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: PECOS_EX DATE: 12-07-2004

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1386.96	0.000	0.00	0.00	0.00
1387.10	0.000	300.00	0.00	0.00
1387.47	0.000	600.00	0.00	0.00
1388.09	-0.006	900.00	5.46	0.61
1388.45	-0.004	1200.00	9.26	0.77
1388.64	-0.009	1500.00	12.31	0.82
1388.79	-0.006	1800.00	9.18	0.51
1388.91	-0.005	2100.00	20.36	0.97
1389.01	-0.009	2400.00	12.97	0.54
1389.11	-0.006	2700.00	6.88	0.25
1389.19	-0.003	3000.00	16.06	0.54

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 12-07-2004
CURRENT TIME: 10:18:08

FILE DATE: 12-07-2004
FILE NAME: PECOS_EX

PERFORMANCE CURVE FOR CULVERT 1 - 3(10.00 (ft) BY 5.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1386.96	0.00	6.65	0-NF	0.00	0.00	0.00	7.45	0.00	0.00
300.00	1387.10	2.50	6.79	4-FFt	1.35	1.46	5.00	7.45	2.00	0.00
600.00	1387.47	3.91	7.16	4-FFt	2.16	2.32	5.00	7.45	4.00	0.00
893.76	1388.09	5.13	7.78	4-FFt	2.85	3.03	5.00	7.45	5.96	0.00
1030.39	1388.45	5.69	8.14	4-FFt	3.15	3.33	5.00	7.45	6.87	0.00
1093.11	1388.64	5.96	8.33	4-FFt	3.29	3.46	5.00	7.45	7.29	0.00
1140.56	1388.79	6.17	8.48	4-FFt	3.39	3.56	5.00	7.45	7.60	0.00

1174.78	1388.90	6.32	8.59	4-FFt	3.46	3.63	5.00	7.45	7.83	0.00
1209.08	1389.01	6.48	8.70	4-FFt	3.53	3.70	5.00	7.45	8.06	0.00
1237.47	1389.11	6.61	8.80	4-FFt	3.59	3.76	5.00	7.45	8.25	0.00
1259.81	1389.18	6.71	8.87	4-FFt	3.64	3.81	5.00	7.45	8.40	0.00

El. inlet face invert 1380.31 ft El. outlet invert 1379.51 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1380.31 ft
OUTLET STATION	246.39 ft
OUTLET ELEVATION	1379.51 ft
NUMBER OF BARRELS	3
SLOPE (V/H)	0.0032
CULVERT LENGTH ALONG SLOPE	246.39 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

3

CURRENT DATE: 12-07-2004 FILE DATE: 12-07-2004
CURRENT TIME: 10:18:08 FILE NAME: PECOS_EX

TAILWATER

CONSTANT WATER SURFACE ELEVATION
1386.96

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	76.00 ft

***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X ft	Y ft
1	0.00	1389.00
2	110.00	1388.80
3	110.10	1388.30
4	210.00	1388.00
5	210.10	1388.50
6	300.00	1388.30
7	400.00	1388.10
8	500.00	1388.20
9	960.00	1389.10

DESIGN MEMORANDUM

Client: _____ Sheet _____ Of _____

Project: _____ Date: _____

Data For: _____ Work Order: _____

Prepared By: _____ Checked By: _____ File No: _____

Note: This form must be used for project calculations and original filed in project files

Checking for Existing Watershed Q

The water surface elevation @ HEC-RAS section 14100 is 1388.67'

based on HYS Rating Curve the Q pass the culvert @ this elevation is 1103 cfs

This Q (1103 cfs) was subtracted from the total Q for Elsworth Road overtopping analysis

GM South Culvert
Existing Condition Flow, assume 50% clogging

CURRENT DATE: 01-16-2005 FILE DATE: 01-16-2005
CURRENT TIME: 16:20:36 FILE NAME: GMS_EXP5

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

C U L V NO.	SITE DATA INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1376.48	1376.32	252.30	5 RCB	10.00	2.50	.012	CONVENTIONAL
2								
3								
4								
5								
6								

clogging. rise reduce 50%

SUMMARY OF CULVERT FLOWS (cfs) FILE: GMS_EXP5 DATE: 01-16-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1382.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1382.75	250.0	250.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1383.21	500.0	500.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1383.97	750.0	750.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1385.00	1000.0	990.5	0.0	0.0	0.0	0.0	0.0	0.00	4
1385.04	1015.0	1000.6	0.0	0.0	0.0	0.0	0.0	6.97	4
1385.57	1500.0	1104.1	0.0	0.0	0.0	0.0	0.0	393.77	4
1385.76	1750.0	1138.5	0.0	0.0	0.0	0.0	0.0	603.64	3
1385.94	2000.0	1169.7	0.0	0.0	0.0	0.0	0.0	823.74	3
1386.10	2250.0	1197.8	0.0	0.0	0.0	0.0	0.0	1047.02	3
1386.25	2500.0	1223.6	0.0	0.0	0.0	0.0	0.0	1272.22	3
1385.00	991.3	991.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: GMS_EXP5 DATE: 01-16-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1382.59	0.000	0.00	0.00	0.00
1382.75	0.000	250.00	0.00	0.00
1383.21	0.000	500.00	0.00	0.00
1383.97	0.000	750.00	0.00	0.00
1385.00	-0.009	1000.00	9.53	0.95
1385.04	-0.007	1015.00	7.41	0.73
1385.57	-0.001	1500.00	2.10	0.14
1385.76	-0.005	1750.00	7.85	0.45
1385.94	-0.004	2000.00	6.61	0.33
1386.10	-0.003	2250.00	5.20	0.23
1386.25	-0.002	2500.00	4.19	0.17

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-16-2005 FILE DATE: 01-16-2005
CURRENT TIME: 16:20:36 FILE NAME: GMS_EXP5

PERFORMANCE CURVE FOR CULVERT 1 - 5(10.00 (ft) BY 2.50 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1382.59	0.00	6.11	0-NF	0.00	0.00	0.00	6.27	0.00	0.00
250.00	1382.75	1.42	6.27	4-FFt	1.50	0.92	2.50	6.27	2.00	0.00
500.00	1383.21	2.26	6.73	4-FFt	2.50	1.46	2.50	6.27	4.00	0.00
750.00	1383.97	3.09	7.49	4-FFt	2.50	1.92	2.50	6.27	6.00	0.00
990.47	1384.99	4.09	8.51	4-FFt	2.50	2.31	2.50	6.27	7.92	0.00
1000.62	1385.04	4.13	8.56	4-FFt	2.50	2.32	2.50	6.27	8.00	0.00
1104.13	1385.57	4.65	9.09	4-FFt	2.50	2.48	2.50	6.27	8.83	0.00

1138.51	1385.76	4.83	9.28	4-FFt	2.50	2.50	2.50	6.27	9.11	0.00
1169.65	1385.93	5.01	9.45	4-FFt	2.50	2.50	2.50	6.27	9.36	0.00
1197.78	1386.10	5.17	9.62	4-FFt	2.50	2.50	2.50	6.27	9.58	0.00
1223.60	1386.25	5.32	9.77	4-FFt	2.50	2.50	2.50	6.27	9.79	0.00

El. inlet face invert 1376.48 ft El. outlet invert 1376.32 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1376.48 ft
OUTLET STATION	252.30 ft
OUTLET ELEVATION	1376.32 ft
NUMBER OF BARRELS	5
SLOPE (V/H)	0.0006
CULVERT LENGTH ALONG SLOPE	252.30 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	2.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

3

CURRENT DATE: 01-16-2005 FILE DATE: 01-16-2005
CURRENT TIME: 16:20:36 FILE NAME: GMS_EXP5

TAILWATER

CONSTANT WATER SURFACE ELEVATION
1382.59

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	82.00 ft
CREST LENGTH	300.00 ft
OVERTOPPING CREST ELEVATION	1385.00 ft

GM North culvert

Existing condition flow, assume 50% clogging

GMN_EXP4.LST

C-10

1

CURRENT DATE: 01-16-2005 FILE DATE: 01-16-2005
CURRENT TIME: 15:54:59 FILE NAME: GMN_EXP4

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULVERT NO.	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1376.48	1376.32	249.40	5 RCB	10.00	2.50	.012	CONVENTIONAL
2								
3								
4								
5								
6								

clogging, rise reduce 50%

SUMMARY OF CULVERT FLOWS (cfs) FILE: GMN_EXP4 DATE: 01-16-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1381.69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1381.86	250.0	250.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1382.33	500.0	500.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1383.12	750.0	750.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1384.23	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1384.78	1105.0	1105.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1385.57	1500.0	1235.8	0.0	0.0	0.0	0.0	0.0	257.46	3
1385.84	1750.0	1278.8	0.0	0.0	0.0	0.0	0.0	464.97	3
1386.08	2000.0	1315.8	0.0	0.0	0.0	0.0	0.0	679.82	3
1386.30	2250.0	1348.6	0.0	0.0	0.0	0.0	0.0	897.96	3
1386.50	2500.0	1378.6	0.0	0.0	0.0	0.0	0.0	1118.71	3
1385.00	1142.3	1142.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: GMN_EXP4 DATE: 01-16-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1381.69	0.000	0.00	0.00	0.00
1381.86	0.000	250.00	0.00	0.00
1382.33	0.000	500.00	0.00	0.00
1383.12	0.000	750.00	0.00	0.00
1384.23	0.000	1000.00	0.00	0.00
1384.78	0.000	1105.00	0.00	0.00
1385.57	-0.007	1500.00	6.73	0.45
1385.84	-0.005	1750.00	6.27	0.36
1386.08	-0.004	2000.00	4.43	0.22
1386.30	-0.003	2250.00	3.42	0.15
1386.50	-0.002	2500.00	2.73	0.11

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 01-16-2005 FILE DATE: 01-16-2005
CURRENT TIME: 15:54:59 FILE NAME: GMN_EXP4

PERFORMANCE CURVE FOR CULVERT 1 - 5(10.00 (ft) BY 2.50 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1381.69	0.00	5.21	0-NF	0.00	0.00	0.00	5.37	0.00	0.00
250.00	1381.86	1.57	5.38	4-FFt	1.50	0.92	2.50	5.37	2.00	0.00
500.00	1382.33	2.47	5.85	4-FFt	2.50	1.46	2.50	5.37	4.00	0.00
750.00	1383.12	3.39	6.64	4-FFt	2.50	1.92	2.50	5.37	6.00	0.00
1000.00	1384.23	4.53	7.75	4-FFt	2.50	2.32	2.50	5.37	8.00	0.00
1105.00	1384.78	5.10	8.30	4-FFt	2.50	2.48	2.50	5.37	8.84	0.00
1235.81	1385.56	5.89	9.08	4-FFt	2.50	2.50	2.50	5.37	9.89	0.00

```
1278.76  1385.83   6.18   9.35 4-FFt   2.50   2.50   2.50   5.37  10.23   0.00
1315.75  1386.07   6.43   9.59 4-FFt   2.50   2.50   2.50   5.37  10.53   0.00
1348.63  1386.29   6.66   9.81 4-FFt   2.50   2.50   2.50   5.37  10.79   0.00
1378.56  1386.50   6.88  10.02 4-FFt   2.50   2.50   2.50   5.37  11.03   0.00
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        El. inlet face invert    1376.48 ft   El. outlet invert  1376.32 ft
        El. inlet throat invert     0.00 ft   El. inlet crest       0.00 ft
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                     1376.48 ft
      OUTLET STATION                       249.40 ft
      OUTLET ELEVATION                    1376.32 ft
      NUMBER OF BARRELS                      5
      SLOPE (V/H)                            0.0006
      CULVERT LENGTH ALONG SLOPE           249.40 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN           10.00 ft
      BARREL RISE            2.50 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE  (90-45 DEG.)
      INLET DEPRESSION      NONE

ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
□
                                                                           3

CURRENT DATE: 01-16-2005                                FILE DATE: 01-16-2005
CURRENT TIME: 15:54:59                                  FILE NAME: GMN_EXP4

ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ            TAILWATER           ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

           CONSTANT WATER SURFACE ELEVATION
                    1381.69

ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ROADWAY OVERTOPPING DATA  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

      ROADWAY SURFACE                          PAVED
      EMBANKMENT TOP WIDTH                     82.00 ft
      CREST LENGTH                            200.00 ft
      OVERTOPPING CREST ELEVATION            1385.00 ft

ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
□
```

DESIGN MEMORANDUM

Client: _____ Sheet _____ Of _____

Project: _____ Date: _____

Data For: _____ Work Order: _____

Prepared By: _____ Checked By: _____ File No: _____

amec

Note: This form must be used for project calculations and original filed in project files

The two culverts under Elsworth Road near GM site were checked for Exiting Watershed flow of 2028 cfs

At head water elevation 1385.00:

discharge passing through the south culvert is 991
discharge passing through the north culvert is 1142 cfs

1142 + 991 = 2133 cfs > 2028 cfs

OK

The headwater elevation to passing total 2028 cfs is 1384.73'

Q pass GM South is 934 cfs

Q pass GM North is 1095 cfs

GM South Culvert
Proposed Condition. 50% Clogging

CURRENT DATE: 01-22-2005
CURRENT TIME: 13:18:22

FILE DATE: 01-22-2005
FILE NAME: GM_S_PR

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULVERT SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1376.48	1376.32	252.30	5 RCB	10.00	2.50	.012	CONVENTIONAL

→ Clogging; rise reduce 50%

SUMMARY OF CULVERT FLOWS (cfs) FILE: GM_S_PR DATE: 01-22-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1381.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1381.64	250.0	250.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1382.11	500.0	500.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1382.91	750.0	750.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1384.02	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1385.17	1250.0	1205.1	0.0	0.0	0.0	0.0	0.0	39.48	5
1385.47	1452.0	1254.0	0.0	0.0	0.0	0.0	0.0	195.66	4
1385.81	1750.0	1305.5	0.0	0.0	0.0	0.0	0.0	437.80	3
1386.05	2000.0	1342.1	0.0	0.0	0.0	0.0	0.0	653.10	3
1386.27	2250.0	1374.5	0.0	0.0	0.0	0.0	0.0	871.99	3
1386.48	2500.0	1404.0	0.0	0.0	0.0	0.0	0.0	1093.31	3
1385.00	1177.8	1177.8	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: GM_S_PR DATE: 01-22-2005

=590

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1381.47	0.000	0.00	0.00	0.00
1381.64	0.000	250.00	0.00	0.00
1382.11	0.000	500.00	0.00	0.00
1382.91	0.000	750.00	0.00	0.00
1384.02	0.000	1000.00	0.00	0.00
1385.17	-0.006	1250.00	5.41	0.43
1385.47	-0.002	1452.00	2.30	0.16
1385.81	-0.006	1750.00	6.67	0.38
1386.05	-0.004	2000.00	4.77	0.24
1386.27	-0.003	2250.00	3.46	0.15
1386.48	-0.002	2500.00	2.72	0.11

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-22-2005
CURRENT TIME: 13:18:22

FILE DATE: 01-22-2005
FILE NAME: GM_S_PR

PERFORMANCE CURVE FOR CULVERT 1 - 5(10.00 (ft) BY 2.50 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1381.47	0.00	4.99	0-NF	0.00	0.00	0.00	5.15	0.00	0.00
250.00	1381.64	1.57	5.16	4-FFt	1.50	0.92	2.50	5.15	2.00	0.00
500.00	1382.11	2.47	5.63	4-FFt	2.50	1.46	2.50	5.15	4.00	0.00
750.00	1382.91	3.39	6.43	4-FFt	2.50	1.92	2.50	5.15	6.00	0.00
1000.00	1384.02	4.53	7.54	4-FFt	2.50	2.32	2.50	5.15	8.00	0.00
1205.12	1385.16	5.70	8.68	4-FFt	2.50	2.50	2.50	5.15	9.64	0.00
1254.04	1385.47	6.01	8.99	4-FFt	2.50	2.50	2.50	5.15	10.03	0.00

1305.53	1385.80	6.36	9.32	4-FFt	2.50	2.50	2.50	5.15	10.44	0.00
1342.13	1386.05	6.62	9.57	4-FFt	2.50	2.50	2.50	5.15	10.74	0.00
1374.54	1386.27	6.85	9.79	4-FFt	2.50	2.50	2.50	5.15	11.00	0.00
1403.97	1386.48	7.07	10.00	4-FFt	2.50	2.50	2.50	5.15	11.23	0.00

El. inlet face invert 1376.48 ft El. outlet invert 1376.32 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1376.48 ft
OUTLET STATION	252.30 ft
OUTLET ELEVATION	1376.32 ft
NUMBER OF BARRELS	5
SLOPE (V/H)	0.0006
CULVERT LENGTH ALONG SLOPE	252.30 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	2.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

3

CURRENT DATE: 01-22-2005 FILE DATE: 01-22-2005
CURRENT TIME: 13:18:22 FILE NAME: GM_S_PR

TAILWATER

CONSTANT WATER SURFACE ELEVATION
1381.47

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	82.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1385.00 ft

GM North culvert
proposed condition, 50% clogging

GM_N_PR.LST

C-10

1

CURRENT DATE: 01-22-2005
CURRENT TIME: 13:19:34

FILE DATE: 01-22-2005
FILE NAME: GM_N_PR

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

SITE DATA — CULVERT SHAPE, MATERIAL, INLET

CULVERT NO.	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1376.48	1376.32	249.40	5 RCB	10.00	2.50	.012	CONVENTIONAL
2								
3								
4								
5								
6								

clogging rise reduce 50%

SUMMARY OF CULVERT FLOWS (cfs) FILE: GM_N_PR DATE: 01-22-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1380.92	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1381.09	250.0	250.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1381.56	500.0	500.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1382.35	750.0	750.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1383.46	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1384.88	1250.0	1250.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1385.42	1500.0	1332.9	0.0	0.0	0.0	0.0	0.0	163.96	4
1385.71	1750.0	1376.1	0.0	0.0	0.0	0.0	0.0	366.47	3
1385.97	2000.0	1412.8	0.0	0.0	0.0	0.0	0.0	581.82	3
1386.00	2028.0	1416.0	0.0	0.0	0.0	0.0	0.0	602.43	2
1386.42	2500.0	1473.8	0.0	0.0	0.0	0.0	0.0	1022.40	3
1385.00	1269.2	1269.2	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: GM_N_PR DATE: 01-22-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1380.92	0.000	0.00	0.00	0.00
1381.09	0.000	250.00	0.00	0.00
1381.56	0.000	500.00	0.00	0.00
1382.35	0.000	750.00	0.00	0.00
1383.46	0.000	1000.00	0.00	0.00
1384.88	0.000	1250.00	0.00	0.00
1385.42	-0.004	1500.00	3.12	0.21
1385.71	-0.007	1750.00	7.41	0.42
1385.97	-0.005	2000.00	5.36	0.27
1386.00	-0.008	2028.00	9.55	0.47
1386.42	-0.003	2500.00	3.82	0.15

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 01-22-2005
CURRENT TIME: 13:19:34

FILE DATE: 01-22-2005
FILE NAME: GM_N_PR

PERFORMANCE CURVE FOR CULVERT 1 - 5(10.00 (ft) BY 2.50 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1380.92	0.00	4.44	0-NF	0.00	0.00	0.00	4.60	0.00	0.00
250.00	1381.09	1.57	4.61	4-FFt	1.50	0.92	2.50	4.60	2.00	0.00
500.00	1381.56	2.47	5.08	4-FFt	2.50	1.46	2.50	4.60	4.00	0.00
750.00	1382.35	3.39	5.87	4-FFt	2.50	1.92	2.50	4.60	6.00	0.00
1000.00	1383.46	4.53	6.98	4-FFt	2.50	2.32	2.50	4.60	8.00	0.00
1250.00	1384.88	5.99	8.40	4-FFt	2.50	2.50	2.50	4.60	10.00	0.00
1332.92	1385.42	6.55	8.94	4-FFt	2.50	2.50	2.50	4.60	10.66	0.00

1376.12	1385.71	6.86	9.23	4-FFt	2.50	2.50	2.50	4.60	11.01	0.00
1412.82	1385.97	7.13	9.49	4-FFt	2.50	2.50	2.50	4.60	11.30	0.00
1416.03	1385.99	7.16	9.51	4-FFt	2.50	2.50	2.50	4.60	11.33	0.00
1473.78	1386.42	7.61	9.94	4-FFt	2.50	2.50	2.50	4.60	11.79	0.00

El. inlet face invert 1376.48 ft El. outlet invert 1376.32 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

```
***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                     1376.48 ft
      OUTLET STATION                       249.40 ft
      OUTLET ELEVATION                    1376.32 ft
      NUMBER OF BARRELS                        5
      SLOPE (V/H)                            0.0006
      CULVERT LENGTH ALONG SLOPE           249.40 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN            10.00 ft
      BARREL RISE             2.50 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE  (90-45 DEG.)
      INLET DEPRESSION      NONE
```


CURRENT DATE: 01-22-2005 FILE DATE: 01-22-2005
CURRENT TIME: 13:19:34 FILE NAME: GM_N_PR

TAILWATER

CONSTANT WATER SURFACE ELEVATION
1380.92

ROADWAY OVERTOPPING DATA

```
      ROADWAY SURFACE                        PAVED
      EMBANKMENT TOP WIDTH                    82.00 ft
      CREST LENGTH                           200.00 ft
      OVERTOPPING CREST ELEVATION           1385.00 ft
```

DESIGN MEMORANDUM

Client: _____ Sheet _____ Of _____

Project: _____ Date: _____

Data For: _____ Work Order: _____

Prepared By: _____ Checked By: _____ File No: _____

Note: This form must be used for project calculations and original filed in project files

Tailwater Elevations for Proposed culvert

① Culvert @ N. of Pecos Road

From HEC-RAS printout
⇓
Ellsworth_channel.prj
Ellsworth_channel_overtopping.prj

Existing condition = 1386.96 (X-Section 14000)
Proposed condition = 1384.12 (X-Section 14000)

② Culvert @ GM (South)

RAS X-Section 9600

Existing = 1382.59
Proposed = 1381.47

③ Culvert @ GM (North)

RAS X-Section = 8700

Existing 1381.69
Proposed 1380.92

DESIGN MEMORANDUM

Client: FCD Sheet _____ Of _____

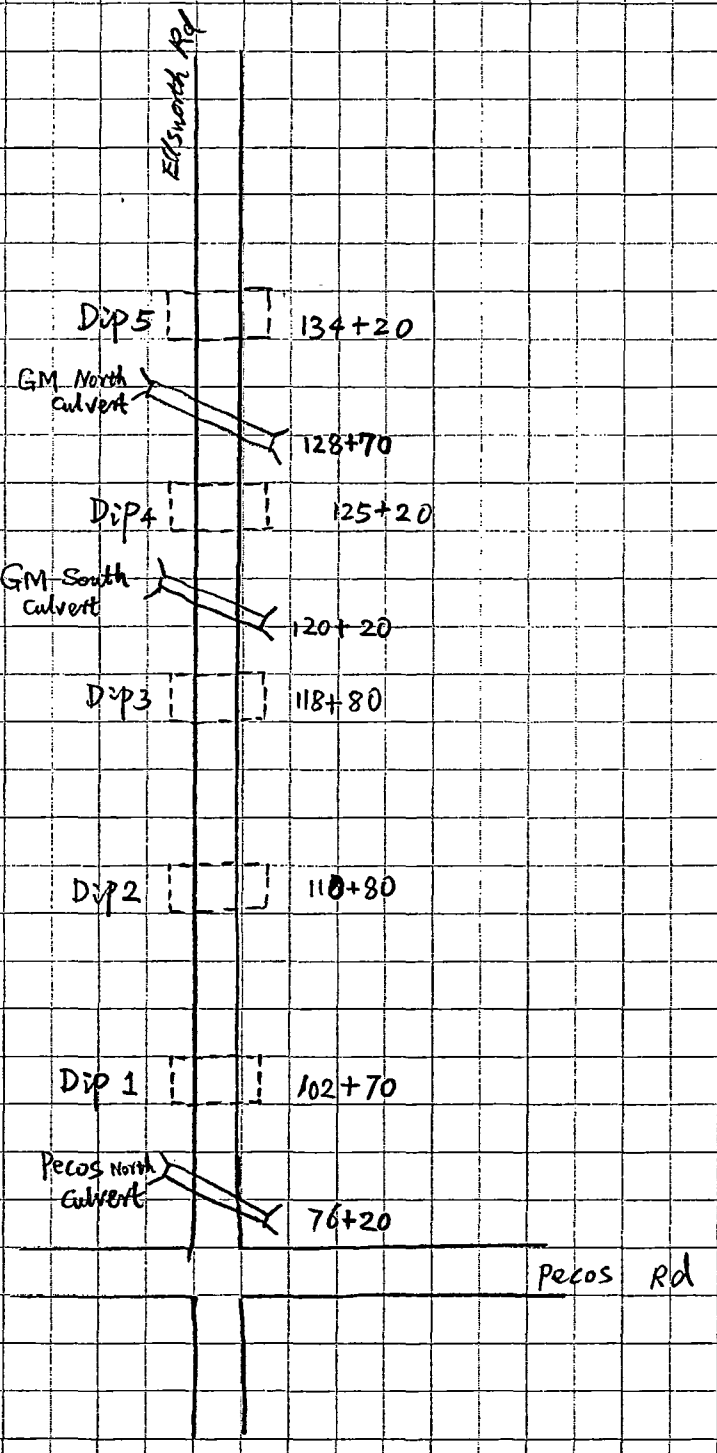
Project: Ellsworth Rd & Ellsworth Channel Date: _____

Data For: Overtopping @ Culverts Work Order: _____

Prepared By: GL Checked By: _____ File No: _____

Note: This form must be used for project calculations and original filed in project files

Existing Dip section and Proposed Culvert Location



Summary of Culverts

Culvert Location	Approx Sta	Pre-CIP				Interim -CIP				Full-CIP			
		Q100 (cfs)	Rd EL (ft)	WSEL (ft)	Overtopping Dep (ft)	Q100 (cfs)	Rd EL (ft)	WSEL (ft)	Overtopping Dep (ft)	Q100 (cfs)	Rd EL (ft)	WSEL (ft)	Overtopping Dep (ft)
Pecos North	Roadway: 76+20 Channel: 477+00 RAS: 14100	2856	1387.5	1389.39	1.89	2856	1388.1	1388.67	0.57	600	1388.1	1386.63	0
GM Manifield South	Roadway: 120+20 Channel: 521+00 RAS: 9800	1014	1382.5	1383.45	0.95	934	1384.6	1384.73	0*	590	1384.6	1382.4	0
GM Manifield North	Roadway: 128+70 Channel: 529+60 RAS:8900	1014	1382.1	1383.05	0.95	1095	1386.5	1384.73	0	863	1386.5	1382.4	0

* The overtopping depth at GM south is estmated based on the berm elevation at the culvert inlet (1385.0 ft)

Flow and Elevation Relationship @ Ellsworth Road Berm Openings

East of Dip Section #2 (weir flow)

Elevation (ft)	Opening Width (ft)	Water Depth (ft)	Discharge (cfs)
1384	68	0	0
1385	100	1	300
1386	100	2	849

East of Dip Section #3 (weir flow)

Elevation (ft)	Opening Width (ft)	Water Depth (ft)	Discharge (cfs)
1384	72	0	0
1385	116	1	348
1386	120	2	1018

East of Dip Section #4(weir flow)

Elevation (ft)	Opening Width (ft)	Water Depth (ft)	Discharge (cfs)
1383	22	0	0
1384	72	1	216
1385	132	2	1120
1386	135	3	2104

East of Dip Section #5 (orifice flow)

Elevation (ft)	Pipe Diameter (inch)	Water Depth (ft)	Discharge (cfs)
1385	2-48"	0	0
1386	2-48"	1	121

Flow and Elevation Relationship at Ellsworth Road Berm Openings (Summary of 4 openings)

Elevation (ft)	Discharge (cfs)				Total Discharge (cfs)
	East of #2	East of #3	East of #4	East of #5	
1383	0	0	0	0	0
1384	0	0	216	0	216
1385	300	348	1120	0	1768
1386	849	1018	2104	121	4092

Q100=2028 cfs
Elevation=1385.112 (interploated based the table above)
At elevation 1385.112 the discharges at each dip section are

	Discharge (cfs)
East of #2	361
East of #3	423
East of #4	1230
East of #5	14
Total Q (cfs)	2028

Water surface elevation @ dip section 2
Worksheet for Irregular Channel

Project Description	
Project File	x:\team6\haestad\fmw\gm_manif.fm2
Worksheet	Dip Section #2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data					
Channel Slope	0.020000 ft/ft				
Elevation range: 1,383.00 ft to 1,384.00 ft.					
Station (ft)	Elevation (ft)		Start Station	End Station	Roughness
0.00	1,384.00		0.00	330.00	0.015
120.00	1,383.00				
200.00	1,383.00				
330.00	1,384.00				
Discharge	361.00	cfs			

Results		
Wtd. Mannings Coefficient	0.015	
Water Surface Elevation	1,383.43	ft
Flow Area	56.90	ft^2
Wetted Perimeter	186.68	ft
Top Width	186.68	ft
Height	0.43	ft
Critical Depth	1,383.62	ft
Critical Slope	0.004387	ft/ft
Velocity	6.34	ft/s
Velocity Head	0.63	ft
Specific Energy	1,384.05	ft
Froude Number	2.03	
Flow is supercritical.		

Water surface elevation @ dip section 3
Worksheet for Irregular Channel

Project Description	
Project File	x:\team6\haestad\fmw\gm_manif.fm2
Worksheet	Dip Section #3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.020000	ft/ft

Elevation range: 1,383.00 ft to 1,384.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1,384.00	0.00	380.00	0.015
150.00	1,383.00			
230.00	1,383.00			
380.00	1,384.00			

Discharge	423.00	cfs

Results		
Wtd. Mannings Coefficient	0.015	
Water Surface Elevation	1,383.45	ft
Flow Area	66.18	ft^2
Wetted Perimeter	214.73	ft
Top Width	214.72	ft
Height	0.45	ft
Critical Depth	1,383.65	ft
Critical Slope	0.004381	ft/ft
Velocity	6.39	ft/s
Velocity Head	0.63	ft
Specific Energy	1,384.08	ft
Froude Number	2.03	

Flow is supercritical.

Water surface elevation @ dip section 4
Worksheet for Irregular Channel

Project Description	
Project File	x:\team6\haestad\fmw\gm_manif.fm2
Worksheet	Dip Section #4
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data					
Channel Slope	0.020000 ft/ft				
Elevation range: 1,382.10 ft to 1,384.00 ft.					
Station (ft)	Elevation (ft)		Start Station	End Station	Roughness
0.00	1,384.00		0.00	400.00	0.015
205.00	1,382.10				
240.00	1,382.10				
400.00	1,383.50				
Discharge	1,230.00	cfs			

Results		
Wtd. Mannings Coefficient	0.015	
Water Surface Elevation	1,383.05	ft
Flow Area	132.37	ft^2
Wetted Perimeter	245.05	ft
Top Width	245.04	ft
Height	0.95	ft
Critical Depth	1,383.45	ft
Critical Slope	0.003613	ft/ft
Velocity	9.29	ft/s
Velocity Head	1.34	ft
Specific Energy	1,384.39	ft
Froude Number	2.23	
Flow is supercritical.		

Water surface elevation @ dip section 5
Worksheet for Irregular Channel

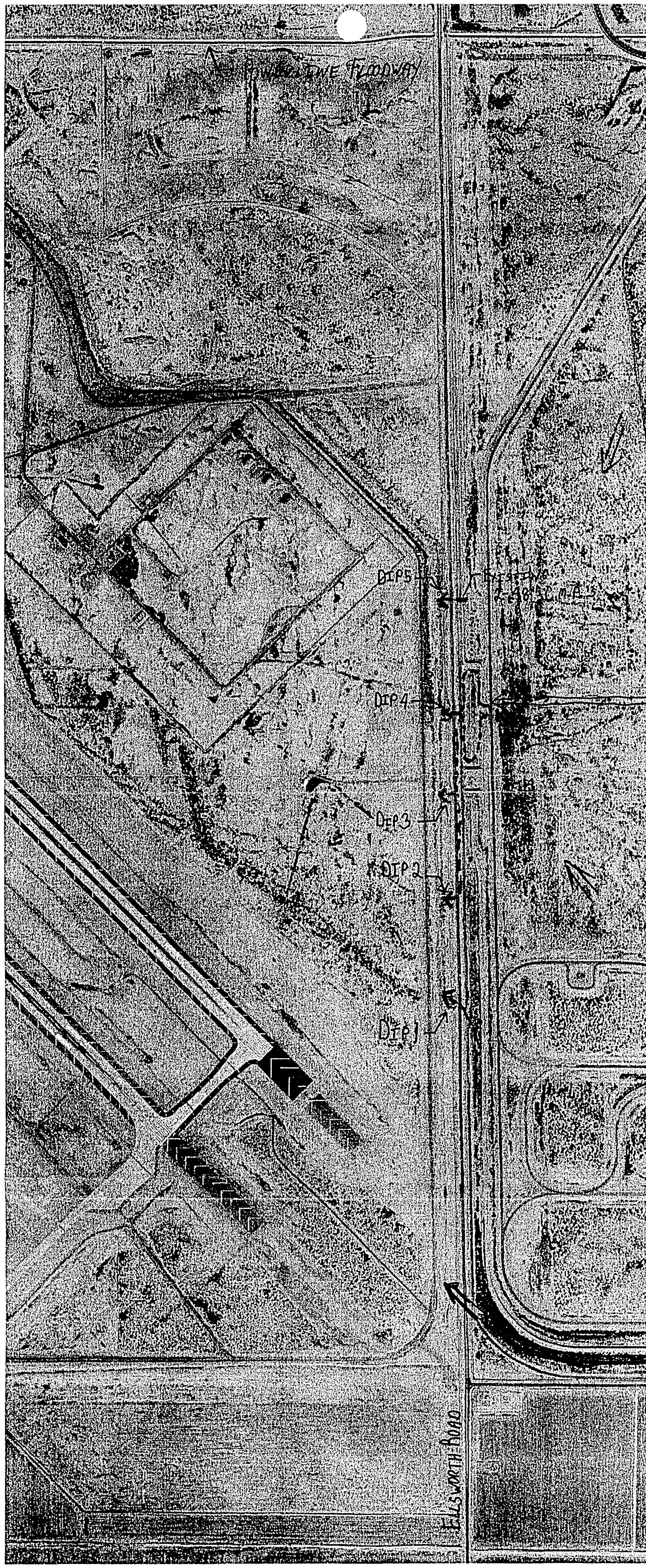
Project Description	
Project File	x:\team6\haestad\fmw\gm_manif.fm2
Worksheet	Dip Section #5
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data					
Channel Slope	0.020000	ft/ft			
Elevation range: 1,382.00 ft to 1,383.00 ft.					
Station (ft)	Elevation (ft)		Start Station	End Station	Roughness
0.00	1,383.00		0.00	340.00	0.015
100.00	1,382.00				
160.00	1,382.00				
340.00	1,383.00				
Discharge	14.00	cfs			

Results		
Wtd. Mannings Coefficient	0.015	
Water Surface Elevation	1,382.08	ft
Flow Area	5.85	ft²
Wetted Perimeter	82.93	ft
Top Width	82.93	ft
Height	0.08	ft
Critical Depth	1,382.11	ft
Critical Slope	0.007299	ft/ft
Velocity	2.39	ft/s
Velocity Head	0.09	ft
Specific Energy	1,382.17	ft
Froude Number	1.59	
Flow is supercritical.		

N

J.T.S.



DIP SECTION IN G.M. TEST TRACK.
≈ 2028 cfs OF G.M. ONSITE DRAINAGE CONCENTRATES AT THIS LOCATION

* NOTE:
DIP'S 2-5 ARE COLLECTIVELY REFERRED TO AS THE "G.M. MANIFOLD" SINCE FLOW ACCROSS THESE POINTS IS DRIVEN BY A COMMON HEADWATER ELEVATION.

• NORTH-EAST CORNER OF ELLSWORTH AND PECOS
≈ 2856 cfs OF FLOW THAT IS DIVERTED AROUND THE G.M. PROPERTY CONCENTRATES AT THIS LOCATION

— EXISTING PECOS ROAD

EXISTING FLOW CONDITIONS @ G.M. PROPERTY

APPENDIX K

Drop Structure Design Calculations

DESIGN MEMORANDUM

Client: FCD, MCDOT, City of Mesa Sheet ____ Of ____

Project: Ellsworth Channel design Date: 1/12/05

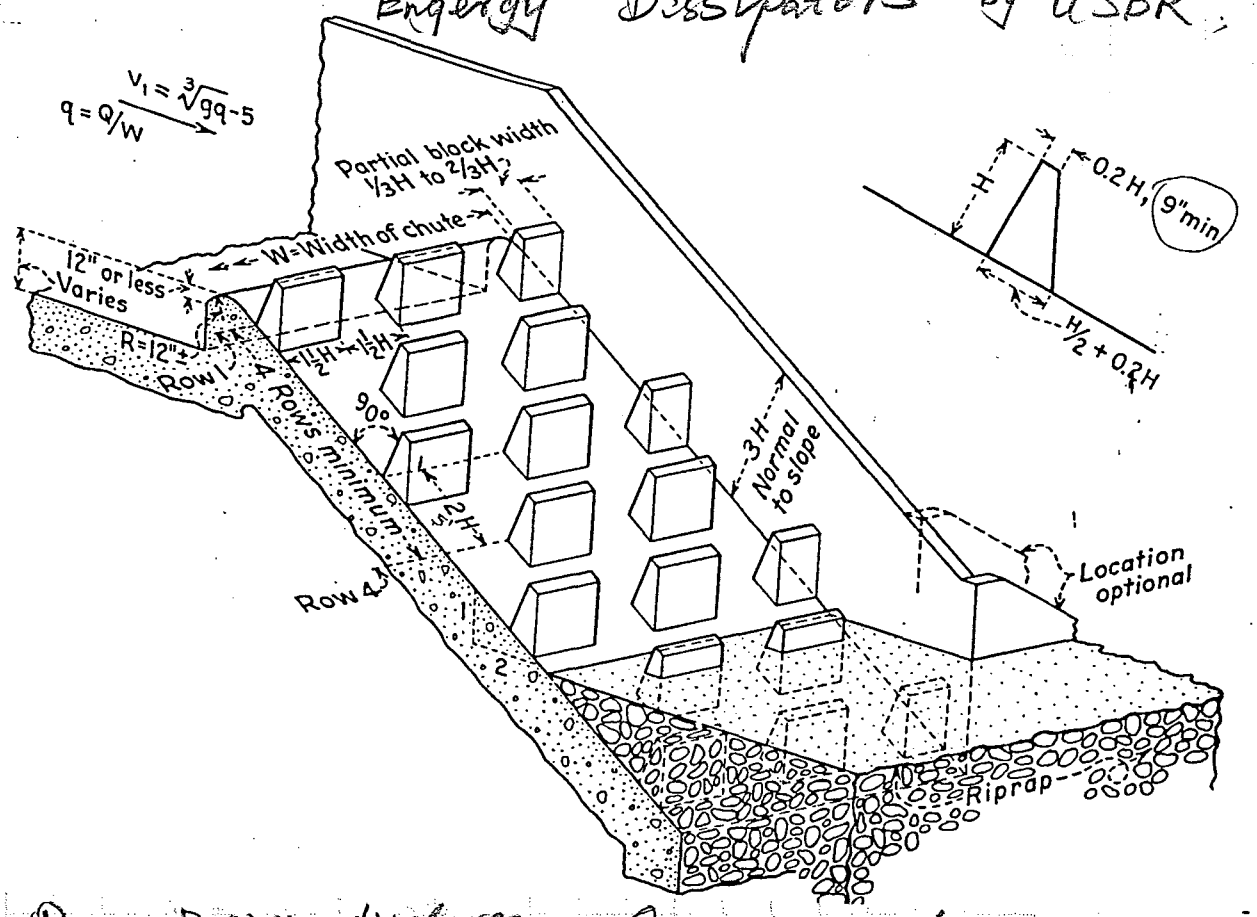
Data For: Slope drop structure design Work Order: ____

Prepared By: GL Checked By: ____ File No: ____

Note: This form must be used for project calculations and original filed in project files

Baffled apron design:

Refrence: "Hydraulic Design of stilling Basins and Energy Dissipators" by USBR.



① Design discharge: $Q_{100} = 1744$ cfs

② Unit design discharge q:

$$q = \frac{Q}{W} = \frac{1744}{70.12} = 24.91 \text{ cfs/ft}$$

③ Entrance velocity V_1.

$V_1 = 4.24$ ft/s (HEC-RAS model)

$$\sqrt[3]{gq} - 5 = \sqrt[3]{24.91 \times 32.2} - 5 = 4.29 \text{ ft/s}$$

$V_1 = 4.24 \approx \sqrt[3]{gq} - 5$

DESIGN MEMORANDUM

Client: _____ Sheet _____ Of _____

Project: _____ Date: _____

Data For: _____ Work Order: _____

Prepared By: _____ Checked By: _____ File No: _____

Note: This form must be used for project calculations and original filed in project files

amec

704

(4). vertical offset between the approach channel floor & the chute = 2'

Short radius curve with R = 1' to provid a crest

the first row of baffle pier is placed 12" below the top of the chute

(5) Baffle pier height H

$$H = 0.8 D_c = 0.8 \sqrt[3]{\frac{q^2}{g}} = 0.8 \sqrt[3]{\frac{24.91^2}{32.2}} = 2.14', \text{ using } 2.5'$$

(6). Baffle pier widths : $\approx \frac{3}{2} H = \frac{3}{2} \times 2.5 = 3.75'$ using 3.5'

(7). slope distance (along a 2:1 slope) between rows of baffle piers $= 2H = 2 \times 2.5 = 5'$

(8) baffle piers constructed with their upstream face normal to the chute surface

(9). Total five rows of baffle piers.

One row of piers will be buried in the backfill.

DESIGN MEMORANDUM

Client: _____ Sheet _____ Of _____

Project: _____ Date: _____

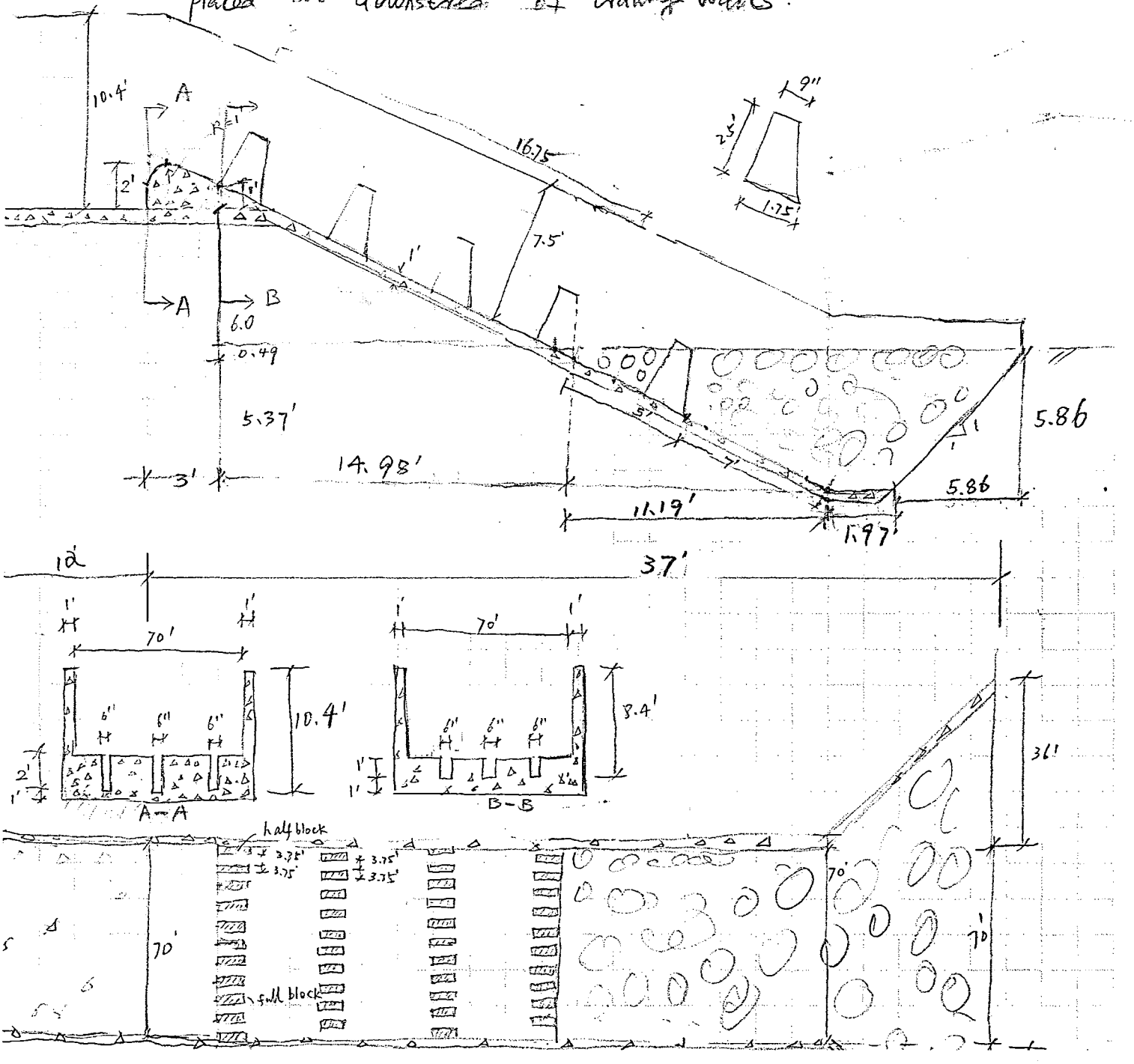
Data For: _____ Work Order: _____

Prepared By: _____ Checked By: _____ File No: _____

Note: This form must be used for project calculations and original filed in project files

(10). Chute training wall height = 3H = 3 × 2.5' = 7.5'

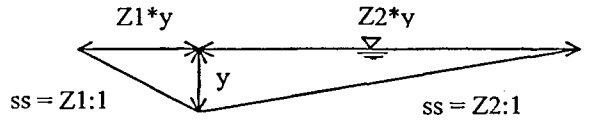
(11). Riprap consisting of 6–12" Stones will be placed at downstream of training walls.



APPENDIX L

Downdrain Location Determinations

Project Ellsworth Channel
Subject: Swale Calculations



The figure Above shows a typical triangular swale. The front and back slopes can be expressed as Z2 and Z1 respectively. The depth of flow is represented by the variable y. As shown in the picture above, the topwidth of the road or greencourt is given by the equation (Z1y + Z2y). Using the above variables, a general equation can be developed based on normal depth calculations using manning's equation. Using the above variable, a general equation can be developed based on normal depth calculations using manning's equation.

(1) $$Q = \frac{1.49}{n} A R^{2/3} \sqrt{S}$$

(2) $$A = \tfrac{1}{2} y(Z_1 y) + \tfrac{1}{2} y(Z_2 y) = \left(\frac{Z_1 + Z_2}{2}\right) y^2 = \alpha y^2$$

(3) $$P = \sqrt{y^2 + y^2 Z_1^2} + \sqrt{y^2 + y^2 Z_2^2} = \left(\sqrt{1 + Z_1^2} + \sqrt{1 + Z_2^2}\right) y = \beta y$$

(4) $$R = \frac{A}{P} = \frac{\alpha}{\beta} y$$

Put equations (2) and (4) into (1)

(5) $$Q = \frac{1.49}{n} \alpha y^2 \left(\frac{\alpha}{\beta} y\right)^{2/3} \sqrt{S} = \frac{1.49}{n} \gamma y^{8/3} \sqrt{S}; \text{ where } \gamma = \alpha \left(\frac{\alpha}{\beta}\right)^{2/3}$$

Rearranging terms to solve for y gives

(6) $$y = \left(\frac{Qn}{1.49 \gamma \sqrt{S}}\right)^{3/8}$$ Where; $$\gamma = \left(\frac{Z_1 + Z_2}{2}\right) \left(\frac{Z_1 + Z_2}{2\left(\sqrt{1 + Z_1^2} + \sqrt{1 + Z_2^2}\right)}\right)^{2/3}$$

Project Ellsworth Channel
Subject: Swale Calculations

The discharges in swale was calculated using the rational method. The rational method calculates the discharge using the following equation:

$Q = CiA$

Where
Q = Discharge (cfs)
C = Runoff Coefficient
i = Rainfall Intensity (in/hr)
A = Drainage Area (acres)

The cummulative drainage area is calculated on an incremental basis by station. At each station, the cummulative area is used to compute a new discharge in the swale based on the total area contributing to the swale at that point.

Based on this discharge, the depth of flow in the swale is computed using equation (6).

The velocity is then computed as Q/A = Q/equation (2).

Based on the velocity calculated for each segment of the swale, a cummulative travel time can be calculated where the travel time for each segment = L/V/60.

The time of concentration at any point along the swale is considered to be equal to the total travel time. The rainfall intensity, i, is chosen such that its duration is equal to the time of concentration. For travel times <5 min or > 60 min, the time of concentration is set equal to 5 or 60 respectively.

For travel times between 5 and 60 min, an iterative procedure is used compute the swale hydraulics. As an initial guess, Q is calculated using the rainfall intesity based on the travel time from the previous segment of swale. Based on this discharge, the hydraulics of the swale are determined and a new travel time is calculated. A new value of i is interpolated from the Intesity Duration curve using the new travel time, and a new discharge is calculated. This procedure is repeated until the results from 2 successive iterations are within 0.1 min.

Project: Ellsworth Channel
Subject Swale Calculations
Filename: Swale_calculations
Computed By: afc **Checked By:**

East Side Swale Calculations (Station 446+99 to Station 459+00)

Station	Drainage_width	Drainage area	C	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)	(Acre)		(cfs)	(ft/sec)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
446+99	23.00	0.00	0.35	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00004	0.00	0.00
447+50	28.00	0.03	0.35	0.05	0.11	7.47	7.47	5.09	4	4	4	8.25	2.47	0.025	0.00004	0.34	2.73
448+22	**31.00**	**0.08**	**0.35**	**0.10**	**0.13**	**9.08**	**16.55**	**3.52**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00004**	**0.43**	**3.42**
448+50	29.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.00077	0.00	0.00
449+00	21.00	0.03	0.35	0.06	0.35	2.38	2.38	5.64	4	4	4	8.25	2.47	0.025	0.00077	0.20	1.61
449+50	21.00	0.05	0.35	0.10	0.41	2.04	4.42	5.64	4	4	4	8.25	2.47	0.025	0.00077	0.25	2.02
450+00	21.00	0.08	0.35	0.14	0.44	1.88	6.30	5.36	4	4	4	8.25	2.47	0.025	0.00077	0.29	2.28
450+50	21.00	0.10	0.35	0.17	0.46	1.81	8.11	4.81	4	4	4	8.25	2.47	0.025	0.00077	0.30	2.43
451+00	21.00	0.13	0.35	0.20	0.48	1.74	9.85	4.54	4	4	4	8.25	2.47	0.025	0.00077	0.32	2.57
451+50	21.00	0.15	0.35	0.22	0.49	1.70	11.55	4.13	4	4	4	8.25	2.47	0.025	0.00077	0.33	2.65
452+00	21.00	0.17	0.35	0.23	0.50	1.67	13.22	3.86	4	4	4	8.25	2.47	0.025	0.00077	0.34	2.74
452+50	21.00	0.20	0.35	0.26	0.51	1.63	14.85	3.73	4	4	4	8.25	2.47	0.025	0.00077	0.35	2.84
453+00	21.00	0.22	0.35	0.27	0.52	1.61	16.45	3.52	4	4	4	8.25	2.47	0.025	0.00077	0.36	2.90
453+50	21.00	0.25	0.35	0.29	0.53	1.58	18.03	3.36	4	4	4	8.25	2.47	0.025	0.00077	0.37	2.96
454+00	20.00	0.27	0.35	0.31	0.54	1.56	19.59	3.29	4	4	4	8.25	2.47	0.025	0.00077	0.38	3.04
454+50	20.00	0.29	0.35	0.32	0.54	1.54	21.13	3.13	4	4	4	8.25	2.47	0.025	0.00077	0.38	3.08
455+00	20.00	0.32	0.35	0.34	0.55	1.52	22.66	3.05	4	4	4	8.25	2.47	0.025	0.00077	0.39	3.14
455+50	21.00	0.34	0.35	0.34	0.55	1.52	24.17	2.89	4	4	4	8.25	2.47	0.025	0.00077	0.39	3.16
456+00	21.00	0.36	0.35	0.36	0.56	1.50	25.67	2.81	4	4	4	8.25	2.47	0.025	0.00077	0.40	3.21
456+50	21.00	0.39	0.35	0.36	0.56	1.50	27.17	2.66	4	4	4	8.25	2.47	0.025	0.00077	0.40	3.22
457+00	21.00	0.41	0.35	0.37	0.56	1.49	28.66	2.58	4	4	4	8.25	2.47	0.025	0.00077	0.41	3.25
457+50	21.00	0.44	0.35	0.37	0.56	1.49	30.15	2.42	4	4	4	8.25	2.47	0.025	0.00077	0.41	3.25
458+00	21.00	0.46	0.35	0.38	0.57	1.47	31.62	2.39	4	4	4	8.25	2.47	0.025	0.00077	0.41	3.30
458+50	21.00	0.48	0.35	0.39	0.57	1.47	33.09	2.33	4	4	4	8.25	2.47	0.025	0.00077	0.42	3.33
459+00	**21.00**	**0.51**	**0.35**	**0.41**	**0.52**	**1.59**	**34.68**	**2.29**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00060**	**0.44**	**3.53**

East Side Swale Calculations (Station 460+44 to Station 461+70)

Station	Drainage_width	Drainage area	C	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)	(Acre)		(cfs)	(ft/sec)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
460+44	20.00	0.00	0.35	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00110	0.00	0.00
461+00	26.00	0.03	0.35	0.06	0.40	2.31	2.31	5.64	4	4	4	8.25	2.47	0.025	0.00110	0.19	1.52
461+50	30.00	0.06	0.35	0.12	0.49	1.72	4.03	5.64	4	4	4	8.25	2.47	0.025	0.00110	0.25	2.00
461+70	**26.00**	**0.07**	**0.35**	**0.15**	**0.51**	**0.66**	**4.69**	**5.64**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00110**	**0.27**	**2.15**

East Side Swale Calculations (Station 472+00 to Station 514+00)

Station	Drainage width	Drainage area	C	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)	(Acre)		(cfs)	(ft/sec)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
472+00	40.00	0.00	0.35	0.00	0.00	0.00	0.00	5.52	4	4	4	8.25	2.47	0.025	0.00575	0.00	0.00
472+50	41.00	0.05	0.35	0.09	0.84	1.00	1.00	5.52	4	4	4	8.25	2.47	0.025	0.00575	0.16	1.31
473+00	41.00	0.09	0.35	0.18	1.00	0.84	1.83	5.52	4	4	4	8.25	2.47	0.025	0.00575	0.21	1.70
473+34	**42.00**	**0.13**	**0.35**	**0.24**	**1.07**	**0.53**	**2.36**	**5.52**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	0.00575	**0.24**	**1.91**
473+34	42.00	0.00	0.35	0.00	0.00	0.00	0.00	5.52	4	4	4	8.25	2.47	0.025	0.00097	0.00	0.00
473+50	35.00	0.01	0.35	0.03	0.32	0.83	0.83	5.64	4	4	4	8.25	2.47	0.025	0.00097	0.15	1.18
474+00	26.00	0.05	0.35	0.10	0.44	1.91	2.74	5.64	4	4	4	8.25	2.47	0.025	0.00097	0.24	1.88
474+50	41.00	0.09	0.35	0.17	0.51	1.65	4.39	5.64	4	4	4	8.25	2.47	0.025	0.00097	0.29	2.34
475+00	41.00	0.13	0.35	0.27	0.56	1.48	5.87	5.64	4	4	4	8.25	2.47	0.025	0.00097	0.34	2.75
475+50	**20.00**	**0.17**	**0.35**	**0.33**	**0.60**	**1.40**	**7.27**	**5.64**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00097**	**0.37**	**3.00**
475+50	20.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.00077	0.00	0.00
476+00	22.00	0.02	0.35	0.05	0.34	2.48	2.48	5.64	4	4	4	8.25	2.47	0.025	0.00077	0.19	1.51
476+50	28.00	0.05	0.35	0.10	0.41	2.04	4.53	5.64	4	4	4	8.25	2.47	0.025	0.00077	0.25	2.02
477+00	41.00	0.09	0.35	0.17	0.46	1.80	6.32	5.36	4	4	4	8.25	2.47	0.025	0.00077	0.31	2.45
477+50	41.00	0.14	0.35	0.25	0.51	1.64	7.97	5.09	4	4	4	8.25	2.47	0.025	0.00077	0.35	2.80
478+10	**41.00**	**0.20**	**0.35**	**0.31**	**0.54**	**1.86**	**9.83**	**4.54**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00077**	**0.38**	**3.05**
487+70	45.00	0.00	0.35	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00080	0.00	0.00
488+00	36.00	0.03	0.35	0.06	0.35	1.42	1.42	5.64	4	4	4	8.25	2.47	0.025	0.00080	0.20	1.58
488+50	33.00	0.07	0.35	0.13	0.44	1.89	3.31	5.64	4	4	4	8.25	2.47	0.025	0.00080	0.28	2.20
489+00	33.00	0.11	0.35	0.21	0.49	1.69	5.00	5.64	4	4	4	8.25	2.47	0.025	0.00080	0.33	2.60
489+50	31.00	0.14	0.35	0.27	0.52	1.59	6.59	5.36	4	4	4	8.25	2.47	0.025	0.00080	0.36	2.86
490+00	33.00	0.18	0.35	0.30	0.54	1.54	8.14	4.81	4	4	4	8.25	2.47	0.025	0.00080	0.37	2.99
490+50	35.00	0.22	0.35	0.35	0.56	1.49	9.63	4.54	4	4	4	8.25	2.47	0.025	0.00080	0.39	3.15
491+00	38.00	0.26	0.35	0.38	0.57	1.46	11.09	4.13	4	4	4	8.25	2.47	0.025	0.00080	0.41	3.24
491+50	38.00	0.30	0.35	0.42	0.59	1.42	12.51	4.00	4	4	4	8.25	2.47	0.025	0.00080	0.42	3.40
492+00	37.00	0.35	0.35	0.47	0.60	1.38	13.89	3.86	4	4	4	8.25	2.47	0.025	0.00080	0.44	3.53
492+50	32.00	0.39	0.35	0.49	0.61	1.37	15.26	3.60	4	4	4	8.25	2.47	0.025	0.00080	0.45	3.58
493+00	28.00	0.42	0.35	0.52	0.62	1.35	16.61	3.52	4	4	4	8.25	2.47	0.025	0.00080	0.46	3.66
493+50	27.00	0.45	0.35	0.54	0.63	1.33	17.94	3.44	4	4	4	8.25	2.47	0.025	0.00080	0.47	3.73
494+00	28.00	0.48	0.35	0.56	0.63	1.32	19.26	3.29	4	4	4	8.25	2.47	0.025	0.00080	0.47	3.76
494+50	30.00	0.52	0.35	0.58	0.64	1.31	20.58	3.21	4	4	4	8.25	2.47	0.025	0.00080	0.48	3.82
495+00	32.00	0.55	0.35	0.60	0.64	1.30	21.87	3.13	4	4	4	8.25	2.47	0.025	0.00080	0.49	3.88
495+50	34.00	0.59	0.35	0.61	0.64	1.29	23.16	2.97	4	4	4	8.25	2.47	0.025	0.00080	0.49	3.90
496+00	35.00	0.63	0.35	0.64	0.65	1.28	24.44	2.89	4	4	4	8.25	2.47	0.025	0.00080	0.49	3.96
496+50	33.00	0.67	0.35	0.66	0.66	1.27	25.71	2.81	4	4	4	8.25	2.47	0.025	0.00080	0.50	4.01
497+00	30.00	0.71	0.35	0.67	0.66	1.26	26.98	2.73	4	4	4	8.25	2.47	0.025	0.00080	0.51	4.04
497+50	29.00	0.74	0.35	0.67	0.66	1.27	28.24	2.58	4	4	4	8.25	2.47	0.025	0.00080	0.50	4.03
498+00	30.00	0.77	0.35	0.68	0.66	1.26	29.50	2.50	4	4	4	8.25	2.47	0.025	0.00080	0.51	4.05
498+20	**33.00**	**0.79**	**0.35**	**0.69**	**0.66**	**0.50**	**30.01**	**2.50**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00080**	**0.51**	**4.07**
498+20	33.00	0.00	0.35	0.00	0.00	0.00	0	5.64	4	4	4	8.25	2.47	0.025	0.00200	0.00	0.00
498+50	33.00	0.02	0.35	0.04	0.47	1.06	1.06	5.64	4	4	4	8.25	2.47	0.025	0.00200	0.15	1.23
499+00	38.00	0.06	0.35	0.13	0.61	1.36	2.42	5.64	4	4	4	8.25	2.47	0.025	0.00200	0.23	1.81
499+50	41.00	0.11	0.35	0.21	0.70	1.19	3.61	5.64	4	4	4	8.25	2.47	0.025	0.00200	0.28	2.22
500+00	41.00	0.16	0.35	0.31	0.77	1.09	4.70	5.64	4	4	4	8.25	2.47	0.025	0.00200	0.32	2.54
500+50	43.00	0.20	0.35	0.40	0.82	1.02	5.72	5.64	4	4	4	8.25	2.47	0.025	0.00200	0.35	2.81
501+00	40.00	0.25	0.35	0.47	0.85	0.98	6.70	5.36	4	4	4	8.25	2.47	0.025	0.00200	0.37	2.98
501+50	33.00	0.29	0.35	0.52	0.87	0.95	7.65	5.09	4	4	4	8.25	2.47	0.025	0.00200	0.39	3.09
502+00	31.00	0.33	0.35	0.56	0.89	0.94	8.59	4.81	4	4	4	8.25	2.47	0.025	0.00200	0.40	3.17
502+50	37.00	0.37	0.35	0.59	0.90	0.93	9.52	4.54	4	4	4	8.25	2.47	0.025	0.00200	0.40	3.23
503+00	**20.00**	**0.40**	**0.35**	**0.60**	**0.90**	**0.92**	**10.44**	**4.26**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00200**	**0.41**	**3.26**
510+00		**Located at a local low spot, With a negligable drainage area (No calculations were made)**															
514+00		**Located at a local low spot, With a negligable drainage area (No calculations were made)**															

East Side Swale Calculations (Station 515+00 to Station 538+00)

Station	Drainage_width	Drainage area	C	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)	(Acre)		(cfs)	(ft/sec)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
515+00	22.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.00680	0.00	0.00
515+50	21.00	0.02	0.35	0.05	0.76	1.09	1.09	5.64	4	4	4	8.25	2.47	0.025	0.00680	0.13	1.01
516+00	27.00	0.05	0.35	0.10	0.92	0.90	2.00	5.64	4	4	4	8.25	2.47	0.025	0.00680	0.17	1.34
516+50	**27.00**	**0.08**	**0.35**	**0.16**	**1.03**	**0.81**	**2.80**	**5.64**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00680**	**0.20**	**1.59**
517+00	22.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.00320	0.00	0.00
517+50	21.00	0.02	0.35	0.05	0.58	1.45	1.45	5.64	4	4	4	8.25	2.47	0.025	0.00320	0.15	1.16
518+00	22.00	0.05	0.35	0.10	0.68	1.22	2.66	5.64	4	4	4	8.25	2.47	0.025	0.00320	0.19	1.51
518+50	22.00	0.07	0.35	0.15	0.76	1.10	3.76	5.64	4	4	4	8.25	2.47	0.025	0.00320	0.22	1.76
519+00	22.00	0.10	0.35	0.20	0.82	1.02	4.78	5.64	4	4	4	8.25	2.47	0.025	0.00320	0.25	1.97
519+50	20.00	0.12	0.35	0.24	0.86	0.97	5.75	5.64	4	4	4	8.25	2.47	0.025	0.00320	0.27	2.13
520+00	**22.00**	**0.15**	**0.35**	**0.28**	**0.89**	**0.94**	**6.69**	**5.36**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.00320**	**0.28**	**2.24**

East Side Swale Calculations (Station 527+00 to Station 543+00)

Station	Drainage_width	Drainage area	C	Q	V	Dt	Ttravel	i	Z1	Z2	α	β	γ	n	S	y	Topwidth
	(ft)	(Acre)		(cfs)	(ft/sec)	(min)	(min)	(in/hr)							(ft/ft)	(ft)	(ft)
528+00	22.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.00	0.00
528+50	24.00	0.03	0.35	0.05	0.90	0.93	0.93	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.12	0.96
529+00	31.00	0.06	0.35	0.11	1.09	0.76	1.69	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.16	1.29
529+50	**34.00**	**0.10**	**0.35**	**0.19**	**1.24**	**0.67**	**2.36**	**5.64**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.01000**	**0.19**	**1.56**
530+00	31.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.00	0.00
530+50	28.00	0.03	0.35	0.07	0.96	0.87	0.87	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.13	1.06
531+00	31.00	0.07	0.35	0.13	1.14	0.73	1.61	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.17	1.37
531+50	31.00	0.10	0.35	0.20	1.26	0.66	2.27	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.20	1.61
532+00	23.00	0.13	0.35	0.27	1.35	0.62	2.88	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.22	1.77
532+50	22.00	0.16	0.35	0.32	1.41	0.59	3.48	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.24	1.89
533+00	23.00	0.19	0.35	0.37	1.46	0.57	4.05	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.25	2.00
533+50	**27.00**	**0.21**	**0.35**	**0.42**	**1.52**	**0.55**	**4.60**	**5.64**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.01000**	**0.26**	**2.11**
534+00	25.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.00	0.00
534+50	22.00	0.03	0.35	0.05	0.90	0.92	0.92	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.12	0.97
535+00	24.00	0.05	0.35	0.11	1.07	0.78	1.70	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.16	1.26
535+50	**27.00**	**0.08**	**0.35**	**0.16**	**1.19**	**0.70**	**2.40**	**5.64**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.01000**	**0.18**	**1.48**
536+00	25.00	0.00	0.35	0.00	0.00	0.00	0.00	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.00	0.00
536+50	18.00	0.02	0.35	0.05	0.88	0.94	0.94	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.12	0.94
537+00	17.00	0.04	0.35	0.09	1.02	0.81	1.76	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.15	1.17
537+50	19.00	0.07	0.35	0.13	1.13	0.74	2.50	5.64	4	4	4	8.25	2.47	0.025	0.01000	0.17	1.35
538+00	**24.00**	**0.09**	**0.35**	**0.18**	**1.22**	**0.68**	**3.18**	**5.64**	**4**	**4**	**4**	**8.25**	**2.47**	**0.025**	**0.01000**	**0.19**	**1.53**

APPENDIX M

Channel Freeboard Tables

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Full CIP Flow
Prepared By: AFC

Sheet 1-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Plugged Full CIP Q.p07
Equation 6.1 DDMVII: Freeboard = 0.2 * (Flow Depth + (V^2/2*g)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
17100	44799.2	600	1384.2	1390.5	6.3	2.8	1.6	1.6	1.6	OK	OK	
17000	44899.2	600	1384.1	1390.4	6.3	2.8	2.0	1.6	1.6	OK	OK	
16900	44999.2	600	1384.1	1390.3	6.3	2.8	2.0	1.6	1.6	OK	OK	
16800	45099.2	600	1384.0	1390.3	6.3	2.8	1.9	1.6	1.6	OK	OK	
16700	45199.2	600	1383.9	1390.2	6.3	2.8	1.9	1.6	1.6	OK	OK	
16600	45299.2	600	1383.9	1390.1	6.3	2.8	2.0	1.6	1.6	OK	OK	
16500	45399.2	600	1383.8	1390.1	6.3	2.8	2.0	1.6	1.6	OK	OK	
16400	45499.2	600	1383.8	1390.0	6.3	2.8	2.0	1.6	1.6	OK	OK	
16300	45599.2	600	1383.7	1389.9	6.3	2.8	2.2	1.6	1.6	OK	OK	
16200	45699.2	600	1383.6	1389.9	6.2	2.8	2.0	1.6	1.6	OK	OK	
16100	45799.2	600	1383.6	1389.8	6.2	2.8	1.9	1.6	1.6	OK	OK	
16000	45899.2	600	1383.5	1389.7	6.2	2.8	1.9	1.6	1.6	OK	OK	
15967	45932.7	600	1383.5	1389.7	6.2	2.8	1.9	1.7	1.6	OK	OK	
15948	45951.7	600	1383.5	1389.7	6.2	2.4	1.9	1.6	1.6	OK	OK	
15938	45961.7	600	1383.5	1389.7	6.2	2.7	2.0	1.6	1.6	OK	OK	
15921	45978.5	600	1383.5	1389.5	6.0	4.6	2.5	2.5	1.6	OK	OK	
15895	46004.2	Culvert	C3									
15871	46028.5	600	1383.4	1388.6	5.1	5.3	3.4	3.4	1.4	OK	OK	
15856	46043.7	600	1383.4	1388.8	5.3	3.2	2.5	2.5	1.4	OK	OK	
15846	46053.7	600	1383.4	1388.8	5.4	3.0	2.5	2.5	1.4	OK	OK	
15827	46072.6	600	1383.4	1388.7	5.3	3.8	2.6	2.6	1.4	OK	OK	
15809	46090.2	600	1383.4	1388.6	5.2	3.8	2.7	2.6	1.4	OK	OK	
15800	46099.2	600	1383.4	1388.6	5.2	3.8	2.7	2.7	1.4	OK	OK	
15700	46199.2	600	1383.3	1388.4	5.1	4.0	2.8	2.8	1.3	OK	OK	
15600	46299.2	600	1383.3	1388.2	5.0	4.2	2.9	2.9	1.3	OK	OK	
15550	46349.2	600	1383.2	1388.1	4.8	4.3	3.0	3.0	1.3	OK	OK	
15460	46439.2	600	1383.2	1387.7	4.5	5.8	3.3	3.3	1.2	OK	OK	
15450	46449.2	600	1381.9	1387.7	5.9	5.2	2.4	2.4	1.6	OK	OK	
15350	46549.2	Culvert	C4									
15192	46707.2	600	1380.4	1386.0	5.6	3.9	2.3	2.3	1.5	OK	OK	
15100	46799.2	600	1380.3	1385.9	5.6	3.4	2.3	2.3	1.4	OK	OK	
15000	46899.2	600	1380.3	1385.7	5.5	3.5	1.6	2.4	1.4	OK	OK	
14900	46999.2	600	1380.2	1385.6	5.4	3.6	2.7	2.4	1.4	OK	OK	
14800	47099.2	600	1380.1	1385.5	5.4	3.6	2.7	2.5	1.4	OK	OK	
14700	47199.2	600	1380.0	1385.3	5.3	3.7	2.7	2.5	1.4	OK	OK	
14600	47299.2	600	1379.9	1385.2	5.3	3.8	2.7	2.6	1.4	OK	OK	
14579	47320.2	600	1379.9	1385.2	5.3	3.8	2.6	2.6	1.4	OK	OK	

Client: Flood Control District of Maricopa County
Project Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Full CIP Flow
Prepared By: AFC

Sheet 2-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Plugged Full CIP Q.p07
Equation 6.1 DDMVII: Freeboard = 0.2 * (Flow Depth + (V^2/2*g)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
14569	47330.2	600	1379.9	1385.1	5.2	3.8	2.6	2.6	1.4	OK	OK	
14501	47398.2	600	1379.9	1385.0	5.2	3.9	2.7	2.7	1.4	OK	OK	
14491	47408.2	600	1379.8	1385.0	5.2	3.9	2.7	2.7	1.4	OK	OK	
14451	47448.2	600	1379.8	1384.9	5.1	3.9	2.7	2.8	1.3	OK	OK	
14400	47499.2	600	1379.8	1384.8	5.1	4.0	2.9	2.8	1.3	OK	OK	
14300	47599.2	600	1379.7	1384.6	5.0	4.2	2.9	2.9	1.3	OK	OK	
14200	47699.2	600	1379.6	1384.4	4.8	4.4	3.1	3.1	1.3	OK	OK	
14100	47799.2	600	1379.5	1384.1	4.6	4.8	3.3	3.3	1.2	OK	OK	
14000	47899.2	600	1379.5	1384.1	4.6	2.8	2.8	2.3	1.2	OK	OK	
13900	47999.2	600	1379.4	1384.0	4.6	2.9	2.9	2.3	1.2	OK	OK	
13800	48099.2	600	1379.3	1383.9	4.7	2.8	3.3	2.3	1.2	OK	OK	
13700	48199.2	600	1379.2	1383.9	4.7	2.8	3.1	2.3	1.2	OK	OK	
13600	48299.2	600	1379.1	1383.8	4.7	2.8	3.1	2.2	1.2	OK	OK	
13500	48399.2	600	1379.1	1383.7	4.7	2.8	3.3	2.2	1.2	OK	OK	
13400	48499.2	600	1379.0	1383.7	4.7	2.8	3.0	2.2	1.2	OK	OK	
13300	48599.2	600	1378.9	1383.6	4.7	2.8	3.5	2.2	1.2	OK	OK	
13200	48699.2	600	1378.8	1383.5	4.7	2.8	2.2	2.2	1.2	OK	OK	
13100	48799.2	600	1378.7	1383.5	4.7	2.8	2.2	2.2	1.2	OK	OK	
13000	48899.2	600	1378.7	1383.4	4.7	2.8	2.2	2.2	1.2	OK	OK	
12900	48999.2	600	1378.6	1383.3	4.8	2.7	2.1	2.1	1.2	OK	OK	
12800	49099.2	600	1378.5	1383.3	4.8	2.7	2.1	2.1	1.2	OK	OK	
12700	49199.2	600	1378.4	1383.2	4.8	2.7	2.1	2.1	1.2	OK	OK	
12600	49299.2	600	1378.3	1383.1	4.8	2.7	2.1	2.1	1.2	OK	OK	
12500	49399.2	600	1378.3	1383.1	4.8	2.7	2.1	2.1	1.2	OK	OK	
12400	49499.2	600	1378.2	1383.0	4.8	2.7	2.1	2.1	1.2	OK	OK	
12300	49599.2	600	1378.1	1383.0	4.9	2.7	2.0	2.0	1.2	OK	OK	
12200	49699.2	600	1378.0	1382.9	4.9	2.6	2.0	2.0	1.3	OK	OK	
12100	49799.2	600	1377.9	1382.9	4.9	2.6	2.0	2.0	1.3	OK	OK	
12000	49899.2	600	1377.9	1382.8	5.0	2.6	2.0	2.0	1.3	OK	OK	
11900	49999.2	600	1377.8	1382.7	5.0	2.6	3.4	1.9	1.3	OK	OK	
11800	50099.2	600	1377.7	1382.7	5.0	2.6	3.4	1.9	1.3	OK	OK	
11700	50199.2	600	1377.6	1382.6	5.0	2.5	1.9	1.9	1.3	OK	OK	
11600	50299.2	600	1377.5	1382.6	5.1	2.5	2.3	1.8	1.3	OK	OK	
11500	50399.2	600	1377.5	1382.5	5.1	2.5	2.3	1.8	1.3	OK	OK	
11400	50499.2	600	1377.4	1382.5	5.1	2.2	2.5	2.0	1.3	OK	OK	
11300	50599.2	600	1377.3	1382.5	5.2	2.4	2.8	1.7	1.3	OK	OK	
112[illegible]	50699.2	600	1377.2	1382.4	5.2	2.4	[illegible].3	1.7	1.3	OK	OK	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Full CIP Flow
Prepared By: AFC

Sheet 3-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Plugged Full CIP Q.p07
Equation 6.1 DDMVII: Freeboard = 0.2 * (Flow Depth + (V^2/2*g)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
11100	50799.2	600	1377.1	1382.4	5.2	2.4	2.3	1.7	1.3	OK	OK	
11000	50899.2	600	1377.1	1382.3	5.3	2.4	2.7	1.6	1.3	OK	OK	
10900	50999.2	600	1377.0	1382.3	5.3	2.3	3.2	1.6	1.3	OK	OK	
10800	51099.2	600	1376.9	1382.2	5.3	2.3	3.2	1.6	1.4	OK	OK	
10700	51199.2	600	1376.8	1382.2	5.4	2.3	2.6	1.5	1.4	OK	OK	
10651	51248.3	600	1376.8	1382.2	5.4	2.3	1.9	1.5	1.4	OK	OK	
10624	51275.5	600	1376.8	1382.2	5.4	1.7	1.9	1.5	1.4	OK	OK	
10614	51285.5	600	1376.7	1382.2	5.4	1.7	1.9	1.5	1.4	OK	OK	
10601	51298.3	600	1376.7	1382.2	5.4	2.0	2.8	2.8	1.4	OK	OK	
10570	51329.2	Culvert	C7									
10540	51359.4	600	1376.7	1382.1	5.4	2.0	3.0	3.0	1.4	OK	OK	
10529	51370.7	600	1376.7	1382.1	5.4	1.8	2.0	2.0	1.4	OK	OK	
10519	51380.7	600	1376.7	1382.1	5.4	1.8	2.0	2.0	1.4	OK	OK	
10491	51408.5	600	1376.6	1382.0	5.4	2.3	2.0	2.0	1.4	OK	OK	
10400	51499.2	600	1376.6	1382.0	5.4	2.3	2.0	2.0	1.4	OK	OK	
10300	51599.2	600	1376.5	1381.9	5.5	2.3	2.0	2.0	1.4	OK	OK	
10200	51699.2	600	1376.4	1381.9	5.5	2.2	1.9	1.9	1.4	OK	OK	
10100	51799.2	600	1376.3	1381.9	5.5	2.2	1.9	1.9	1.4	OK	OK	
10000	51899.2	600	1376.3	1381.8	5.6	2.2	1.8	1.8	1.4	OK	OK	
9900	51999.2	600	1376.2	1381.8	5.6	2.2	3.4	1.8	1.4	OK	OK	
9800	52099.2	600	1376.1	1381.8	5.7	2.1	1.7	1.4	1.4	OK	OK	
9700	52199.2	600	1376.0	1381.7	5.7	2.1	1.7	1.7	1.4	OK	OK	
9600	52299.2	1172	1375.9	1381.6	5.6	3.2	2.7	2.7	1.4	OK	OK	
9500	52399.2	1172	1375.9	1381.5	5.7	2.5	5.6	2.8	1.4	OK	OK	
9400	52499.2	1172	1375.8	1381.5	5.7	2.5	5.8	2.8	1.5	OK	OK	
9341	52558.6	1172	1375.7	1381.5	5.8	2.4	4.0	2.8	1.5	OK	OK	
9315	52584.5	1172	1375.7	1381.5	5.8	2.2	4.5	2.7	1.5	OK	OK	
9305	52594.5	1172	1375.7	1381.5	5.8	2.4	4.8	2.7	1.5	OK	OK	
9289	52610.3	1172	1375.7	1381.4	5.8	2.6	3.6	3.6	1.5	OK	OK	
9248	52651.2	Culvert	C9									
9208	52691.5	1172	1375.6	1381.2	5.6	2.6	3.8	3.8	1.4	OK	OK	
9193	52705.7	1172	1375.6	1381.2	5.6	2.4	5.9	2.9	1.4	OK	OK	
9183	52715.7	1172	1375.6	1381.2	5.7	2.3	5.7	2.9	1.4	OK	OK	
9154	52745.2	1172	1375.6	1381.2	5.6	2.5	5.3	2.9	1.4	OK	OK	
9143	52756.2	1172	1375.6	1381.2	5.6	2.5	3.3	3.3	1.4	OK	OK	
9100	52799.2	1172	1375.5	1381.2	5.7	2.5	5.1	2.8	1.4	OK	OK	
9000	52899.2	1172	1375.5	1381.2	5.7	2.5	4.9	2.8	1.5	OK	OK	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Full CIP Flow
Prepared By: AFC

Sheet 4-9
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Plugged Full CIP Q.p07
Equation 6.1 DDMVII: Freeboard = 0.2 * (Flow Depth + (V^2/2*g)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
8900	52999.2	1172	1375.4	1381.1	5.8	2.4	4.9	2.8	1.5	OK	OK	
8800	53099.2	1172	1375.3	1381.1	5.8	2.0	4.7	2.0	1.5	OK	OK	
8700	53199.2	1172	1375.2	1381.1	5.8	2.4	4.2	2.7	1.5	OK	OK	
8600	53299.2	1744	1375.1	1380.9	5.7	3.6	5.4	2.8	1.5	OK	OK	
8500	53399.2	1744	1375.1	1380.8	5.7	3.6	4.1	2.8	1.5	OK	OK	
8400	53499.2	1744	1375.0	1380.7	5.8	3.6	4.0	2.8	1.5	OK	OK	
8300	53599.2	1744	1374.9	1380.6	5.8	3.6	4.3	2.8	1.5	OK	OK	
8200	53699.2	1744	1374.8	1380.6	5.8	3.6	4.6	2.7	1.5	OK	OK	
8100	53799.2	1744	1374.7	1380.5	5.8	3.6	4.8	2.7	1.5	OK	OK	
8000	53899.2	1744	1374.7	1380.4	5.8	3.6	2.7	2.7	1.5	OK	OK	
7900	53999.2	1744	1374.6	1380.4	5.8	3.6	3.1	2.7	1.5	OK	OK	
7800	54099.2	1744	1374.5	1380.3	5.8	3.6	3.1	2.7	1.5	OK	OK	
7700	54199.2	1744	1374.4	1380.2	5.8	3.6	3.1	2.7	1.5	OK	OK	
7600	54299.2	1744	1374.3	1380.1	5.8	3.6	3.1	2.7	1.5	OK	OK	
7500	54399.2	1744	1374.3	1380.1	5.8	3.6	3.6	2.7	1.5	OK	OK	
7400	54499.2	1744	1374.2	1380.0	5.8	3.6	3.7	2.7	1.5	OK	OK	
7300	54599.2	1744	1374.1	1379.9	5.8	3.6	3.5	2.7	1.5	OK	OK	
7200	54699.2	1744	1374.0	1379.9	5.8	3.6	3.7	2.7	1.5	OK	OK	
7100	54799.2	1744	1373.9	1379.8	5.9	3.5	3.8	2.6	1.5	OK	OK	
7000	54899.2	1744	1373.9	1379.7	5.9	3.5	4.4	2.6	1.5	OK	OK	
6900	54999.2	1744	1373.8	1379.7	5.9	3.5	4.4	2.6	1.5	OK	OK	
6800	55099.2	1744	1373.7	1379.6	5.9	3.5	4.3	2.6	1.5	OK	OK	
6700	55199.2	1744	1373.6	1379.5	5.9	3.5	4.5	2.6	1.5	OK	OK	
6688	55211.5	1744	1373.6	1379.5	5.9	3.5	3.8	2.6	1.5	OK	OK	
6675	55224.0	1744	1373.6	1379.5	5.9	3.5	4.4	2.6	1.5	OK	OK	
6663	55236.4	1744	1373.6	1379.4	5.9	4.0	5.0	2.7	1.5	OK	OK	
6647	55252.3	1744	1373.6	1379.3	5.8	4.6	6.2	6.2	1.5	OK	OK	
6615	55284.2	Culvert	C11									
6586	55313.2	1744	1373.5	1378.3	4.8	5.5	7.2	7.2	1.3	OK	OK	
6571	55327.7	1744	1373.5	1378.4	4.9	4.8	5.9	5.7	1.3	OK	OK	
6559	55340.1	1744	1373.4	1378.4	4.9	4.4	5.8	5.6	1.3	OK	OK	
6547	55352.6	1744	1373.4	1378.3	4.9	4.4	5.7	5.4	1.3	OK	OK	
6527	55372.2	1744	1373.4	1378.3	4.9	4.4	5.5	4.0	1.3	OK	OK	
6500	55399.2	1744	1373.4	1378.3	4.9	4.4	5.9	5.5	1.3	OK	OK	
6400	55499.2	1744	1373.2	1378.2	4.9	4.4	6.0	5.8	1.3	OK	OK	
6300	55599.2	1744	1373.1	1378.0	5.0	4.4	6.4	6.6	1.3	OK	OK	
62[illegible]	55699.2	1744	1372.9	1377.9	5.0	4.4	[illegible]8	7.4	1.3	OK	OK	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Full CIP Flow
Prepared By: AFC

Sheet 5-9
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Plugged Full CIP Q.p07
Equation 6.1 DDMVII: Freeboard = 0.2 * (Flow Depth + (V^2/2*g)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
6100	55799.2	1744	1372.8	1377.8	5.0	4.4	6.7	7.3	1.3	OK	OK	
6000	55899.2	1744	1372.7	1377.6	5.0	4.4	6.8	6.8	1.3	OK	OK	
5900	55999.2	1744	1372.5	1377.5	5.0	4.4	6.9	7.2	1.3	OK	OK	
5800	56099.2	1744	1372.4	1377.4	5.0	4.3	6.9	7.6	1.3	OK	OK	
5700	56199.2	1744	1372.2	1377.3	5.0	4.3	6.7	6.8	1.3	OK	OK	
5600	56299.2	1744	1372.1	1377.2	5.1	4.3	6.6	6.2	1.3	OK	OK	
5500	56399.2	1744	1372.0	1377.0	5.1	4.3	6.3	5.9	1.3	OK	OK	
5400	56499.2	1744	1371.8	1376.9	5.1	4.2	6.1	5.2	1.3	OK	OK	
5300	56599.2	1744	1371.7	1376.8	5.1	4.2	5.9	5.3	1.4	OK	OK	
5200	56699.2	1744	1371.5	1376.7	5.2	4.2	5.4	5.0	1.4	OK	OK	
5100	56799.2	1744	1371.4	1376.6	5.2	4.1	4.9	3.5	1.4	OK	OK	
5000	56899.2	1744	1371.3	1376.5	5.2	4.1	4.7	4.3	1.4	OK	OK	
4900	56999.2	1744	1371.1	1376.4	5.3	4.1	4.5	4.4	1.4	OK	OK	
4800	57099.2	1744	1371.0	1376.3	5.3	4.0	4.2	3.5	1.4	OK	OK	
4700	57199.2	1744	1370.8	1376.2	5.4	4.0	3.6	3.4	1.4	OK	OK	
4674	57225.2	1744	1370.8	1376.2	5.4	4.0	3.6	3.6	1.4	OK	OK	
4664	57235.2	1744	1370.8	1376.2	5.4	4.0	3.6	3.6	1.4	OK	OK	
4600	57299.2	1744	1370.7	1376.1	5.4	3.9	3.4	3.4	1.4	OK	OK	
4500	57399.2	1744	1370.6	1376.0	5.5	3.9	3.3	3.3	1.4	OK	OK	
4400	57499.2	1744	1370.4	1375.9	5.5	3.8	3.3	3.3	1.4	OK	OK	
4300	57599.2	1744	1370.3	1375.9	5.6	3.8	3.2	3.2	1.5	OK	OK	
4200	57699.2	1744	1370.1	1375.8	5.6	3.7	3.2	3.2	1.5	OK	OK	
4100	57799.2	1744	1370.0	1375.7	5.7	3.7	3.1	3.1	1.5	OK	OK	
4000	57899.2	1744	1369.9	1375.6	5.8	3.6	3.0	3.0	1.5	OK	OK	
3900	57999.2	1744	1369.7	1375.6	5.8	3.5	3.0	3.0	1.5	OK	OK	
3800	58099.2	1744	1369.6	1375.5	5.9	3.5	2.9	2.9	1.5	OK	OK	
3700	58199.2	1744	1369.4	1375.4	6.0	3.4	2.8	2.8	1.5	OK	OK	
3600	58299.2	1744	1369.3	1375.4	6.1	3.4	2.7	2.7	1.6	OK	OK	
3506	58393.5	1744	1369.2	1375.4	6.2	3.3	2.7	2.7	1.6	OK	OK	S D S
3474	58425.5	1744	1369.1	1375.3	6.2	3.3	2.7	2.7	1.6	OK	OK	L R T
3474	58425.5	1744	1369.1	1375.2	6.1	4.1	4.3	4.3	1.6	OK	OK	O O R
3462	58437.5	1744	1369.1	1375.2	6.1	4.1	4.3	4.3	1.6	OK	OK	P P U
3462	58437.5	1744	1370.1	1375.0	4.9	5.1	4.5	4.5	1.3	OK	OK	I C
3461	58438.5	1744	1371.1	1373.8	2.7	9.3	5.7	5.7	1.0	OK	OK	N T
3445	58454.5	1744	1363.1	1369.2	6.1	4.1	2.8	2.8	1.6	OK	OK	G U
3445	58454.5	1744	1363.1	1369.2	6.1	4.1	2.8	2.8	1.6	OK	OK	R
3433	58466.3	1744	1363.1	1369.2	6.1	4.1	2.9	2.9	1.6	OK	OK	E

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Full CIP Flow
Prepared By: AFC

Sheet 6-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Plugged Full CIP Q.p07
Equation 6.1 DDMVII: Freeboard = 0.2 * (Flow Depth + (V^2/2*g)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
3425	58474.1	1744	1363.1	1369.3	6.1	3.1	6.6	5.8	1.6	OK	OK	
3400	58499.2	1744	1363.0	1369.2	6.2	3.3	6.8	6.6	1.6	OK	OK	
3300	58599.2	1744	1362.8	1369.2	6.4	3.2	5.1	6.2	1.6	OK	OK	
3200	58699.2	1744	1362.6	1369.1	6.6	3.0	4.4	5.4	1.7	OK	OK	
3100	58799.2	1744	1362.3	1369.1	6.8	2.9	4.3	6.3	1.7	OK	OK	
3000	58899.2	1744	1362.1	1369.0	7.0	2.8	4.0	6.4	1.8	OK	OK	
2900	58999.2	1744	1361.8	1369.0	7.2	2.7	3.8	5.0	1.8	OK	OK	
2800	59099.2	1744	1361.6	1369.0	7.4	2.6	3.7	4.3	1.9	OK	OK	
2700	59199.2	1744	1361.4	1369.0	7.6	2.3	4.2	3.9	1.9	OK	OK	
2654	59245.2	1744	1361.3	1369.0	7.7	2.3	3.9	3.2	1.9	OK	OK	
2608	59291.2	1744	1361.2	1368.8	7.7	3.3	3.6	2.6	2.0	OK	OK	
2598	59301.1	1744	1361.1	1368.7	7.6	3.9	3.8	3.8	2.0	OK	OK	
2581	59318.1	1744	1361.1	1368.5	7.4	5.3	3.5	3.5	2.0	OK	OK	
2569	59330.2	Culvert	C12									
2557	59342.1	1744	1361.1	1365.2	4.1	9.5	6.0	6.0	1.4	OK	OK	
2542	59357.2	1744	1361.0	1365.0	3.9	8.0	6.2	2.6	1.2	OK	OK	
2532	59367.2	1744	1361.0	1365.1	4.0	6.7	6.1	5.1	1.2	OK	OK	
2513	59386.0	1744	1361.0	1365.1	4.2	5.6	6.1	4.3	1.2	OK	OK	
2400	59499.2	1744	1360.7	1364.8	4.2	5.5	6.8	4.8	1.2	OK	OK	
2300	59599.2	1744	1360.4	1364.6	4.2	5.5	7.8	4.7	1.2	OK	OK	
2200	59699.2	1744	1360.2	1364.3	4.2	5.5	8.7	4.8	1.2	OK	OK	
2100	59799.2	1744	1359.9	1364.1	4.1	5.5	8.4	5.2	1.2	OK	OK	
2000	59899.2	1744	1359.7	1363.8	4.2	5.6	7.9	4.3	1.2	OK	OK	
1900	59999.2	1744	1359.4	1363.6	4.2	5.5	7.6	4.7	1.2	OK	OK	
1800	60099.2	1744	1359.2	1363.3	4.1	5.5	8.5	4.2	1.2	OK	OK	
1700	60199.2	1744	1358.9	1363.1	4.1	5.6	8.3	3.9	1.2	OK	OK	
1600	60299.2	1744	1358.7	1362.8	4.2	5.6	8.3	4.1	1.2	OK	OK	
1500	60399.2	1744	1358.4	1362.6	4.1	5.5	2.1	2.1	1.2	OK	OK	
1400	60499.2	1744	1358.2	1362.3	4.1	5.6	8.4	6.8	1.2	OK	OK	
1300	60599.2	1744	1357.9	1362.1	4.1	5.6	7.4	3.4	1.2	OK	OK	
1200	60699.2	1744	1357.7	1361.8	4.1	5.5	7.5	3.2	1.2	OK	OK	
1100	60799.2	1744	1357.4	1361.6	4.1	5.6	7.1	3.2	1.2	OK	OK	
1000	60899.2	1744	1357.2	1361.3	4.1	5.6	6.9	2.1	1.2	OK	OK	
900	60999.2	1744	1356.9	1361.0	4.1	5.6	8.1	2.1	1.2	OK	OK	
800	61099.2	1744	1356.6	1360.8	4.1	5.6	2.9	2.1	1.2	OK	OK	
700	61199.2	1744	1356.4	1360.5	4.1	5.6	6.8	2.1	1.2	OK	OK	
600	61299.2	1744	1356.1	1360.3	4.1	5.5	6.8	7.5	1.1	OK	OK	

Client: Flood Control District of Maricopa County
Project Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Full CIP Flow
Prepared By: AFC

Sheet 7-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Plugged Full CIP Q.p07
Equation 6.1 DDMVII: Freeboard = 0.2 * (Flow Depth + (V^2/2*g)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
500	61399.2	1744	1355.9	1359.9	4.0	5.8	6.6	8.7	1.1	OK	OK	
400	61499.2	1744	1355.6	1359.6	4.0	5.9	6.4	7.5	1.1	OK	OK	
300	61599.2	1744	1355.4	1358.3	2.9	8.6	3.3	7.7	1.0	OK	OK	TIE IN
244	61655.2	1744	1355.3	1357.5	2.2	10.1	6.7	6.7	0.9	OK	OK	WITH
243	61656.2	1744	1355.2	1357.3	2.1	10.6	6.1	6.1	1.0	OK	OK	EXISTING
204	61695.2	1744	1355.1	1357.3	2.1	10.2	3.9	3.9	0.9	OK	OK	DROP
204	61695.3	1744	1353.1	1358.2	5.1	4.0	0.9	0.9	1.3	NO	NO	STRUCTURE
184	61715.3	1744	1353.2	1358.2	5.0	4.1	1.0	1.0	1.3	NO	NO	
164	61735.3	1744	1353.0	1358.2	5.2	4.0	0.8	0.8	1.4	NO	NO	
100	61799.2	1744	1352.1	1358.3	6.2	1.9	8.8	6.8	1.6	OK	OK	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream REDUCED by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 1-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
17100	44799.2	349	1384.2	1389.1	4.9	2.5	3.0	3.0	N/A	N/A	N/A	
17000	44899.2	349	1384.1	1389.0	4.9	2.5	3.4	3.0	N/A	N/A	N/A	
16900	44999.2	349	1384.1	1388.9	4.9	2.5	3.4	3.0	N/A	N/A	N/A	
16800	45099.2	349	1384.0	1388.8	4.8	2.5	3.3	3.0	N/A	N/A	N/A	
16700	45199.2	349	1383.9	1388.8	4.8	2.5	3.3	3.0	N/A	N/A	N/A	
16600	45299.2	349	1383.9	1388.7	4.8	2.5	3.4	3.0	N/A	N/A	N/A	
16500	45399.2	349	1383.8	1388.6	4.8	2.6	3.4	3.1	N/A	N/A	N/A	
16400	45499.2	349	1383.8	1388.6	4.8	2.6	3.5	3.1	N/A	N/A	N/A	
16300	45599.2	349	1383.7	1388.5	4.8	2.6	3.6	3.1	N/A	N/A	N/A	
16200	45699.2	349	1383.6	1388.4	4.8	2.6	3.5	3.1	N/A	N/A	N/A	
16100	45799.2	349	1383.6	1388.3	4.8	2.6	3.4	3.1	N/A	N/A	N/A	
16000	45899.2	349	1383.5	1388.2	4.7	2.6	3.4	3.1	N/A	N/A	N/A	
15967	45932.7	349	1383.5	1388.2	4.7	2.6	3.4	3.2	N/A	N/A	N/A	
15948	45951.7	349	1383.5	1388.2	4.7	2.0	3.4	3.1	N/A	N/A	N/A	
15938	45961.7	349	1383.5	1388.2	4.7	2.1	3.5	3.1	N/A	N/A	N/A	
15921	45978.5	349	1383.5	1388.1	4.6	3.5	3.9	3.9	N/A	N/A	N/A	
15895	46004.2	Culvert	C3									
15871	46028.5	349	1383.4	1387.9	4.5	3.6	4.1	4.1	N/A	N/A	N/A	
15856	46043.7	349	1383.4	1388.0	4.6	2.2	3.3	3.3	N/A	N/A	N/A	
15846	46053.7	349	1383.4	1388.0	4.6	2.1	3.3	3.3	N/A	N/A	N/A	
15827	46072.6	349	1383.4	1387.9	4.5	2.8	3.3	3.3	N/A	N/A	N/A	
15809	46090.2	349	1383.4	1387.9	4.5	2.9	3.4	3.4	N/A	N/A	N/A	
15800	46099.2	349	1383.4	1387.9	4.5	2.9	3.4	3.4	N/A	N/A	N/A	
15700	46199.2	349	1383.3	1387.8	4.5	2.9	3.4	3.4	N/A	N/A	N/A	
15600	46299.2	349	1383.3	1387.7	4.4	3.0	3.5	3.5	N/A	N/A	N/A	
15550	46349.2	349	1383.2	1387.6	4.4	3.0	3.5	3.5	N/A	N/A	N/A	
15460	46439.2	349	1383.2	1387.5	4.3	3.5	3.5	3.5	N/A	N/A	N/A	
15450	46449.2	349	1381.9	1387.5	5.6	3.1	2.6	2.6	N/A	N/A	N/A	
15350	46549.2	Culvert	C4									
15192	46707.2	349	1380.4	1387.4	7.0	1.7	0.9	0.9	N/A	N/A	N/A	
15100	46799.2	349	1380.3	1387.4	7.0	1.3	0.8	0.8	N/A	N/A	N/A	
15000	46899.2	349	1380.3	1387.4	7.1	1.3	-0.1	0.8	N/A	N/A	N/A	
14900	46999.2	349	1380.2	1387.4	7.2	1.3	1.0	0.7	N/A	N/A	N/A	
14800	47099.2	349	1380.1	1387.3	7.3	1.3	0.9	0.6	N/A	N/A	N/A	
14700	47199.2	349	1380.0	1387.3	7.3	1.2	0.7	0.6	N/A	N/A	N/A	
14600	47299.2	349	1379.9	1387.3	7.4	1.2	0.5	0.5	N/A	N/A	N/A	
14579	47320.2	349	1379.9	1387.3	7.4	1.2	0.5	0.5	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream REDUCED by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 1-9
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
14569	47330.2	349	1379.9	1387.3	7.4	1.2	0.5	0.5	N/A	N/A	N/A	
14501	47398.2	349	1379.9	1387.3	7.5	1.2	0.4	0.4	N/A	N/A	N/A	
14491	47408.2	349	1379.8	1387.3	7.5	1.2	0.4	0.4	N/A	N/A	N/A	
14490	47409.2	Lat Struct							N/A	N/A	N/A	
14451	47448.2	342	1379.8	1387.3	7.5	1.2	0.4	0.4	N/A	N/A	N/A	
14400	47499.2	309	1379.8	1387.3	7.5	1.0	0.5	0.3	N/A	N/A	N/A	
14300	47599.2	246	1379.7	1387.3	7.6	0.8	0.3	0.3	N/A	N/A	N/A	
14200	47699.2	190	1379.6	1387.3	7.7	0.6	0.2	0.2	N/A	N/A	N/A	
14100	47799.2	141	1379.5	1387.3	7.8	0.5	0.1	0.1	N/A	N/A	N/A	
14000	47899.2	21	1379.5	1387.3	7.8	0.0	-0.4	-1.0	N/A	N/A	N/A	
13900	47999.2	2330	1379.4	1386.8	7.4	5.3	0.1	-0.5	N/A	N/A	N/A	
13800	48099.2	2149	1379.3	1386.7	7.4	4.9	0.6	-0.5	N/A	N/A	N/A	
13700	48199.2	1986	1379.2	1386.6	7.4	4.7	0.3	-0.5	N/A	N/A	N/A	
13600	48299.2	1876	1379.1	1386.5	7.4	4.4	0.3	-0.5	N/A	N/A	N/A	
13500	48399.2	1826	1379.1	1386.4	7.4	4.3	0.6	-0.5	N/A	N/A	N/A	
13400	48499.2	1801	1379.0	1386.3	7.4	4.3	0.3	-0.5	N/A	N/A	N/A	
13300	48599.2	1790	1378.9	1386.2	7.3	4.3	0.8	-0.5	N/A	N/A	N/A	
13200	48699.2	1781	1378.8	1386.2	7.3	4.3	-0.4	-0.4	N/A	N/A	N/A	
13100	48799.2	1777	1378.7	1386.1	7.3	4.2	-0.4	-0.4	N/A	N/A	N/A	
13000	48899.2	1777	1378.7	1386.0	7.3	4.1	-0.4	-0.4	N/A	N/A	N/A	
12900	48999.2	1762	1378.6	1385.9	7.3	4.1	-0.4	-0.4	N/A	N/A	N/A	
12800	49099.2	1711	1378.5	1385.8	7.3	3.9	-0.4	-0.4	N/A	N/A	N/A	
12700	49199.2	1692	1378.4	1385.8	7.4	3.7	-0.5	-0.5	N/A	N/A	N/A	
12600	49299.2	1690	1378.3	1385.8	7.4	3.4	-0.5	-0.5	N/A	N/A	N/A	
12500	49399.2	1689	1378.3	1385.7	7.4	3.5	-0.5	-0.5	N/A	N/A	N/A	
12400	49499.2	1688	1378.2	1385.6	7.4	3.7	-0.5	-0.5	N/A	N/A	N/A	
12300	49599.2	1688	1378.1	1385.5	7.4	3.7	-0.5	-0.5	N/A	N/A	N/A	
12200	49699.2	1688	1378.0	1385.5	7.4	3.6	-0.5	-0.5	N/A	N/A	N/A	
12100	49799.2	1688	1377.9	1385.4	7.4	3.7	-0.5	-0.5	N/A	N/A	N/A	
12000	49899.2	1688	1377.9	1385.3	7.5	3.7	-0.6	-0.6	N/A	N/A	N/A	
11900	49999.2	1688	1377.8	1385.2	7.5	3.8	-0.6	-0.6	N/A	N/A	N/A	
11800	50099.2	1688	1377.7	1385.1	7.4	3.9	-0.5	-0.5	N/A	N/A	N/A	
11700	50199.2	1688	1377.6	1385.1	7.5	3.9	-0.5	-0.5	N/A	N/A	N/A	
11600	50299.2	1688	1377.5	1385.0	7.5	3.9	-0.1	-0.6	N/A	N/A	N/A	
11500	50399.2	1688	1377.5	1384.9	7.5	3.6	-0.1	-0.6	N/A	N/A	N/A	
11400	50499.2	1688	1377.4	1384.9	7.5	3.5	0.1	-0.4	N/A	N/A	N/A	
11[illegible]	50599.2	1688	1377.3	1384.7	7.5	4.0	0.5	-0.6	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream REDUCED by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 3-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
11200	50699.2	1688	1377.2	1384.7	7.5	4.0	0.0	-0.6	N/A	N/A	N/A	
11100	50799.2	1688	1377.1	1384.6	7.4	4.0	0.1	-0.6	N/A	N/A	N/A	
11000	50899.2	1688	1377.1	1384.5	7.5	4.0	0.5	-0.6	N/A	N/A	N/A	
10900	50999.2	1688	1377.0	1384.4	7.5	3.9	1.1	-0.6	N/A	N/A	N/A	
10800	51099.2	1688	1376.9	1384.4	7.5	3.8	1.1	-0.6	N/A	N/A	N/A	
10700	51199.2	1688	1376.8	1384.3	7.5	3.7	0.5	-0.6	N/A	N/A	N/A	
10651	51248.3	1688	1376.8	1384.2	7.4	4.0	-0.1	-0.5	N/A	N/A	N/A	
10624	51275.5	1688	1376.8	1384.2	7.5	3.3	-0.2	-0.6	N/A	N/A	N/A	
10614	51285.5	1688	1376.7	1384.2	7.5	3.1	-0.2	-0.6	N/A	N/A	N/A	
10601	51298.3	1688	1376.7	1384.1	7.4	4.1	0.9	0.9	N/A	N/A	N/A	
10570	51329.2	Culvert	C7						N/A	N/A	N/A	
10540	51359.4	1688	1376.7	1383.8	7.1	4.3	1.2	1.2	N/A	N/A	N/A	
10529	51370.7	1688	1376.7	1383.9	7.2	3.7	0.2	0.2	N/A	N/A	N/A	
10519	51380.7	1688	1376.7	1383.9	7.2	3.5	0.2	0.2	N/A	N/A	N/A	
10491	51408.5	1688	1376.6	1383.7	7.1	4.3	0.3	0.3	N/A	N/A	N/A	
10400	51499.2	1688	1376.6	1383.6	7.1	4.3	0.3	0.3	N/A	N/A	N/A	
10300	51599.2	1688	1376.5	1383.5	7.0	4.3	0.4	0.4	N/A	N/A	N/A	
10200	51699.2	1688	1376.4	1383.4	7.0	4.4	0.4	0.4	N/A	N/A	N/A	
10100	51799.2	1688	1376.3	1383.3	7.0	4.4	0.4	0.4	N/A	N/A	N/A	
10000	51899.2	1688	1376.3	1383.2	6.9	4.4	0.5	0.5	N/A	N/A	N/A	
9900	51999.2	1688	1376.2	1383.1	6.9	4.5	2.1	0.5	N/A	N/A	N/A	
9800	52099.2	1688	1376.1	1383.0	6.9	4.5	0.5	0.2	N/A	N/A	N/A	
9700	52199.2	1688	1376.0	1382.8	6.8	4.6	0.6	0.6	N/A	N/A	N/A	
9600	52299.2	2035	1375.9	1382.6	6.7	4.3	1.6	1.6	N/A	N/A	N/A	
9500	52399.2	2035	1375.9	1382.6	6.7	3.4	4.5	1.8	N/A	N/A	N/A	
9400	52499.2	2035	1375.8	1382.5	6.8	3.4	4.8	1.7	N/A	N/A	N/A	
9341	52558.6	2035	1375.7	1382.5	6.8	3.4	3.0	1.7	N/A	N/A	N/A	
9315	52584.5	2035	1375.7	1382.5	6.8	3.2	3.5	1.7	N/A	N/A	N/A	
9305	52594.5	2035	1375.7	1382.5	6.8	3.4	3.8	1.7	N/A	N/A	N/A	
9289	52610.3	2035	1375.7	1382.4	6.7	3.8	2.6	2.6	N/A	N/A	N/A	
9248	52651.2	Culvert	C9						N/A	N/A	N/A	
9208	52691.5	2035	1375.6	1382.2	6.6	3.9	2.8	2.8	N/A	N/A	N/A	
9193	52705.7	2035	1375.6	1382.2	6.6	3.5	4.9	1.9	N/A	N/A	N/A	
9183	52715.7	2035	1375.6	1382.2	6.6	3.3	4.8	1.9	N/A	N/A	N/A	
9154	52745.2	2035	1375.6	1382.2	6.6	3.5	4.3	1.9	N/A	N/A	N/A	
9143	52756.2	2035	1375.6	1382.2	6.6	3.5	2.3	2.3	N/A	N/A	N/A	
9100	52799.2	2035	1375.5	1382.1	6.6	3.5	4.2	1.9	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream REDUCED by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 4-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
9000	52899.2	2035	1375.5	1382.1	6.6	3.5	4.0	1.9	N/A	N/A	N/A	
8900	52999.2	2035	1375.4	1382.0	6.7	3.5	4.0	1.9	N/A	N/A	N/A	
8800	53099.2	2035	1375.3	1382.0	6.7	2.9	3.9	1.1	N/A	N/A	N/A	
8700	53199.2	2035	1375.2	1381.9	6.7	3.5	3.3	1.8	N/A	N/A	N/A	
8600	53299.2	2382	1375.1	1381.7	6.6	4.1	4.6	1.9	N/A	N/A	N/A	
8500	53399.2	2382	1375.1	1381.6	6.6	4.1	3.3	1.9	N/A	N/A	N/A	
8400	53499.2	2382	1375.0	1381.6	6.6	4.1	3.1	1.9	N/A	N/A	N/A	
8300	53599.2	2382	1374.9	1381.5	6.6	4.1	3.5	1.9	N/A	N/A	N/A	
8200	53699.2	2382	1374.8	1381.4	6.6	4.1	3.8	1.9	N/A	N/A	N/A	
8100	53799.2	2382	1374.7	1381.3	6.6	4.1	4.0	1.9	N/A	N/A	N/A	
8000	53899.2	2382	1374.7	1381.2	6.6	4.2	1.9	1.9	N/A	N/A	N/A	
7900	53999.2	2382	1374.6	1381.1	6.6	4.2	2.3	1.9	N/A	N/A	N/A	
7800	54099.2	2382	1374.5	1381.1	6.6	4.2	2.3	1.9	N/A	N/A	N/A	
7700	54199.2	2382	1374.4	1381.0	6.6	4.2	2.3	1.9	N/A	N/A	N/A	
7600	54299.2	2382	1374.3	1380.9	6.6	4.2	2.4	2.0	N/A	N/A	N/A	
7500	54399.2	2382	1374.3	1380.8	6.5	4.2	2.9	2.0	N/A	N/A	N/A	
7400	54499.2	2382	1374.2	1380.7	6.5	4.2	3.0	2.0	N/A	N/A	N/A	
7300	54599.2	2382	1374.1	1380.6	6.5	4.2	2.8	2.0	N/A	N/A	N/A	
7200	54699.2	2382	1374.0	1380.5	6.5	4.2	3.0	2.0	N/A	N/A	N/A	
7100	54799.2	2382	1373.9	1380.5	6.5	4.2	3.1	2.0	N/A	N/A	N/A	
7000	54899.2	2382	1373.9	1380.4	6.5	4.2	3.8	2.0	N/A	N/A	N/A	
6900	54999.2	2382	1373.8	1380.3	6.5	4.2	3.7	2.0	N/A	N/A	N/A	
6800	55099.2	2382	1373.7	1380.2	6.5	4.2	3.7	2.0	N/A	N/A	N/A	
6700	55199.2	2382	1373.6	1380.1	6.5	4.2	3.9	2.0	N/A	N/A	N/A	
6688	55211.5	2382	1373.6	1380.1	6.5	4.2	3.2	2.0	N/A	N/A	N/A	
6675	55224.0	2382	1373.6	1380.1	6.5	4.3	3.8	2.0	N/A	N/A	N/A	
6663	55236.4	2382	1373.6	1380.0	6.4	4.9	4.5	2.1	N/A	N/A	N/A	
6647	55252.3	2382	1373.6	1379.8	6.2	5.8	5.7	5.7	N/A	N/A	N/A	
6615	55284.2	Culvert	C11						N/A	N/A	N/A	
6586	55313.2	2382	1373.5	1379.2	5.7	6.3	6.3	6.3	N/A	N/A	N/A	
6571	55327.7	2382	1373.5	1379.3	5.8	5.5	5.0	4.9	N/A	N/A	N/A	
6559	55340.1	2382	1373.4	1379.3	5.8	4.9	4.9	4.6	N/A	N/A	N/A	
6547	55352.6	2382	1373.4	1379.3	5.8	4.8	4.8	4.5	N/A	N/A	N/A	
6527	55372.2	2382	1373.4	1379.2	5.8	4.8	4.6	3.1	N/A	N/A	N/A	
6500	55399.2	2382	1373.4	1379.2	5.9	4.8	5.0	4.6	N/A	N/A	N/A	
6400	55499.2	2382	1373.2	1379.1	5.9	4.8	5.1	4.9	N/A	N/A	N/A	
63	55599.2	2382	1373.1	1379.0	5.9	4.8	5.5	5.7	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream REDUCED by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 5-9
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
6200	55699.2	2382	1372.9	1378.8	5.9	4.8	5.9	6.4	N/A	N/A	N/A	
6100	55799.2	2382	1372.8	1378.7	5.9	4.8	5.8	6.4	N/A	N/A	N/A	
6000	55899.2	2382	1372.7	1378.6	5.9	4.8	5.9	5.8	N/A	N/A	N/A	
5900	55999.2	2382	1372.5	1378.5	6.0	4.7	6.0	6.2	N/A	N/A	N/A	
5800	56099.2	2382	1372.4	1378.3	6.0	4.7	5.9	6.6	N/A	N/A	N/A	
5700	56199.2	2382	1372.2	1378.2	6.0	4.7	5.7	5.8	N/A	N/A	N/A	
5600	56299.2	2382	1372.1	1378.1	6.0	4.7	5.6	5.3	N/A	N/A	N/A	
5500	56399.2	2382	1372.0	1378.0	6.0	4.6	5.4	4.9	N/A	N/A	N/A	
5400	56499.2	2382	1371.8	1377.9	6.1	4.6	5.1	4.2	N/A	N/A	N/A	
5300	56599.2	2382	1371.7	1377.8	6.1	4.6	4.9	4.3	N/A	N/A	N/A	
5200	56699.2	2382	1371.5	1377.7	6.1	4.5	4.4	4.0	N/A	N/A	N/A	
5100	56799.2	2382	1371.4	1377.6	6.2	4.5	3.9	2.5	N/A	N/A	N/A	
5000	56899.2	2382	1371.3	1377.5	6.2	4.5	3.7	3.3	N/A	N/A	N/A	
4900	56999.2	2382	1371.1	1377.4	6.3	4.4	3.5	3.4	N/A	N/A	N/A	
4800	57099.2	2382	1371.0	1377.3	6.3	4.4	3.2	2.6	N/A	N/A	N/A	
4700	57199.2	2382	1370.8	1377.2	6.4	4.3	2.6	2.5	N/A	N/A	N/A	
4674	57225.2	2382	1370.8	1377.2	6.3	4.4	2.6	2.6	N/A	N/A	N/A	
4664	57235.2	2382	1370.8	1377.1	6.3	4.4	2.6	2.6	N/A	N/A	N/A	
4600	57299.2	2382	1370.7	1377.1	6.4	4.3	2.4	2.4	N/A	N/A	N/A	
4500	57399.2	2382	1370.6	1377.0	6.5	4.3	2.4	2.4	N/A	N/A	N/A	
4400	57499.2	2382	1370.4	1376.9	6.5	4.2	2.3	2.3	N/A	N/A	N/A	
4300	57599.2	2382	1370.3	1376.8	6.6	4.2	2.2	2.2	N/A	N/A	N/A	
4200	57699.2	2382	1370.1	1376.8	6.6	4.1	2.2	2.2	N/A	N/A	N/A	
4100	57799.2	2382	1370.0	1376.7	6.7	4.0	2.1	2.1	N/A	N/A	N/A	
4000	57899.2	2382	1369.9	1376.6	6.8	4.0	2.0	2.0	N/A	N/A	N/A	
3900	57999.2	2382	1369.7	1376.6	6.8	3.9	2.0	2.0	N/A	N/A	N/A	
3800	58099.2	2382	1369.6	1376.5	6.9	3.9	1.9	1.9	N/A	N/A	N/A	
3700	58199.2	2382	1369.4	1376.4	7.0	3.8	1.8	1.8	N/A	N/A	N/A	
3600	58299.2	2382	1369.3	1376.4	7.1	3.7	1.7	1.7	N/A	N/A	N/A	
3506	58393.5	2382	1369.2	1376.3	7.2	3.7	1.8	1.8	N/A	N/A	N/A	S D S
3474	58425.5	2382	1369.1	1376.3	7.2	3.7	1.7	1.7	N/A	N/A	N/A	L R T
3474	58425.5	2382	1369.1	1376.1	7.0	4.9	3.4	3.4	N/A	N/A	N/A	O O R
3462	58437.5	2382	1369.1	1376.1	7.0	4.9	3.4	3.4	N/A	N/A	N/A	P P U
3462	58437.5	2382	1370.1	1375.9	5.7	5.9	3.7	3.7	N/A	N/A	N/A	I C
3461	58438.5	2382	1371.1	1374.4	3.3	10.3	5.1	5.1	N/A	N/A	N/A	N T
3445	58454.5	2382	1363.1	1370.0	6.9	4.9	2.0	2.0	N/A	N/A	N/A	G U
3445	58454.5	2382	1363.1	1370.0	6.9	4.9	2.0	2.0	N/A	N/A	N/A	R

Client: Flood Control District of Maricopa County
Proje Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream REDUCED by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 6-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
3433	58466.3	2382	1363.1	1370.0	6.9	5.0	2.0	2.0	N/A	N/A	N/A	E
3425	58474.1	2382	1363.1	1370.1	7.0	3.6	5.7	5.0	N/A	N/A	N/A	
3400	58499.2	2382	1363.0	1370.1	7.1	3.8	5.9	5.8	N/A	N/A	N/A	
3300	58599.2	2382	1362.8	1370.0	7.2	3.6	4.2	5.4	N/A	N/A	N/A	
3200	58699.2	2382	1362.6	1370.0	7.4	3.5	3.6	4.5	N/A	N/A	N/A	
3100	58799.2	2382	1362.3	1369.9	7.6	3.4	3.4	5.5	N/A	N/A	N/A	
3000	58899.2	2382	1362.1	1369.9	7.8	3.3	3.2	5.6	N/A	N/A	N/A	
2900	58999.2	2382	1361.8	1369.8	8.0	3.2	3.0	4.2	N/A	N/A	N/A	
2800	59099.2	2382	1361.6	1369.8	8.2	3.1	2.8	3.5	N/A	N/A	N/A	
2700	59199.2	2382	1361.4	1369.8	8.4	2.7	3.4	3.1	N/A	N/A	N/A	
2654	59245.2	2382	1361.3	1369.8	8.5	2.8	3.1	2.4	N/A	N/A	N/A	
2608	59291.2	2382	1361.2	1369.6	8.4	4.1	2.9	1.9	N/A	N/A	N/A	
2598	59301.1	2382	1361.1	1369.4	8.3	4.8	3.1	3.1	N/A	N/A	N/A	
2581	59318.1	2382	1361.1	1369.0	7.9	6.8	3.1	3.1	N/A	N/A	N/A	
2569	59330.2	Culvert	C12						N/A	N/A	N/A	
2557	59342.1	2382	1361.1	1366.1	5.0	10.8	5.1	5.1	N/A	N/A	N/A	
2542	59357.2	2382	1361.0	1365.6	4.6	9.3	5.6	2.0	N/A	N/A	N/A	
2532	59367.2	2382	1361.0	1365.8	4.7	7.3	5.5	4.4	N/A	N/A	N/A	
2513	59386.0	2382	1361.0	1365.9	4.9	6.1	5.4	3.6	N/A	N/A	N/A	
2400	59499.2	2382	1360.7	1365.6	4.9	6.1	6.0	4.0	N/A	N/A	N/A	
2300	59599.2	2382	1360.4	1365.3	4.9	6.1	7.1	4.0	N/A	N/A	N/A	
2200	59699.2	2382	1360.2	1365.1	4.9	6.1	7.9	4.1	N/A	N/A	N/A	
2100	59799.2	2382	1359.9	1364.8	4.9	6.1	7.6	4.4	N/A	N/A	N/A	
2000	59899.2	2382	1359.7	1364.6	4.9	6.1	7.2	3.6	N/A	N/A	N/A	
1900	59999.2	2382	1359.4	1364.3	4.9	6.1	6.9	4.0	N/A	N/A	N/A	
1800	60099.2	2382	1359.2	1364.1	4.9	6.1	7.7	3.5	N/A	N/A	N/A	
1700	60199.2	2382	1358.9	1363.8	4.9	6.1	7.5	3.2	N/A	N/A	N/A	
1600	60299.2	2382	1358.7	1363.6	4.9	6.1	7.6	3.4	N/A	N/A	N/A	
1500	60399.2	2382	1358.4	1363.3	4.9	6.1	1.3	1.3	N/A	N/A	N/A	
1400	60499.2	2382	1358.2	1363.1	4.9	6.1	7.7	6.1	N/A	N/A	N/A	
1300	60599.2	2382	1357.9	1362.8	4.9	6.1	6.7	2.7	N/A	N/A	N/A	
1200	60699.2	2382	1357.7	1362.5	4.9	6.1	6.8	2.5	N/A	N/A	N/A	
1100	60799.2	2382	1357.4	1362.3	4.9	6.2	6.3	2.5	N/A	N/A	N/A	
1000	60899.2	2382	1357.2	1362.0	4.9	6.2	6.1	1.3	N/A	N/A	N/A	
900	60999.2	2382	1356.9	1361.8	4.9	6.2	7.4	1.4	N/A	N/A	N/A	
800	61099.2	2382	1356.6	1361.5	4.8	6.2	2.2	1.4	N/A	N/A	N/A	
700	61199.2	2382	1356.4	1361.2	4.8	6.2	6.1	1.4	N/A	N/A	N/A	

Client	Flood Control District of Maricopa County	Sheet	7-7
Project	Ellsworth Channel Design	Date:	05/16/2005
Design:	**Channel Freeboard Check**	Checked By:	
	For Proposed Geometry, And Interim CIP Flow, Flow Downstream REDUCED	File Name:	CHANNEL DEPTH CHECK.XLS
	by amount that escapes downstream of Culvert C6		
Prepared By:	AFC		
HEC-RAS Project:	Ellsworth Channel.prj		
HEC-RAS Plan:	Final Unplugged Int CIP Q Weir No Berm.p03		

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
600	61299.2	2382	1356.1	1361.0	4.8	5.9	6.0	6.7	N/A	N/A	N/A	
500	61399.2	2382	1355.9	1360.6	4.7	6.4	5.9	8.0	N/A	N/A	N/A	
400	61499.2	2382	1355.6	1360.3	4.6	6.6	5.7	6.9	N/A	N/A	N/A	
300	61599.2	2382	1355.4	1358.9	3.5	9.4	2.7	7.1	N/A	N/A	N/A	TIE IN
244	61655.2	2382	1355.3	1358.0	2.7	11.0	6.2	6.2	N/A	N/A	N/A	WITH
243	61656.2	2382	1355.2	1357.8	2.6	11.5	5.6	5.6	N/A	N/A	N/A	EXISTING
204	61695.2	2382	1355.1	1358.0	2.9	10.3	3.1	3.1	N/A	N/A	N/A	DROP
204	61695.3	2382	1353.1	1358.7	5.5	5.0	0.5	0.5	N/A	N/A	N/A	STRUCTURE
184	61715.3	2382	1353.2	1358.6	5.4	5.1	0.6	0.6	N/A	N/A	N/A	
164	61735.3	2382	1353.0	1358.6	5.6	5.0	0.4	0.4	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream NOT Reduced by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 1-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q.p01

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
17100	44799.2	349	1384.2	1389.4	5.2	2.3	2.7	2.7	N/A	N/A	N/A	
17000	44899.2	349	1384.1	1389.3	5.2	2.2	3.1	2.7	N/A	N/A	N/A	
16900	44999.2	349	1384.1	1389.3	5.2	2.2	3.0	2.7	N/A	N/A	N/A	
16800	45099.2	349	1384.0	1389.2	5.2	2.2	2.9	2.7	N/A	N/A	N/A	
16700	45199.2	349	1383.9	1389.2	5.2	2.2	2.9	2.7	N/A	N/A	N/A	
16600	45299.2	349	1383.9	1389.1	5.2	2.2	3.0	2.6	N/A	N/A	N/A	
16500	45399.2	349	1383.8	1389.1	5.2	2.2	3.0	2.6	N/A	N/A	N/A	
16400	45499.2	349	1383.8	1389.0	5.3	2.2	3.0	2.6	N/A	N/A	N/A	
16300	45599.2	349	1383.7	1389.0	5.3	2.2	3.1	2.6	N/A	N/A	N/A	
16200	45699.2	349	1383.6	1388.9	5.3	2.2	3.0	2.6	N/A	N/A	N/A	
16100	45799.2	349	1383.6	1388.9	5.3	2.2	2.9	2.6	N/A	N/A	N/A	
16000	45899.2	349	1383.5	1388.8	5.3	2.2	2.8	2.6	N/A	N/A	N/A	
15967	45932.7	349	1383.5	1388.8	5.3	2.2	2.8	2.6	N/A	N/A	N/A	
15948	45951.7	349	1383.5	1388.8	5.3	1.7	2.8	2.6	N/A	N/A	N/A	
15938	45961.7	349	1383.5	1388.8	5.3	1.8	2.9	2.6	N/A	N/A	N/A	
15921	45978.5	349	1383.5	1388.7	5.2	3.1	3.3	3.3	N/A	N/A	N/A	
15895	46004.2	Culvert	C3									
15871	46028.5	349	1383.4	1388.6	5.1	3.1	3.4	3.4	N/A	N/A	N/A	
15856	46043.7	349	1383.4	1388.6	5.2	1.9	2.7	2.7	N/A	N/A	N/A	
15846	46053.7	349	1383.4	1388.6	5.2	1.8	2.7	2.7	N/A	N/A	N/A	
15827	46072.6	349	1383.4	1388.6	5.2	2.2	2.7	2.7	N/A	N/A	N/A	
15809	46090.2	349	1383.4	1388.6	5.1	2.3	2.7	2.7	N/A	N/A	N/A	
15800	46099.2	349	1383.4	1388.6	5.2	2.3	2.7	2.7	N/A	N/A	N/A	
15700	46199.2	349	1383.3	1388.5	5.2	2.2	2.7	2.7	N/A	N/A	N/A	
15600	46299.2	349	1383.3	1388.5	5.2	2.2	2.7	2.7	N/A	N/A	N/A	
15550	46349.2	349	1383.2	1388.4	5.2	2.2	2.7	2.7	N/A	N/A	N/A	
15460	46439.2	349	1383.2	1388.4	5.2	2.8	2.6	2.6	N/A	N/A	N/A	
15450	46449.2	349	1381.9	1388.4	6.5	2.7	1.7	1.7	N/A	N/A	N/A	
15350	46549.2	Culvert	C4									
15192	46707.2	349	1380.4	1388.2	7.8	1.5	0.1	0.1	N/A	N/A	N/A	
15100	46799.2	349	1380.3	1388.2	7.9	1.1	0.0	0.0	N/A	N/A	N/A	
15000	46899.2	349	1380.3	1388.2	7.9	1.1	-0.9	-0.1	N/A	N/A	N/A	
14900	46999.2	349	1380.2	1388.2	8.0	1.1	0.1	-0.1	N/A	N/A	N/A	
14800	47099.2	349	1380.1	1388.2	8.1	1.0	0.0	-0.2	N/A	N/A	N/A	
14700	47199.2	349	1380.0	1388.2	8.2	1.0	-0.2	-0.3	N/A	N/A	N/A	
14600	47299.2	349	1379.9	1388.2	8.2	1.0	-0.3	-0.4	N/A	N/A	N/A	
14579	47320.2	349	1379.9	1388.2	8.3	0.9	-0.4	-0.4	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream NOT Reduced by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 2-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q.p01

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
14569	47330.2	349	1379.9	1388.2	8.3	0.9	-0.4	-0.4	N/A	N/A	N/A	
14501	47398.2	349	1379.9	1388.2	8.3	0.9	-0.4	-0.4	N/A	N/A	N/A	
14491	47408.2	349	1379.8	1388.2	8.3	0.9	-0.5	-0.4	N/A	N/A	N/A	
14451	47448.2	349	1379.8	1388.2	8.4	0.8	-0.5	-0.5	N/A	N/A	N/A	
14400	47499.2	349	1379.8	1388.2	8.4	0.8	-0.4	-0.5	N/A	N/A	N/A	
14300	47599.2	349	1379.7	1388.2	8.5	0.7	-0.6	-0.6	N/A	N/A	N/A	
14200	47699.2	349	1379.6	1388.2	8.6	0.6	-0.7	-0.7	N/A	N/A	N/A	
14100	47799.2	349	1379.5	1388.2	8.6	0.5	-0.8	-0.8	N/A	N/A	N/A	
14000	47899.2	349	1379.5	1388.2	8.7	0.4	-1.3	-1.8	N/A	N/A	N/A	
13900	47999.2	2856	1379.4	1388.0	8.6	3.7	-1.1	-1.7	N/A	N/A	N/A	
13800	48099.2	2856	1379.3	1387.9	8.6	3.8	-0.7	-1.7	N/A	N/A	N/A	
13700	48199.2	2856	1379.2	1387.8	8.6	3.9	-0.9	-1.7	N/A	N/A	N/A	
13600	48299.2	2856	1379.1	1387.8	8.6	3.9	-0.9	-1.7	N/A	N/A	N/A	
13500	48399.2	2856	1379.1	1387.7	8.6	4.0	-0.7	-1.7	N/A	N/A	N/A	
13400	48499.2	2856	1379.0	1387.7	8.7	3.4	-1.1	-1.8	N/A	N/A	N/A	
13300	48599.2	2856	1378.9	1387.6	8.8	3.4	-0.6	-1.9	N/A	N/A	N/A	
13200	48699.2	2856	1378.8	1387.5	8.7	4.1	-1.8	-1.8	N/A	N/A	N/A	
13100	48799.2	2856	1378.7	1387.4	8.7	4.1	-1.8	-1.8	N/A	N/A	N/A	
13000	48899.2	2856	1378.7	1387.5	8.8	3.2	-1.9	-1.9	N/A	N/A	N/A	
12900	48999.2	2856	1378.6	1387.4	8.9	3.0	-2.0	-2.0	N/A	N/A	N/A	
12800	49099.2	2856	1378.5	1387.4	8.9	2.8	-2.0	-2.0	N/A	N/A	N/A	
12700	49199.2	2856	1378.4	1387.4	9.0	2.4	-2.1	-2.1	N/A	N/A	N/A	
12600	49299.2	2856	1378.3	1387.4	9.1	2.3	-2.2	-2.2	N/A	N/A	N/A	
12500	49399.2	2856	1378.3	1387.4	9.1	2.2	-2.2	-2.2	N/A	N/A	N/A	
12400	49499.2	2856	1378.2	1387.4	9.2	2.1	-2.3	-2.3	N/A	N/A	N/A	
12300	49599.2	2856	1378.1	1387.4	9.3	2.1	-2.4	-2.4	N/A	N/A	N/A	
12200	49699.2	2856	1378.0	1387.3	9.3	2.1	-2.4	-2.4	N/A	N/A	N/A	
12100	49799.2	2856	1377.9	1387.3	9.4	2.2	-2.5	-2.5	N/A	N/A	N/A	
12000	49899.2	2856	1377.9	1387.3	9.5	2.3	-2.6	-2.6	N/A	N/A	N/A	
11900	49999.2	2856	1377.8	1387.3	9.5	2.3	-1.1	-2.6	N/A	N/A	N/A	
11800	50099.2	2856	1377.7	1387.2	9.5	3.2	-1.1	-2.6	N/A	N/A	N/A	
11700	50199.2	2856	1377.6	1387.2	9.5	3.2	-2.6	-2.6	N/A	N/A	N/A	
11600	50299.2	2856	1377.5	1387.1	9.6	3.0	-2.3	-2.7	N/A	N/A	N/A	
11500	50399.2	2856	1377.5	1387.1	9.7	2.4	-2.3	-2.8	N/A	N/A	N/A	
11400	50499.2	2856	1377.4	1387.1	9.7	2.7	-2.1	-2.6	N/A	N/A	N/A	
11300	50599.2	2856	1377.3	1387.1	9.8	2.7	-1.8	-2.9	N/A	N/A	N/A	
11[illegible]	50699.2	2856	1377.2	1387.1	9.8	2.5	-2.4	-2.9	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream NOT Reduced by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 3-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q.p01

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
11100	50799.2	2856	1377.1	1387.0	9.9	2.5	-2.4	-3.0	N/A	N/A	N/A	
11000	50899.2	2856	1377.1	1387.0	10.0	2.6	-2.0	-3.1	N/A	N/A	N/A	
10900	50999.2	2856	1377.0	1387.0	10.0	2.6	-1.5	-3.1	N/A	N/A	N/A	
10800	51099.2	2856	1376.9	1387.0	10.1	2.4	-1.5	-3.2	N/A	N/A	N/A	
10700	51199.2	2856	1376.8	1387.0	10.2	2.2	-2.2	-3.3	N/A	N/A	N/A	
10651	51248.3	2856	1376.8	1386.7	10.0	4.0	-2.6	-3.1	N/A	N/A	N/A	
10624	51275.5	2856	1376.8	1386.8	10.0	3.5	-2.7	-3.1	N/A	N/A	N/A	
10614	51285.5	2856	1376.7	1386.7	10.0	3.6	-2.7	-3.1	N/A	N/A	N/A	
10601	51298.3	2856	1376.7	1386.5	9.7	5.3	-1.5	-1.5	N/A	N/A	N/A	
10570	51329.2	Culvert	C7									
10540	51359.4	2856	1376.7	1385.3	8.6	6.0	-0.3	-0.3	N/A	N/A	N/A	
10529	51370.7	2856	1376.7	1385.5	8.8	4.2	-1.4	-1.4	N/A	N/A	N/A	
10519	51380.7	2856	1376.7	1385.4	8.8	4.4	-1.4	-1.4	N/A	N/A	N/A	
10491	51408.5	2856	1376.6	1385.3	8.6	5.2	-1.2	-1.2	N/A	N/A	N/A	
10400	51499.2	2856	1376.6	1385.4	8.8	3.7	-1.4	-1.4	N/A	N/A	N/A	
10300	51599.2	2856	1376.5	1385.4	8.9	3.7	-1.5	-1.5	N/A	N/A	N/A	
10200	51699.2	2856	1376.4	1385.3	8.9	3.7	-1.5	-1.5	N/A	N/A	N/A	
10100	51799.2	2856	1376.3	1385.2	8.9	3.7	-1.5	-1.5	N/A	N/A	N/A	
10000	51899.2	2856	1376.3	1385.1	8.8	4.4	-1.4	-1.4	N/A	N/A	N/A	
9900	51999.2	2856	1376.2	1385.0	8.8	4.6	0.2	-1.4	N/A	N/A	N/A	
9800	52099.2	2856	1376.1	1384.9	8.8	4.6	-1.4	-1.7	N/A	N/A	N/A	
9700	52199.2	2856	1376.0	1384.7	8.7	5.1	-1.3	-1.3	N/A	N/A	N/A	
9600	52299.2	3203	1375.9	1384.5	8.6	4.7	-0.3	-0.3	N/A	N/A	N/A	
9500	52399.2	3203	1375.9	1384.5	8.7	3.8	2.6	-0.2	N/A	N/A	N/A	
9400	52499.2	3203	1375.8	1384.5	8.7	3.8	2.8	-0.2	N/A	N/A	N/A	
9341	52558.6	3203	1375.7	1384.4	8.7	3.8	1.1	-0.2	N/A	N/A	N/A	
9315	52584.5	3203	1375.7	1384.4	8.7	3.4	1.6	-0.2	N/A	N/A	N/A	
9305	52594.5	3203	1375.7	1384.4	8.7	3.2	1.8	-0.2	N/A	N/A	N/A	
9289	52610.3	3203	1375.7	1384.2	8.5	4.8	0.8	0.8	N/A	N/A	N/A	
9248	52651.2	Culvert	C9									
9208	52691.5	3203	1375.6	1383.8	8.2	5.0	1.2	1.2	N/A	N/A	N/A	
9193	52705.7	3203	1375.6	1383.8	8.2	4.4	3.3	0.3	N/A	N/A	N/A	
9183	52715.7	3203	1375.6	1383.8	8.3	4.1	3.1	0.3	N/A	N/A	N/A	
9154	52745.2	3203	1375.6	1383.8	8.3	4.1	2.6	0.3	N/A	N/A	N/A	
9143	52756.2	3203	1375.6	1383.8	8.3	3.9	0.6	0.6	N/A	N/A	N/A	
9100	52799.2	3203	1375.5	1383.8	8.3	3.9	2.5	0.2	N/A	N/A	N/A	
9000	52899.2	3203	1375.5	1383.7	8.3	3.9	2.3	0.2	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream NOT Reduced by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 4-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q.p01

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
8900	52999.2	3203	1375.4	1383.7	8.3	3.9	2.3	0.2	N/A	N/A	N/A	
8800	53099.2	3203	1375.3	1383.7	8.4	3.4	2.2	-0.5	N/A	N/A	N/A	
8700	53199.2	3203	1375.2	1383.5	8.3	3.9	1.7	0.2	N/A	N/A	N/A	
8600	53299.2	3550	1375.1	1383.4	8.3	4.4	2.9	0.2	N/A	N/A	N/A	
8500	53399.2	3550	1375.1	1383.3	8.3	4.4	1.6	0.2	N/A	N/A	N/A	
8400	53499.2	3550	1375.0	1383.2	8.3	4.5	1.5	0.2	N/A	N/A	N/A	
8300	53599.2	3550	1374.9	1383.2	8.3	4.5	1.8	0.2	N/A	N/A	N/A	
8200	53699.2	3550	1374.8	1383.1	8.3	4.5	2.1	0.2	N/A	N/A	N/A	
8100	53799.2	3550	1374.7	1383.0	8.3	4.5	2.3	0.2	N/A	N/A	N/A	
8000	53899.2	3550	1374.7	1382.9	8.3	4.5	0.2	0.2	N/A	N/A	N/A	
7900	53999.2	3550	1374.6	1382.9	8.3	4.5	0.6	0.2	N/A	N/A	N/A	
7800	54099.2	3550	1374.5	1382.8	8.3	4.5	0.6	0.2	N/A	N/A	N/A	
7700	54199.2	3550	1374.4	1382.7	8.3	4.5	0.6	0.2	N/A	N/A	N/A	
7600	54299.2	3550	1374.3	1382.6	8.3	4.5	0.6	0.2	N/A	N/A	N/A	
7500	54399.2	3550	1374.3	1382.5	8.3	4.5	1.2	0.2	N/A	N/A	N/A	
7400	54499.2	3550	1374.2	1382.5	8.3	4.5	1.3	0.2	N/A	N/A	N/A	
7300	54599.2	3550	1374.1	1382.4	8.3	4.5	1.0	0.2	N/A	N/A	N/A	
7200	54699.2	3550	1374.0	1382.3	8.3	4.5	1.2	0.2	N/A	N/A	N/A	
7100	54799.2	3550	1373.9	1382.2	8.3	4.5	1.4	0.2	N/A	N/A	N/A	
7000	54899.2	3550	1373.9	1382.2	8.3	4.5	2.0	0.2	N/A	N/A	N/A	
6900	54999.2	3550	1373.8	1382.1	8.3	4.5	1.9	0.2	N/A	N/A	N/A	
6800	55099.2	3550	1373.7	1382.0	8.3	4.5	1.9	0.2	N/A	N/A	N/A	
6700	55199.2	3550	1373.6	1381.9	8.3	4.5	2.1	0.2	N/A	N/A	N/A	
6688	55211.5	3550	1373.6	1381.9	8.3	4.5	1.4	0.2	N/A	N/A	N/A	
6675	55224.0	3550	1373.6	1381.8	8.2	5.0	2.1	0.3	N/A	N/A	N/A	
6663	55236.4	3550	1373.6	1381.7	8.1	5.7	2.8	0.4	N/A	N/A	N/A	
6647	55252.3	3550	1373.6	1381.4	7.9	6.8	4.1	4.1	N/A	N/A	N/A	
6615	55284.2	Culvert	C11									
6586	55313.2	3550	1373.5	1380.5	7.1	7.6	5.0	5.0	N/A	N/A	N/A	
6571	55327.7	3550	1373.5	1380.7	7.2	6.5	3.6	3.5	N/A	N/A	N/A	
6559	55340.1	3550	1373.4	1380.7	7.3	5.8	3.4	3.2	N/A	N/A	N/A	
6547	55352.6	3550	1373.4	1380.7	7.3	5.4	3.3	3.0	N/A	N/A	N/A	
6527	55372.2	3550	1373.4	1380.7	7.3	5.4	3.1	1.6	N/A	N/A	N/A	
6500	55399.2	3550	1373.4	1380.7	7.3	5.4	3.5	3.1	N/A	N/A	N/A	
6400	55499.2	3550	1373.2	1380.5	7.3	5.3	3.6	3.4	N/A	N/A	N/A	
6300	55599.2	3550	1373.1	1380.4	7.4	5.3	4.0	4.2	N/A	N/A	N/A	
62	55699.2	3550	1372.9	1380.3	7.4	5.3	4.4	5.0	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream NOT Reduced by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 5-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q.p01

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
6100	55799.2	3550	1372.8	1380.2	7.4	5.3	4.3	4.9	N/A	N/A	N/A	
6000	55899.2	3550	1372.7	1380.1	7.4	5.3	4.4	4.3	N/A	N/A	N/A	
5900	55999.2	3550	1372.5	1380.0	7.4	5.2	4.5	4.7	N/A	N/A	N/A	
5800	56099.2	3550	1372.4	1379.8	7.5	5.2	4.4	5.1	N/A	N/A	N/A	
5700	56199.2	3550	1372.2	1379.7	7.5	5.2	4.2	4.3	N/A	N/A	N/A	
5600	56299.2	3550	1372.1	1379.6	7.5	5.1	4.1	3.7	N/A	N/A	N/A	
5500	56399.2	3550	1372.0	1379.5	7.6	5.1	3.9	3.4	N/A	N/A	N/A	
5400	56499.2	3550	1371.8	1379.4	7.6	5.1	3.6	2.7	N/A	N/A	N/A	
5300	56599.2	3550	1371.7	1379.3	7.6	5.1	3.4	2.8	N/A	N/A	N/A	
5200	56699.2	3550	1371.5	1379.2	7.7	5.0	2.9	2.5	N/A	N/A	N/A	
5100	56799.2	3550	1371.4	1379.1	7.7	5.0	2.4	1.0	N/A	N/A	N/A	
5000	56899.2	3550	1371.3	1379.0	7.8	4.9	2.2	1.8	N/A	N/A	N/A	
4900	56999.2	3550	1371.1	1378.9	7.8	4.9	2.0	1.9	N/A	N/A	N/A	
4800	57099.2	3550	1371.0	1378.8	7.8	4.9	1.7	1.0	N/A	N/A	N/A	
4700	57199.2	3550	1370.8	1378.7	7.9	4.8	1.1	0.9	N/A	N/A	N/A	
4674	57225.2	3550	1370.8	1378.7	7.9	4.8	1.0	1.0	N/A	N/A	N/A	
4664	57235.2	3550	1370.8	1378.7	7.9	4.8	1.0	1.0	N/A	N/A	N/A	
4600	57299.2	3550	1370.7	1378.7	8.0	4.8	0.8	0.8	N/A	N/A	N/A	
4500	57399.2	3550	1370.6	1378.6	8.0	4.7	0.8	0.8	N/A	N/A	N/A	
4400	57499.2	3550	1370.4	1378.5	8.1	4.7	0.7	0.7	N/A	N/A	N/A	
4300	57599.2	3550	1370.3	1378.4	8.1	4.6	0.7	0.7	N/A	N/A	N/A	
4200	57699.2	3550	1370.1	1378.3	8.2	4.5	0.6	0.6	N/A	N/A	N/A	
4100	57799.2	3550	1370.0	1378.3	8.3	4.4	0.5	0.5	N/A	N/A	N/A	
4000	57899.2	3550	1369.9	1378.2	8.4	4.2	0.4	0.4	N/A	N/A	N/A	
3900	57999.2	3550	1369.7	1378.2	8.5	4.0	0.3	0.3	N/A	N/A	N/A	
3800	58099.2	3550	1369.6	1378.2	8.6	3.8	0.2	0.2	N/A	N/A	N/A	
3700	58199.2	3550	1369.4	1378.1	8.7	3.8	0.1	0.1	N/A	N/A	N/A	
3600	58299.2	3550	1369.3	1378.1	8.8	3.5	0.0	0.0	N/A	N/A	N/A	
3506	58393.5	3550	1369.2	1378.1	8.9	3.4	0.0	0.0	N/A	N/A	N/A	S D S
3474	58425.5	3550	1369.1	1378.1	8.9	3.4	0.0	0.0	N/A	N/A	N/A	L R T
3474	58425.5	3550	1369.1	1377.7	8.6	5.3	1.8	1.8	N/A	N/A	N/A	O O R
3462	58437.5	3550	1369.1	1377.7	8.6	5.3	1.8	1.8	N/A	N/A	N/A	P P U
3462	58437.5	3550	1370.1	1377.6	7.4	6.2	2.0	2.0	N/A	N/A	N/A	I C
3461	58438.5	3550	1371.1	1375.4	4.3	11.8	4.1	4.1	N/A	N/A	N/A	N T
3445	58454.5	3550	1363.1	1372.3	9.2	5.2	-0.3	-0.3	N/A	N/A	N/A	G U
3445	58454.5	3550	1363.1	1372.3	9.2	5.2	-0.3	-0.3	N/A	N/A	N/A	R
3433	58466.3	3550	1363.1	1372.3	9.1	5.3	-0.2	-0.2	N/A	N/A	N/A	E

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream NOT Reduced by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 6-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q.p01

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
3425	58474.1	3550	1363.1	1372.4	9.3	3.7	3.4	2.7	N/A	N/A	N/A	
3400	58499.2	3550	1363.0	1372.4	9.4	3.8	3.6	3.5	N/A	N/A	N/A	
3300	58599.2	3550	1362.8	1372.3	9.6	3.7	1.9	3.1	N/A	N/A	N/A	
3200	58699.2	3550	1362.6	1372.3	9.8	3.6	1.3	2.2	N/A	N/A	N/A	
3100	58799.2	3550	1362.3	1372.3	9.9	3.5	1.1	3.1	N/A	N/A	N/A	
3000	58899.2	3550	1362.1	1372.2	10.2	3.4	0.9	3.3	N/A	N/A	N/A	
2900	58999.2	3550	1361.8	1372.2	10.4	3.3	0.6	1.8	N/A	N/A	N/A	
2800	59099.2	3550	1361.6	1372.2	10.6	3.2	0.5	1.1	N/A	N/A	N/A	
2700	59199.2	3550	1361.4	1372.2	10.8	2.9	1.0	0.7	N/A	N/A	N/A	
2654	59245.2	3550	1361.3	1372.1	10.9	3.0	0.7	0.0	N/A	N/A	N/A	
2608	59291.2	3550	1361.2	1372.1	10.9	3.1	0.3	-0.7	N/A	N/A	N/A	
2598	59301.1	3550	1361.1	1372.1	11.0	3.0	0.5	0.5	N/A	N/A	N/A	
2581	59318.1	3550	1361.1	1371.0	9.9	8.1	1.0	1.0	N/A	N/A	N/A	
2569	59330.2	Culvert	C12						N/A			
2557	59342.1	3550	1361.1	1367.5	6.5	12.3	3.6	3.6	N/A	N/A	N/A	
2542	59357.2	3550	1361.0	1366.5	5.5	11.4	4.6	1.0	N/A	N/A	N/A	
2532	59367.2	3550	1361.0	1366.8	5.8	9.3	4.4	3.3	N/A	N/A	N/A	
2513	59386.0	3550	1361.0	1367.1	6.1	6.9	4.2	2.4	N/A	N/A	N/A	
2400	59499.2	3550	1360.7	1366.8	6.1	6.7	4.8	2.8	N/A	N/A	N/A	
2300	59599.2	3550	1360.4	1366.5	6.1	6.9	5.9	2.8	N/A	N/A	N/A	
2200	59699.2	3550	1360.2	1366.2	6.1	6.9	6.8	2.9	N/A	N/A	N/A	
2100	59799.2	3550	1359.9	1366.0	6.0	6.9	6.5	3.3	N/A	N/A	N/A	
2000	59899.2	3550	1359.7	1365.7	6.1	6.9	6.0	2.4	N/A	N/A	N/A	
1900	59999.2	3550	1359.4	1365.5	6.0	6.9	5.7	2.8	N/A	N/A	N/A	
1800	60099.2	3550	1359.2	1365.2	6.0	6.9	6.6	2.3	N/A	N/A	N/A	
1700	60199.2	3550	1358.9	1365.0	6.0	6.9	6.4	2.0	N/A	N/A	N/A	
1600	60299.2	3550	1358.7	1364.7	6.0	6.9	6.4	2.3	N/A	N/A	N/A	
1500	60399.2	3550	1358.4	1364.5	6.0	6.9	0.2	0.2	N/A	N/A	N/A	
1400	60499.2	3550	1358.2	1364.2	6.0	6.9	6.5	4.9	N/A	N/A	N/A	
1300	60599.2	3550	1357.9	1363.9	6.0	7.0	5.5	1.5	N/A	N/A	N/A	
1200	60699.2	3550	1357.7	1363.7	6.0	7.0	5.6	1.3	N/A	N/A	N/A	
1100	60799.2	3550	1357.4	1363.4	6.0	7.0	5.2	1.4	N/A	N/A	N/A	
1000	60899.2	3550	1357.2	1363.1	6.0	7.0	5.0	0.2	N/A	N/A	N/A	
900	60999.2	3550	1356.9	1362.9	6.0	7.0	6.3	0.2	N/A	N/A	N/A	
800	61099.2	3550	1356.6	1362.6	5.9	7.1	1.1	0.3	N/A	N/A	N/A	
700	61199.2	3550	1356.4	1362.3	5.9	7.1	5.0	0.3	N/A	N/A	N/A	
600	61299.2	3550	1356.1	1362.1	6.0	6.6	4.9	5.6	N/A	N/A	N/A	

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Channel Freeboard Check**
For Proposed Geometry, And Interim CIP Flow, Flow Downstream NOT Reduced by amount that escapes downstream of Culvert C6
Prepared By: AFC

Sheet 7-7
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q.p01

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Channel Velocity	Freeboard at Left Channel Bank	Freeboard at Right Channel Bank	Required Freeboard (Equation 6.1 DDMVII)	Freeboard Check Left	Freeboard Check Right	Notes
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)			
500	61399.2	3550	1355.9	1361.7	5.8	7.3	4.9	6.9	N/A	N/A	N/A	
400	61499.2	3550	1355.6	1361.3	5.7	7.5	4.7	5.8	N/A	N/A	N/A	
300	61599.2	3550	1355.4	1359.8	4.4	10.5	1.8	6.2	N/A	N/A	N/A	TIE IN
244	61655.2	3550	1355.3	1358.8	3.5	12.3	5.4	5.4	N/A	N/A	N/A	WITH
243	61656.2	3550	1355.2	1358.6	3.3	12.7	4.9	4.9	N/A	N/A	N/A	EXISTING
204	61695.2	3550	1355.1	1358.7	3.5	12.3	2.5	2.5	N/A	N/A	N/A	DROP
204	61695.3	3550	1353.1	1355.6	2.4	18.2	3.6	3.6	N/A	N/A	N/A	STRUCTURE
184	61715.3	3550	1353.2	1355.9	2.7	16.4	3.3	3.3	N/A	N/A	N/A	
164	61735.3	3550	1353.0	1358.4	5.4	7.7	0.6	0.6	N/A	N/A	N/A	
100	61799.2	3550	1352.1	1358.9	6.8	3.4	8.3	6.3	N/A	N/A	N/A	

APPENDIX N

Design Memorandums

- **Memorandum for Ellsworth Road Overtopping**
- **Memorandum for Ellsworth Channel Overtopping**
- **Memorandum for Off-site Drainage at Germann and Ellsworth Road**

Design Memorandum
For Ellsworth Road Overtopping

December 8, 2004

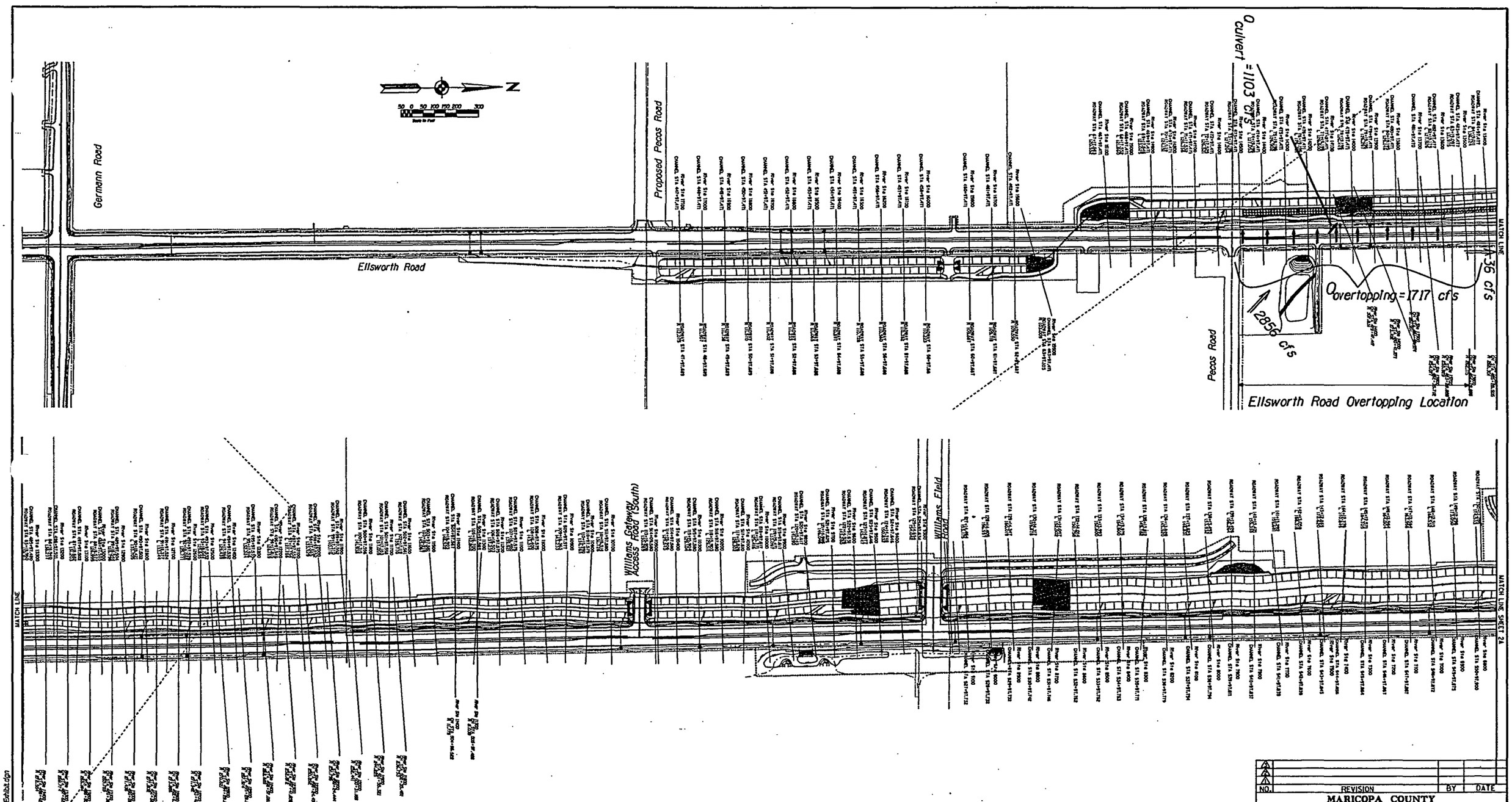
PURPOSE: The purpose of this memorandum is to document the evaluation of the proposed Ellsworth Road overtopping during a 100-year storm event under existing watershed conditions. The evaluation is focused on the road reach from existing Pecos Road extending from approximately 1000 feet north of the existing Pecos Road.

HYDROLOGY: The developed watershed peak discharges are significantly lower than the peak discharges under existing watershed conditions due to on-site retention requirements imposed on new development. Of greater impact in this area is the impact of the proposed Pecos detention basins planned at the Maricopa / Pinal county boundary (east Mesa ADMP). The developed conditions 100-year peak discharge at existing Pecos Road is 600 cfs. The existing conditions peak discharge at the same location is 2858 cfs.

The East Mesa ADMP existing conditions hydrology model shows runoff generated south of existing Pecos Road, draining west to Ellsworth Road, crossing Ellsworth Road and continuing west along the Pecos Road alignment. Runoff generated north of the existing Pecos Road as well as runoff generated in Pinal County, is diverted along the north side of the existing Pecos Road to Ellsworth Road. At Ellsworth Road this runoff flows north along Ellsworth Road and crosses Ellsworth Road into the Williams Gateway Airport North Perimeter Channel.

HEC-RAS model *Ellsworth_channel_overtopping.prj* was developed based on proposed Ellsworth Road geometry. HEC-RAS lateral weir routing was used to estimate the flow overtopping Ellsworth Road. Road overtopping occurs from road station 73+20 to road station 82+00. Approximately 1103 cfs will flow through the box culvert under Ellsworth Road and approximately 1717 cfs will overtops Ellsworth Road and spill into Ellsworth Channel from channel station 145+00 to channel station 135+00. The remaining flow continues toward the north along the east side of Ellsworth Road. Flow overtopping location is shown on the attached map. HEC-RAS output for road overtopping is included in this memorandum.

Ellsworth Road from station 73+20 to station 83+20 will be designed to withstand the 100-year peak flow under existing watershed condition. Ellsworth Channel's east side slope from channel station 145+00 to channel station 135+00 was designed using Reno Mattress to protect against the scour during 100-year storm event under existing watershed conditions.



NO.	REVISION	BY	DATE
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

100% PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	J. EDISON	11/12/04
DRAWN	J. EDISON	11/12/04
CHECKED	R.DAVIES	11/12/04

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499

RIVER STATION

SHEET 1A OF 2A

12/21/2004 01:26:09 PM STA_Exhibit.dgn

HEC-RAS Version 3.1.2 April 2004
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: Ellsworth Road overtopping
Project File : Ellsworth_Rd_overtopping.prj
Run Date and Time: 12/07/2004 3:46:35 PM

Project in English units

PLAN DATA

Plan Title: Ellsworth Rd overtopping (existing Q)
Plan File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.p04

Geometry Title: proposed chnl (geom chan per dist + ber)
Geometry File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.g03

Flow Title : Exiting condition flows
Flow File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.f01

Plan Summary Information:

Number of:	Cross Sections =	26	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	1

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

FLOW DATA

Flow Title: Exiting condition flows
Flow File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.f01

Flow Data (cfs)

River	Reach	RS	PF 1
River	Ellsworth	14500	2856
River	Ellsworth	14100	1753

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River	Ellsworth	PF 1		Normal S = 0.0018

LATERAL STRUCTURE

RIVER: River
REACH: Ellsworth RS: 14499

LATERAL STRUCTURE OUTPUT Profile #PF 1 Lat Struct

E.G. US. (ft)	1390.93	Weir Sta US (ft)	0.00
W.S. US. (ft)	1390.74	Weir Sta DS (ft)	956.98
E.G. DS (ft)	1384.10	Weir Max Depth (ft)	2.14
W.S. DS (ft)	1384.08	Weir Avg Depth (ft)	0.73
Q US (cfs)	2856.00	Weir Submerg	0.00
Q Leaving Total (cfs)	1714.32	Min El Weir Flow (ft)	1385.70
Q DS (cfs)	35.84	Wr Top Wdth (ft)	956.98
Perc Q Leaving	60.12	Q Gate Group (cfs)	
Q Weir (cfs)	1714.32	Gate Open Ht (ft)	
Q Gates (cfs)		Gate #Open	
Q Culv (cfs)		Gate Area (sq ft)	
Q Lat RC (cfs)		Gate Submerg	
Weir Flow Area (sq ft)	698.14	Gate Invert (ft)	

SUMMARY OF MANNING'S N VALUES

River:River

Reach	River Sta.	n1	n2	n3
Ellsworth	14500	.025	.03	.025
Ellsworth	14499	Lat Struct		
Ellsworth	14400	.025	.03	.025
Ellsworth	14300	.025	.03	.025
Ellsworth	14200	.025	.03	.025
Ellsworth	14100	.025	.03	.025
Ellsworth	14000	.025	.03	.025
Ellsworth	13900	.025	.03	.025
Ellsworth	13800	.025	.03	.025
Ellsworth	13700	.025	.03	.025
Ellsworth	13600	.025	.03	.025

Ellsworth	13500	.025	.03	.025
Ellsworth	13400	.025	.03	.025
Ellsworth	13300	.025	.03	.025
Ellsworth	13200	.025	.03	.025
Ellsworth	13100	.025	.03	.025
Ellsworth	13000	.025	.03	.025
Ellsworth	12900	.025	.03	.025
Ellsworth	12800	.025	.03	.025
Ellsworth	12700	.025	.03	.025
Ellsworth	12600	.025	.03	.025
Ellsworth	12500	.025	.03	.025
Ellsworth	12400	.025	.03	.025
Ellsworth	12300	.025	.03	.025
Ellsworth	12200	.025	.03	.025
Ellsworth	12100	.025	.03	.025
Ellsworth	12000	.025	.03	.025

SUMMARY OF REACH LENGTHS

River: River

Reach	River Sta.	Left	Channel	Right
Ellsworth	14500	100	100	100
Ellsworth	14499	Lat Struct		
Ellsworth	14400	100	100	100
Ellsworth	14300	100	100	100
Ellsworth	14200	100	100	100
Ellsworth	14100	100	100	100
Ellsworth	14000	100	100	100
Ellsworth	13900	100	100	100
Ellsworth	13800	98.87	100	101.06
Ellsworth	13700	98.65	100	101.34
Ellsworth	13600	99.78	100	100.25
Ellsworth	13500	100.01	100	100
Ellsworth	13400	102.36	100	97.83
Ellsworth	13300	103.02	100	97.3
Ellsworth	13200	103.09	100	97.23
Ellsworth	13100	95.48	100	104.29
Ellsworth	13000	96.55	100	103.25
Ellsworth	12900	101.64	100	98.37
Ellsworth	12800	103.54	100	96.09
Ellsworth	12700	100.41	100	99.62
Ellsworth	12600	94.09	100	105.5
Ellsworth	12500	100.08	100	100
Ellsworth	12400	102.09	100	97.8
Ellsworth	12300	103.82	100	96.25
Ellsworth	12200	92.68	100	106.55
Ellsworth	12100	99.46	100	100.61
Ellsworth	12000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River

Reach	River Sta.	Contr.	Expan.
Ellsworth	14500	.1	.3
Ellsworth	14499	Lat Struct	
Ellsworth	14400	.1	.3
Ellsworth	14300	.1	.3
Ellsworth	14200	.1	.3
Ellsworth	14100	.1	.3
Ellsworth	14000	.1	.3
Ellsworth	13900	.1	.3
Ellsworth	13800	.1	.3
Ellsworth	13700	.1	.3
Ellsworth	13600	.1	.3
Ellsworth	13500	.1	.3
Ellsworth	13400	.1	.3
Ellsworth	13300	.1	.3
Ellsworth	13200	.1	.3
Ellsworth	13100	.1	.3
Ellsworth	13000	.1	.3
Ellsworth	12900	.1	.3
Ellsworth	12800	.1	.3
Ellsworth	12700	.1	.3
Ellsworth	12600	.1	.3
Ellsworth	12500	.1	.3
Ellsworth	12400	.1	.3
Ellsworth	12300	.1	.3
Ellsworth	12200	.1	.3
Ellsworth	12100	.1	.3
Ellsworth	12000	.1	.3

HEC-RAS Plan: Rdovertoping River: River Reach: Ellsworth Profile: PF 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)	
Ellsworth	14500	PF 1	2856.00	1388.00	1390.74	1390.05	1390.93	0.002411	3.44	829.46	1089.04	0.47
Ellsworth	14499		Lat Struct									
Ellsworth	14400	PF 1	2359.29	1387.85	1390.57	1389.63	1390.72	0.001558	3.05	773.72	1001.74	0.38
Ellsworth	14300	PF 1	1890.73	1387.29	1390.46	1389.24	1390.58	0.001059	2.71	697.66	917.74	0.32
Ellsworth	14200	PF 1	1562.63	1387.67	1389.60	1389.60	1390.29	0.011890	6.70	233.29	488.62	1.00
Ellsworth	14100	PF 1	318.46	1386.61	1388.67	1388.20	1388.75	0.002171	2.26	141.16	664.28	0.40
Ellsworth	14000	PF 1	245.90	1386.59	1388.51	1387.87	1388.57	0.001303	1.95	126.00	623.88	0.32
Ellsworth	13900	PF 1	184.60	1386.10	1388.44	1387.64	1388.47	0.000581	1.37	135.16	585.99	0.22
Ellsworth	13800	PF 1	123.47	1384.58	1388.40	1387.62	1388.42	0.000412	1.05	117.84	568.31	0.18
Ellsworth	13700	PF 1	77.13	1383.28	1388.38	1387.55	1388.38	0.000238	0.74	104.82	551.19	0.13
Ellsworth	13600	PF 1	49.67	1382.66	1388.35	1387.64	1388.35	0.000495	0.58	85.77	544.70	0.16
Ellsworth	13500	PF 1	36.26	1381.90	1388.28	1387.86	1388.29	0.001185	0.75	48.51	542.23	0.24
Ellsworth	13400	PF 1	35.84	1382.56	1388.16	1387.97	1388.17	0.001124	0.74	48.40	526.11	0.24
Ellsworth	13300	PF 1	35.84	1383.43	1387.80	1387.80	1387.86	0.026162	2.08	17.20	479.70	1.00
Ellsworth	13200	PF 1	35.84	1385.10	1386.16	1385.87	1386.18	0.002002	1.15	31.28	360.95	0.33
Ellsworth	13100	PF 1	35.84	1385.36	1385.84	1385.70	1385.88	0.004845	1.65	21.70	269.75	0.51
Ellsworth	13000	PF 1	35.84	1384.90	1385.53	1385.31	1385.55	0.002385	1.23	29.23	228.55	0.36
Ellsworth	12900	PF 1	35.84	1384.67	1385.31	1385.08	1385.34	0.002006	1.23	29.03	221.99	0.34
Ellsworth	12800	PF 1	35.84	1384.46	1385.16	1384.84	1385.18	0.001290	1.05	34.01	216.93	0.27
Ellsworth	12700	PF 1	35.84	1384.28	1384.98	1384.72	1385.00	0.002468	1.17	30.59	238.63	0.36
Ellsworth	12600	PF 1	35.84	1384.00	1384.86	1384.51	1384.87	0.000804	0.77	46.27	245.76	0.21
Ellsworth	12500	PF 1	35.84	1383.85	1384.79	1384.38	1384.80	0.000630	0.75	47.72	286.16	0.19
Ellsworth	12400	PF 1	35.84	1383.84	1384.70	1384.33	1384.72	0.000963	1.00	35.77	311.26	0.24
Ellsworth	12300	PF 1	35.84	1383.88	1384.60	1384.24	1384.62	0.001045	1.03	34.81	302.79	0.25
Ellsworth	12200	PF 1	35.84	1383.76	1384.48	1384.18	1384.50	0.001541	1.17	30.72	259.15	0.30
Ellsworth	12100	PF 1	35.84	1383.53	1384.28	1384.04	1384.31	0.002357	1.35	26.50	196.62	0.37
Ellsworth	12000	PF 1	35.84	1383.35	1384.08	1383.83	1384.10	0.001801	1.22	29.42	151.45	0.32

HEC-RAS Plan: Rdovertoping River: River Reach: Ellsworth Profile: PF 1

Reach	River Sta	Profile	Q US	Q Leaving Total	Q DS	Q Weir	Q Gates	Wr Top Wdth	Weir Max Depth	Weir Avg Depth	Min El Weir Flow	E.G. US.	W.S. US.	E.G. DS	W.S. DS
			(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Ellsworth	14499	PF 1	2856.00	1714.32	35.84	1714.32		956.98	2.14	0.73	1385.70	1390.93	1390.74	1384.10	1384.08

HEC-RAS Version 3.1.2 April 2004
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: Ellsworth Road overtopping
Project File : Ellsworth_Rd_overtopping.prj
Run Date and Time: 12/07/2004 3:46:35 PM

Project in English units

PLAN DATA

Plan Title: Ellsworth Rd overtopping (existing Q)
Plan File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.p04

Geometry Title: proposed chnl (geom chan per dist + ber)
Geometry File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.g03

Flow Title : Exiting condition flows
Flow File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.f01

Plan Summary Information:

Number of:	Cross Sections =	26	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	1

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

FLOW DATA

Flow Title: Exiting condition flows
Flow File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.f01

Flow Data (cfs)

River	Reach	RS	PF 1
River	Ellsworth	14500	2856
River	Ellsworth	14100	1753

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River	Ellsworth	PF 1		Normal S = 0.0018

GEOMETRY DATA

Geometry Title: proposed chnl (geom chan per dist + ber)
Geometry File : m:\Ellworth Channel\HEC-RAS\Ellsworth_Rd_overtopping.g03

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14500

INPUT
Description: Channel Station 47938.16
Station Elevation Data num= 222

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.55	78.21	1387.88	99.22	1387.79	112.35	1388	114.79	1388
117.33	1388	121.49	1388	128.26	1388	132.77	1388	135.36	1388
137.35	1388	140.83	1388	141.54	1388	144.9	1388	145.99	1388
148.96	1388	151.95	1388	153.52	1388	156.49	1388	163.45	1388.1
165.15	1388.08	167.19	1388.07	167.68	1388.06	172.06	1388.01	172.52	1388
182.49	1387.93	186.47	1387.9	193.63	1387.8	200.08	1387.95	200.55	1387.96
200.98	1387.97	201.48	1387.97	201.7	1387.95	201.79	1387.93	201.85	1387.93
202.28	1387.9	204.61	1387.68	208.63	1387.31	209.15	1387.72	239.83	1380.05
250	1379.85	281.5	1387.73	284.61	1387	289.14	1387	290.82	1387
300.96	1387	301.66	1387	302.07	1387	303.57	1387.38	306.06	1388
306.7	1388.16	307.56	1388.37	311.08	1388.41	317.19	1388.42	317.84	1388.54
318.48	1388.6	328.23	1388.11	330.93	1388	331.34	1388	336.25	1388
336.63	1388.02	341.2	1388.25	358.39	1388.59	377.2	1388.97	396.34	1388.59
413.2	1388.25	417.8	1388.02	418.16	1388	421.63	1388	423.51	1388
425.83	1388.41	429.07	1389	431.23	1389.64	432.44	1390	434	1390.55
434.57	1390.75	434.99	1390.89	435	1390.66	435.02	1390	435.7	1389.88
439.77	1389.46	444.45	1389.49	447.28	1389.48	447.52	1389.48	448.9	1389.4
452.02	1389	457.08	1389	458.15	1389	460.26	1389.27	463.08	1389.27
469.17	1389.39	474.6	1389.17	475.07	1389.17	475.85	1389.17	488.84	1389.17
490.34	1389.18	491.2	1389.18	500	1389.18	612.45	1389.01	626.15	1389.1
637.08	1389.14	673.04	1389.16	679.14	1389.13	702.3	1389.18	724.24	1389.22
729.38	1389.26	733.51	1389.26	751.75	1389.33	766.27	1389.34	775.63	1389.19
784.93	1389.06	789.17	1388.99	791.56	1389.34	792.1	1389.42	792.41	1389.45
793.12	1389.51	796.29	1389.77	796.52	1389.79	796.76	1389.81	797.01	1389.83
797.26	1389.85	798.92	1389.96	801.14	1390.13	804.52	1390.36	805.09	1390.41
806.48	1390.51	809.22	1390.7	813.86	1391.05	815.22	1391.31	816.2	1391.51

818.32	1391.51	819.16	1391.51	819.75	1391.49	819.84	1391.45	821.47	1391.41
827.53	1391.34	835.91	1391.03	836.16	1390.99	837.33	1390.82	839.07	1390.56
839.4	1390.51	842.25	1389.93	844.06	1389.6	846	1389.71	847.48	1389.81
851.43	1389.82	861.47	1389.8	861.74	1389.8	861.8	1389.8	861.9	1389.8
870.37	1390.18	870.63	1390.19	874.96	1389.81	876.98	1389.64	878.49	1389.51
880.45	1389.37	880.89	1389.34	881.16	1389.32	898.18	1389.13	898.88	1389.12
899.47	1389.11	900.44	1389.1	901.89	1389.08	912.83	1388.95	915.3	1388.93
917.37	1388.9	922.17	1388.84	938.66	1388.66	941.46	1388.66	945.15	1388.68
974.92	1388.51	979.45	1388.51	997.52	1388.51	1007.28	1388.37	1031.93	1388.36
1045.04	1388.51	1045.54	1388.51	1059.02	1388.69	1061.12	1388.74	1072.19	1388.74
1075.88	1388.9	1082.59	1388.96	1087.34	1389.24	1089.28	1389.31	1093.09	1389.51
1094.88	1389.51	1095.84	1389.49	1096.45	1389.51	1099.94	1389.62	1104.03	1389.83
1112.44	1390.37	1113.54	1390.44	1114.5	1390.51	1125.78	1391.35	1127.46	1391.51
1133.51	1391.95	1134.56	1392	1135.99	1392.08	1145.95	1392.51	1146.26	1392.52
1147.23	1392.54	1148.2	1392.57	1149.21	1392.83	1151.79	1393.51	1152.38	1393.67
1153.22	1393.89	1154.62	1394.26	1155.56	1394.51	1157.52	1395.03	1159.31	1395.51
1159.64	1395.6	1163.06	1396.51	1163.34	1396.59	1163.45	1396.61	1163.68	1396.68
1165.57	1397.18	1166.8	1397.51	1167.1	1397.59	1167.4	1397.67	1168.32	1397.68
1170.71	1397.72	1182.68	1398.03						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	318.48	.03	1114.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
318.48	1114.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	317.84	1392	F
816.2	1182.68	1391	T

LATERAL STRUCTURE

RIVER: River
REACH: Ellsworth RS: 14499

INPUT
Description:
Lateral structure position = Next ot left bank station
Distance from Upstream XS = 0
Deck/Roadway Width = 10
Weir Coefficient = 2
Weir Flow Reference = Water Surface
Weir Embankment Coordinates num = 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.6	100	1388.56	200	1388.51	300	1388.47	400	1388.42
500	1388.38	600	1388.34	700	1388.22	800	1388.3	900	1388.25
1000	1388.35	1100	1388.54	1200	1388.55	1300	1388.35	1400	1387.9
1500	1387.28	1600	1387	1700	1386.12	1800	1386	1900	1386
2000	1386	2100	1385.7	2200	1385.96	2300	1386.16	2400	1386.52
2500	1386.8								

Weir crest shape = Broad Crested

LATERAL STRUCTURE OUTPUT Profile #PF 1 Lat Struct

E.G. US. (ft)	1390.93	Weir Sta US (ft)	0.00
W.S. US. (ft)	1390.74	Weir Sta DS (ft)	956.98
E.G. DS (ft)	1384.10	Weir Max Depth (ft)	2.14

W.S. DS (ft)	1384.08	Weir Avg Depth (ft)	0.73
Q US (cfs)	2856.00	Weir Submerg	0.00
Q Leaving Total (cfs)	1714.32	Min El Weir Flow (ft)	1385.70
Q DS (cfs)	35.84	Wr Top Wdth (ft)	956.98
Perc Q Leaving	60.12	Q Gate Group (cfs)	
Q Weir (cfs)	1714.32	Gate Open Ht (ft)	
Q Gates (cfs)		Gate #Open	
Q Culv (cfs)		Gate Area (sq ft)	
Q Lat RC (cfs)		Gate Submerg	
Weir Flow Area (sq ft)	698.14	Gate Invert (ft)	

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14400

INPUT
Description: Channel Station 47499.16
Station Elevation Data num= 234

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.51	23.3	1387.61	93.59	1387.29	112.36	1387.59	112.9	1387.59
132.39	1387.38	132.46	1387.38	132.6	1387.37	135.85	1387	135.91	1387
136.09	1387	136.43	1387	137.01	1387	138.59	1386.56	140.72	1386.1
140.95	1386.11	141.12	1386.12	141.34	1386.12	142.32	1386.12	154.04	1386.3
155.1	1386.32	167.19	1386.51	167.71	1386.52	168.24	1386.53	174.74	1386.63
174.87	1386.63	174.97	1386.63	175.08	1386.63	175.4	1386.64	175.58	1386.65
175.91	1386.66	176.73	1386.7	182.39	1387	182.7	1387	182.98	1387
183.15	1387	183.2	1387	183.26	1387	183.79	1387.02	184.4	1387.04
184.97	1387.06	185.5	1387.08	202.93	1387.66	206.62	1387.37	208.44	1387.24
209.15	1387.64	239.83	1379.97	250	1379.77	281.5	1387.65	285.39	1387
290.82	1387	302.57	1387	304.05	1387	304.66	1387	306.44	1387.44
306.82	1387.54	306.97	1387.58	307.08	1387.6	307.42	1387.63	312.12	1387.89
314.95	1387.66	316.09	1387.89	316.71	1388	317.68	1388.26	318.43	1388.44
318.91	1388.56	320.43	1388.45	320.81	1388.42	321.02	1388.41	321.19	1388.4
321.32	1388.39	321.48	1388.37	321.83	1388.35	322.53	1388.3	325.5	1388.09
326.84	1388	338.18	1388	341.05	1388	341.07	1388	341.3	1388
344.49	1388.06	353.15	1388.24	377.05	1388.72	400.47	1388.25	408.26	1388.09
412.88	1388	413.01	1388	413.05	1388	415.1	1388	426.47	1388
430.24	1388.94	430.47	1389	430.7	1389.08	433.46	1390	434.11	1390.31
434.36	1390.43	434.67	1390.57	434.67	1390.54	434.68	1390.07	434.68	1390
434.71	1389	434.78	1388.97	434.99	1388.89	435.13	1388.84	435.97	1388.52
445.94	1388.6	457.62	1388.69	461.9	1388.77	477.03	1388.7	484.02	1388.46
512.45	1388.5	526.15	1388.59	537.08	1388.63	573.04	1388.65	579.14	1388.62
602.3	1388.67	624.24	1388.71	629.38	1388.75	633.51	1388.75	651.75	1388.82
666.27	1388.83	675.63	1388.68	684.93	1388.55	689.17	1388.48	691.56	1388.83
692.1	1388.91	692.41	1388.94	693.12	1389	696.29	1389.26	696.52	1389.28
696.76	1389.3	697.01	1389.32	697.26	1389.34	698.92	1389.45	701.14	1389.62
704.52	1389.85	705.09	1389.9	706.48	1390	709.22	1390.19	713.86	1390.54
715.22	1390.8	716.2	1391	718.32	1391	719.16	1391	719.75	1390.98
719.84	1390.94	721.47	1390.9	727.53	1390.83	735.91	1390.52	736.16	1390.48
737.33	1390.31	739.07	1390.05	739.4	1390	742.25	1389.42	744.06	1389.09
746	1389.2	747.48	1389.3	751.43	1389.31	761.47	1389.29	761.74	1389.29
761.8	1389.29	761.9	1389.29	770.37	1389.67	770.63	1389.68	774.96	1389.3
776.98	1389.13	778.49	1389	780.45	1388.86	780.89	1388.83	781.16	1388.81
798.18	1388.62	798.88	1388.61	799.47	1388.6	800.44	1388.59	801.89	1388.57
812.83	1388.44	815.3	1388.42	817.37	1388.39	822.17	1388.33	838.66	1388.15
841.46	1388.15	845.15	1388.17	874.92	1388	879.45	1388	897.52	1388
907.28	1387.86	931.93	1387.85	945.04	1388	945.54	1388	959.02	1388.18
961.12	1388.23	972.19	1388.23	975.88	1388.39	982.59	1388.45	987.34	1388.73

989.28	1388.8	993.09	1389	994.88	1389	995.84	1388.98	996.45	1389
999.94	1389.11	1004.03	1389.32	1012.44	1389.86	1013.54	1389.93	1014.5	1390
1025.78	1390.84	1027.46	1391	1033.51	1391.44	1034.56	1391.49	1035.99	1391.57
1045.95	1392	1046.26	1392.01	1047.23	1392.03	1048.2	1392.06	1049.21	1392.32
1051.79	1393	1052.38	1393.16	1053.22	1393.38	1054.62	1393.75	1055.56	1394
1057.52	1394.52	1059.31	1395	1059.64	1395.09	1063.06	1396	1063.34	1396.08
1063.45	1396.1	1063.68	1396.17	1065.57	1396.67	1066.8	1397	1067.1	1397.08
1067.4	1397.16	1068.32	1397.17	1070.71	1397.21	1082.68	1397.52		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	318.91	.03	1025.78	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
318.91	1025.78	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	318.91	1392	F
716.2	1082.68	1391	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14300

INPUT
Description: Channel Station 45799.16
Station Elevation Data num= 203

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.19	87.95	1386.79	99.49	1386.98	100.86	1386.96	123.43	1386.72
131.91	1386.79	134.82	1386.81	157.25	1386.87	157.82	1386.88	158.92	1386.88
160.48	1386.89	162.17	1386.89	168.65	1386.9	171.13	1386.91	185.37	1386.87
185.96	1386.87	186.41	1386.87	194.65	1386.84	204.67	1386.91	204.69	1386.92
204.79	1387	205.45	1387	208.24	1387	211.39	1387	239.83	1379.89
250	1379.69	281.5	1387.57	283.13	1387	290.82	1387	300.62	1387
301.79	1387	302.78	1387	303	1387	303.29	1387.07	303.33	1387.08
303.8	1387.2	303.8	1387.24	303.83	1388	304.11	1388	304.67	1388
304.99	1388	305.3	1388	305.49	1388	306.05	1388	307.58	1387.78
313.03	1387	314.26	1387	315.98	1387	316.7	1387	316.95	1387.1
317.85	1387.47	317.92	1387.5	317.98	1387.55	318.51	1388	319.09	1388.37
319.35	1388.51	320.12	1388.45	325.01	1388.04	325.53	1388	325.61	1388
340.9	1387.81	350.22	1387.99	351.01	1388	353.07	1388.04	376.9	1388.46
399.98	1388.04	402.09	1388	403.02	1387.98	412.9	1387.81	418.28	1387.37
423.92	1387.29	426.95	1388	430.21	1388.89	430.62	1389	431.53	1389.28
432.3	1389.52	432.33	1389.53	433.85	1390	434.23	1390	434.33	1390
434.34	1390	434.35	1390.11	434.36	1390.25	434.38	1389.47	434.4	1389
434.67	1388.83	434.85	1388.71	435.03	1388.6	435.11	1388.55	435.16	1388.52
435.22	1388.48	435.37	1388.39	449.93	1388.24	456.19	1388.18	456.96	1388.17
460.55	1388.16	482.98	1388.13	483.91	1388.13	486.14	1388.13	508.95	1388.16
529.72	1388.13	553.67	1388.2	564.06	1388.2	573.4	1388.18	582.81	1388.17
583.45	1388.15	594.01	1388	596.5	1387.96	598.07	1387.94	601.54	1387.88
604.43	1387.84	604.77	1387.96	604.9	1388	605.02	1388.05	605.79	1388.38
606.26	1388.42	607.97	1388.55	611.35	1388.8	612.94	1388.92	614.14	1389
620.12	1389.44	624.65	1389.87	626.17	1390	629.76	1390.14	631.73	1390.21
637.2	1390.44	647.79	1390.15	649.48	1390.08	651.32	1390	651.35	1390
651.38	1390	651.4	1390	651.64	1390	651.79	1389.99	651.97	1389.98
652.41	1389.91	653.21	1389.78	654.32	1389.62	654.81	1389.55	658.3	1389
658.5	1388.91	659.67	1388.54	668.79	1388.5	671.77	1388.5	695.96	1388.6
701.58	1388.58	706.52	1388.57	711.12	1388.56	719.47	1388.51	723.01	1388.51
728.97	1388.46	768.84	1388.27	788.74	1388	789.77	1388	812.25	1388

812.6	1388	812.75	1388	824.25	1388	835.21	1388	841.36	1388
863.14	1388	867.49	1388	888.63	1388.63	894.2	1388.77	903.1	1389
904.89	1389.18	906.48	1389.33	913.26	1390	917.07	1390.39	922.59	1391
927.23	1391.14	927.76	1391.16	928.64	1391.19	929.53	1391.22	930.68	1391.26
939.77	1391.55	942.98	1391.65	947.6	1391.79	950.08	1391.87	953.99	1392
954.16	1392.01	955.07	1392.03	955.59	1392.05	957.69	1392.72	958.57	1393
959.51	1393.28	961.8	1393.94	961.96	1393.98	962.03	1394	964.51	1394.68
965.65	1395	967.3	1395.45	969.39	1396	969.7	1396.14	970.43	1396.47
971.56	1396.9	975.59	1396.94	980.11	1397	982.36	1397	983.51	1397
984.13	1397	984.21	1397.01	989.02	1397.09				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	319.35	.03	917.07	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
319.35	917.07	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	319.35	1392	F
637.2	989.02	1391	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14200

INPUT
Description: Channel Station 47699.16 (Modified to Include GM Access Road Berm, per Sheet CHC5)
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1386.67	82.32	1386.3	86.62	1386.37	88.82	1386.33	96.63	1386.25
99.57	1386.27	100.57	1386.28	127.55	1386.33	178.89	1386.74	186.44	1386.81
196.49	1386.96	200.01	1387	203.41	1387.05	204.67	1387.06	204.78	1387.03
204.91	1387	208.05	1387	209.15	1387.48	239.83	1379.81	250	1379.61
281.5	1387.49	290.82	1387	307.6	1387	308.88	1387.32	308.99	1387.35
309.2	1387.38	309.3	1387.38	312.48	1387.84	314.5	1387.9	318.34	1387.45
318.45	1387.52	318.69	1387.59	319.75	1388	319.77	1388.28	319.78	1388.47
321	1388.34	324.07	1388	328.83	1387.9	340.75	1387.67	376.75	1388.21
412.75	1387.67	441.75	1388.25	502.75	1390	666.75	1391	804.75	1391
809.75	1390	817.75	1390	831.75	1391	839.75	1392	845.75	1395

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	319.78	.03	666.75	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
319.78	666.75	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	319.78	1392	F
666.75	845.75	1391	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14100

INPUT
Description: Channel Station 47799.16
Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1386.14	55.92	1385.89	64.55	1385.93	64.57	1385.93	70.26	1385.97
79.65	1386	79.75	1386	79.76	1386	81.14	1386	81.66	1386
82.39	1386	82.4	1386	85.13	1386	90.3	1386	90.88	1386
91.06	1386	91.22	1386	92.42	1386	93.97	1386	108.17	1386.1
123.67	1386.21	160.14	1386.61	176.66	1386.73	186.69	1386.75	202.34	1386.86
204.96	1386.87	205.53	1386.97	205.71	1387	206.46	1387	207.86	1387
210.75	1387	239.83	1379.73	250	1379.53	281.5	1387.41	290.82	1387
293.36	1387	297.84	1387	299.11	1387	301.18	1387	301.52	1387.09
301.92	1387.19	301.93	1387.42	301.95	1388	303	1388	308.98	1388
316.38	1387.44	318.16	1387.3	318.88	1387.55	319	1387.59	319.34	1387.71
320.05	1387.95	320.19	1388	320.19	1388.16	320.21	1388.42	320.36	1388.41
323.52	1388	331.24	1387	331.26	1387	331.27	1387	333.33	1387
333.69	1387.02	337.55	1387.24	340.6	1387.42	350.28	1387.56	376.6	1387.96
384.74	1387.84	412.6	1387.42	418.97	1387.06	419.98	1387	421.06	1387
421.89	1387	425.66	1387.57	428.8	1388	431.4	1388.82	433.68	1389.62
436.08	1388.5	437.11	1388.05	437.24	1388	437.43	1387.98	437.51	1387.97
437.56	1387.97	438.59	1387.95	453.65	1387.75	456.36	1387.84	458.74	1387.93
460.39	1388	461.8	1388.06	466.39	1388.25	469.47	1388.55	473.77	1389
473.96	1389.02	474.3	1389.05	476.2	1389.53	478.08	1389.8	479.55	1390
486.25	1390	490.42	1390	495.05	1390	498.04	1389.17	498.57	1389
499.3	1388.77	500.6	1388.35	501.07	1388.2	503.16	1388.14	508.24	1388
510.63	1387.93	513.77	1387.83	517.36	1387.96	518.75	1387.99	519.11	1387.99
519.57	1387.99	519.63	1388	521.49	1387.91	522.78	1387.84	527.41	1387.55
541.52	1387.49	549.4	1387.44	555.66	1387.45	572.53	1387.57	575.36	1387.56
578.05	1387.45	579.87	1387.37	588.59	1387.01	588.81	1387	588.92	1387
598.86	1386.61	615.08	1386.85	624.92	1387	631.86	1387.11	688.45	1388
695	1388.47	702.13	1388.93	703.18	1389	703.75	1389.32	704.95	1390
705.68	1390.37	706.94	1391	707.96	1391.51	708.93	1392	709.74	1392.41
710.91	1393	711.87	1393.5	712.86	1394	715.35	1394.76	715.8	1395
716.52	1395	717.47	1395	721.31	1395.32	726.78	1395.49	729.01	1395.56
731.76	1395.98	732.24	1396.05	732.95	1395.97	748.35	1395.15	762.37	1394.66
776.67	1394.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	320.21	.03	704.95	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
320.21	704.95	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	320.21	1392	F
479.55	776.67	1390	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14000

INPUT
Description: Channel Station 47899.16
Station Elevation Data num= 188

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.63	7.59	1385.67	7.72	1385.67	36.27	1385.87	83.36	1386
83.81	1386	83.89	1386	90.81	1386	93.44	1386	97.07	1386
97.08	1386	110.78	1386	118.89	1386	119.82	1386	121.25	1386

133.03	1385.65	134.29	1385.67	137.28	1385.68	155.59	1386	155.81	1386
156.86	1386.04	166.01	1386.36	167.88	1386.43	172.06	1386.56	183.85	1386.71
191.98	1386.84	199.45	1386.94	199.91	1386.92	200.26	1386.91	203.34	1386.36
205.38	1386	206.06	1386	207.67	1386	207.8	1386	208.66	1386.31
234.91	1379.75	250	1379.45	265.09	1379.75	291.34	1386.23	309.33	1386
309.69	1386	309.73	1386	311.37	1386	312.48	1386.28	315.37	1387
315.64	1387.07	316.52	1387.29	317.68	1387.29	317.99	1387.29	319.21	1387.62
319.92	1387.81	320.61	1388	320.63	1388.29	320.64	1388.38	321.11	1388.31
322.09	1388.15	323.01	1388	324.16	1387.86	331.14	1387	331.83	1387
338.44	1387	339	1387.03	340.45	1387.1	376.1	1387.7	376.45	1387.71
378.6	1387.67	412.45	1387.1	414.42	1387	414.51	1387	423.31	1387
424.45	1387	425.13	1387.15	426.48	1387.43	428.48	1387.86	429.19	1388
429.6	1388.13	430.24	1388.33	432.4	1389	432.95	1389.17	433.25	1389.27
433.35	1389.3	433.37	1389.17	433.39	1389	439.91	1388.61	444.48	1388.34
445.99	1388.25	451.94	1388	459.15	1387.38	460.55	1387.25	460.91	1387.21
461.24	1387.13	462.93	1387.14	470.45	1387.14	472.51	1387.14	474.4	1387.14
474.58	1387.14	476.12	1387.14	483.96	1387.13	484.59	1387.13	485.32	1387.13
485.87	1387.14	487.13	1387.15	488.33	1387.16	489.45	1387.16	493.82	1387.27
494.16	1387.28	495.68	1387.3	496.09	1387.32	497.5	1387.34	497.97	1387.36
498.52	1387.39	499.78	1387.41	500.41	1387.44	500.94	1387.47	501.57	1387.49
502.32	1387.53	503.24	1387.55	504.04	1387.59	504.44	1387.59	505.34	1387.64
506.42	1387.69	506.62	1387.69	507.79	1387.74	507.87	1387.75	507.94	1387.75
508.8	1387.79	509.25	1387.79	509.3	1387.78	510.62	1387.77	511.76	1387.76
512.04	1387.74	513.1	1387.73	514.05	1387.72	514.48	1387.7	515.33	1387.69
515.89	1387.65	516.63	1387.63	517.3	1387.58	517.92	1387.55	518.76	1387.48
519.23	1387.45	520.26	1387.36	520.55	1387.34	521.83	1387.22	521.91	1387.21
522.35	1387.17	524.58	1387.21	527.02	1387.25	528.84	1387.28	529.88	1387.3
537.68	1387.53	539.45	1387.42	540.12	1387.38	541.68	1387.28	546.11	1387
548.25	1386.87	552.65	1386.59	558.04	1386.69	564.11	1386.8	575.46	1387
594.43	1387.33	604.28	1387.51	608.23	1387.58	609.81	1387.6	611.15	1387.63
612.31	1387.65	613.31	1387.67	614.2	1387.68	614.98	1387.7	629.97	1387.96
630.54	1387.98	631.33	1388	632.69	1388.28	646.09	1389.88	646.77	1390.03
646.88	1390.05	654.68	1391.24	661.28	1392.25	666.94	1393.11	671.84	1393.85
676.12	1394.5	679.9	1395.08	683.26	1395.59	683.51	1395.63	695.61	1394.22
705.49	1393.7	714.51	1393.39	727.26	1393.05				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	320.64	.03	632.69	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
320.64	632.69	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	320.64	1392	F
433.35	727.26	1389.3	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13900

INPUT
Description: Channel Station 47999.16
Station Elevation Data num= 141

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.74	2.27	1385.76	87.06	1386	87.88	1386	88.02	1386
100.48	1386	105.21	1386	111.76	1386	135.26	1386	135.29	1386
137.43	1386	137.5	1386	138.21	1385.99	139.86	1385.94	142.94	1386
148.1	1386	150.3	1385.85	156.8	1385.4	163.75	1385.64	166.11	1385.71

172.45	1385.89	176.39	1386	195.74	1386.76	198.61	1386.87	198.64	1386.87
200.06	1386.88	201.04	1386.69	204.57	1386	207.48	1385.68	208.66	1386.23
234.91	1379.67	250	1379.37	265.09	1379.67	291.34	1386.23	305.67	1386
309.37	1386	310.29	1386	311.69	1386	313.6	1386.48	315.69	1387
316.15	1387.11	316.4	1387.18	317.54	1387.18	317.63	1387.43	318.08	1387.18
318.8	1387.46	320.19	1388	320.86	1388.26	321.07	1388.34	322.31	1388.03
322.45	1388	322.94	1387.88	326.47	1387	330.93	1386.97	334.27	1386.94
340.3	1386.89	343.47	1386.96	345.66	1387	347.07	1387.03	376.3	1387.61
401.39	1387.11	406.95	1387	407.91	1386.98	412.3	1386.89	424.91	1386.99
426.13	1387	428.22	1387.59	429.65	1388	430.31	1388.19	431.59	1388.56
432.89	1388.94	433.02	1388.97	434.88	1388.52	436.09	1388.18	436.9	1388
437.15	1388	442.77	1387.56	445.91	1387.34	447.52	1387.23	449.63	1387
452.66	1386.77	460.7	1386.12	461.82	1386.1	463.81	1386.11	467.47	1386.39
470.94	1386.67	477.69	1386.79	478.58	1386.81	479.93	1386.83	481.77	1386.87
484.42	1386.92	487.1	1386.97	488.88	1387	489.08	1387	491	1387.04
492.68	1387.07	498.86	1387.18	500.36	1387.2	501.29	1387.22	501.92	1387.23
502.38	1387.24	502.71	1387.25	504.82	1387.28	508.33	1387.23	551.17	1387.28
551.51	1387.28	555	1387.3	568.13	1387.73	576.39	1388	576.99	1388
577.04	1388	577.09	1388	577.13	1388	591.84	1388.51	592.75	1388.54
605.76	1389	605.8	1389	606.17	1389.02	606.87	1389.05	608.81	1389.48
610.28	1389.81	611.97	1390.2	612.96	1390.43	613.61	1390.58	620.77	1392.39
623.65	1393.09	626.43	1393.42	629.79	1394.17	630.34	1394.29	631.67	1394.49
632.8	1394.66	633.78	1394.81	634.64	1394.94	635.39	1395.05	636.06	1395.15
636.66	1395.24	636.7	1395.25	659	1392.7	664.11	1392.44	668.81	1392.28
676.19	1392.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	321.07	.03	592.75	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
321.07	592.75	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	321.07	1392	F
433.02	676.19	1388.97	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13800

INPUT
Description: Channel Station 48099.16
Station Elevation Data num= 229

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.74	90.76	1386	91.95	1386	92.15	1386	110.14	1386
116.98	1386	126.44	1386	128.58	1386	129.19	1386	129.36	1386
133.73	1386	136.64	1385.94	155.32	1385.63	158.37	1385.59	159.03	1385.58
159.45	1385.57	159.73	1385.57	161.33	1385.52	164.3	1385.65	172.25	1386
182.95	1386.45	196.03	1387	198.56	1387.11	198.81	1387.12	199.14	1387.03
199.27	1387	201.57	1386.37	202.91	1386	207.28	1385.58	207.4	1385.57
208.66	1386.15	234.91	1379.59	250	1379.29	265.09	1379.59	291.34	1386.15
292.69	1386	309.05	1386	310.5	1386	312.01	1386	314.17	1386.54
316.01	1387	319.8	1387.95	320.01	1388	320.04	1388.01	320.88	1388.22
321.12	1388.19	322.55	1388	327.49	1387.35	330.18	1387	334.42	1387
339.78	1387	340.07	1387.01	340.15	1387.02	341.59	1387.05	376.15	1387.74
410.95	1387.04	412.06	1387.02	412.15	1387.02	412.18	1387.02	412.51	1387
417.32	1387	425.48	1387	426.28	1387.19	429.63	1388	431.18	1388.34
432.75	1388.7	434	1388.55	434.7	1388.46	438.78	1388	442.95	1387.54

447.88	1387	450.14	1386.75	451.06	1386.65	457.12	1386	457.56	1385.95
460.01	1385.7	464.69	1385.66	465.92	1385.66	468.06	1385.95	468.16	1385.97
468.28	1385.99	468.37	1386	468.52	1386.02	468.88	1386.07	469.21	1386.11
469.5	1386.15	470.99	1386.35	473.03	1386.62	474.39	1386.81	476.03	1386.83
476.26	1386.83	478.58	1386.86	479.67	1386.88	481.42	1386.9	484.36	1386.94
485.43	1386.95	486.13	1386.96	488.77	1386.99	490	1387	490.01	1387
490.02	1387	490.03	1387	490.06	1387	490.07	1387	490.08	1387
490.1	1387	491.48	1387.02	491.83	1387.02	492.17	1387.03	502.36	1387.76
505.69	1387.93	506.46	1387.92	521.14	1387.3	523.72	1387.11	528.33	1387.19
542.07	1387.5	547.32	1387.1	547.67	1387.07	548.05	1387.04	548.47	1387.01
548.58	1387	548.71	1386.99	548.89	1386.98	549.12	1386.96	550.11	1386.65
552.18	1386	554	1385.33	554.89	1385	555.06	1384.94	556.02	1384.58
556.17	1384.6	556.32	1384.63	556.79	1384.7	557.76	1384.91	558.17	1385
558.18	1385	558.45	1385.06	558.65	1385.1	558.79	1385.13	558.91	1385.15
559	1385.17	559.08	1385.19	559.15	1385.2	559.39	1385.25	559.5	1385.26
559.61	1385.28	559.67	1385.29	560.01	1385.34	562.2	1385.66	564	1385.89
564.63	1385.97	566.01	1385.47	566.19	1385.4	566.43	1385.53	566.6	1385.62
567.29	1386	567.48	1386.1	567.57	1386.15	567.86	1386.31	569.11	1387
569.22	1387.06	569.45	1387.18	569.59	1387.26	569.68	1387.31	569.75	1387.35
569.8	1387.38	569.83	1387.4	569.87	1387.41	569.91	1387.44	569.95	1387.46
569.96	1387.46	569.97	1387.47	570.16	1387.57	570.35	1387.66	570.44	1387.7
570.67	1387.8	571.14	1388	572.94	1388.78	573.27	1388.92	573.45	1389
575.36	1389.83	575.75	1390	577.62	1390.81	578.06	1391	579.9	1391.8
580.37	1392	582.2	1392.79	582.67	1393	584.49	1393.79	584.98	1394
586.46	1394.64	586.65	1394.73	586.85	1394.81	587.8	1394.83	588.04	1394.84
588.68	1394.85	592.62	1394.93	596.53	1395	600.31	1395.07	600.83	1395.08
600.87	1395.07	601.21	1395	603.04	1394.6	605.8	1394	608.33	1393.45
610.39	1393	614.86	1392.03	614.99	1392	616.97	1391.57	617.62	1391.43
618.86	1391.16	619.79	1391.11	620.68	1391.07	622.14	1391	622.32	1390.99
623.72	1390.91	623.79	1390.91	623.85	1390.92	623.99	1390.92	624.02	1390.93
624.05	1390.93	624.06	1390.93	624.08	1390.93	637.24	1390.75	638.41	1390.74
639.17	1390.75	639.93	1390.76	640.67	1390.78	658.79	1391.09		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	320.88	.03	571.14	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
320.88	571.14	98.87	100	101.06	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	320.88	1392	F
432.75	658.79	1388.7	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13700

INPUT
Description: Channel Station 48199.16
Station Elevation Data num= 191

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.73	94.63	1386	96.18	1386	96.44	1386	119.86	1386
128.78	1386	131.19	1386	131.42	1386	132.82	1386	148.71	1386
156.42	1385.97	158.44	1385.98	160.9	1385.97	161.18	1385.98	161.34	1385.98
161.79	1385.97	162.79	1385.99	163.18	1386	171.92	1386.21	187.99	1386.59
199.64	1386.88	200.19	1386.65	201.45	1386.12	201.73	1386	202.68	1385.92
207.19	1385.52	208.66	1386.07	234.91	1379.51	250	1379.21	265.09	1379.51
291.34	1386.07	294.6	1386	308.96	1386	309.84	1386	312.56	1386

314.15	1386.4	316.56	1387	318.55	1387.5	320.57	1388	321.57	1388.25
321.76	1388.3	322.26	1388.01	322.27	1388	322.64	1387.95	330.22	1387
333.44	1387	335.87	1387	336.48	1387.03	337.36	1387.07	340.3	1387.22
352.32	1387.46	376.3	1387.94	405.98	1387.04	407.16	1387	407.5	1387
407.6	1387	408.94	1387.06	411.11	1387.16	412.3	1387.22	413.26	1387.17
413.93	1387.14	415.38	1387.06	416.72	1387	417.35	1387	421.7	1387
425.03	1387	426.15	1387.27	429.12	1388	430.06	1388.11	433.32	1388.49
433.33	1388.49	433.33	1388.5	433.34	1388.5	433.59	1388	442.23	1387.19
444.26	1387	455.88	1386.01	455.98	1386	458.42	1385.8	459.72	1385.69
461.86	1385.68	463.2	1385.67	468.21	1385.61	468.3	1385.64	469.48	1386
470.05	1386.2	471.76	1386.78	471.81	1386.79	471.84	1386.81	471.86	1386.81
471.87	1386.82	471.89	1386.82	471.9	1386.83	471.99	1386.86	473.03	1386.86
483.72	1386.92	483.95	1386.94	485.23	1387	494.7	1387.42	498.99	1387.65
505.14	1387.07	505.88	1387	506.38	1386.95	508.23	1386.77	516.06	1386.96
517.7	1387	519.42	1387.04	520.5	1387.07	525.55	1387.19	526.94	1387.22
527.3	1387.23	527.33	1387.23	527.73	1387.24	527.8	1387.18	527.95	1387.06
528.01	1387	528.08	1386.95	528.45	1386.64	529.28	1386	530.42	1385.16
530.64	1385	530.75	1384.91	532	1384	532.38	1383.72	532.94	1383.31
535.11	1383.31	538.64	1383.28	541.03	1383.46	544.83	1383.76	545.12	1383.78
545.3	1383.8	545.31	1383.81	545.33	1383.82	545.57	1384	546.07	1384.36
546.97	1385	547.91	1385.67	548.37	1386	549.01	1386.45	549.78	1387
550.29	1387.36	551.04	1387.89	551.14	1387.93	551.31	1388	552.46	1388.46
553.79	1389	555.67	1389.76	556.26	1390	558.21	1390.78	558.74	1391
559.15	1391.16	561.22	1392	561.63	1392.16	563.7	1393	564.09	1393.16
565.69	1393.81	566.18	1394	567.6	1394.58	567.73	1394.63	567.86	1394.68
568.27	1394.69	570.4	1394.74	580.44	1394.99	581.96	1394.66	583.58	1394.32
585.06	1394	588.17	1393.34	589.75	1393	592.28	1392.46	594.36	1392.02
594.46	1392	595.47	1391.79	597.09	1391.44	602.32	1391.18	602.58	1391.17
602.84	1391.15	603.01	1391.13	603.15	1391.12	603.94	1391	603.99	1391
604.19	1391	604.22	1391	604.24	1391	606.61	1390.77	606.68	1390.77
606.75	1390.76	606.81	1390.77	606.86	1390.76	608.05	1390.67	608.15	1390.65
636.33	1391.14								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	321.76	.03	550.29	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
321.76	550.29	98.65	100	101.34	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	321.76	1392	F
433.33	636.33	1388.5	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13600

INPUT
Description: Channel Station 48299.16
Station Elevation Data num= 231

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.71	99.92	1386	101.82	1386	102.14	1386	131.02	1386
133.17	1386	133.27	1386	133.44	1386	133.74	1386	143.91	1385.96
154.31	1385.88	156.13	1385.88	162.29	1385.8	166.5	1385.93	169.13	1386
180.61	1386.31	191.5	1386.59	192.58	1386.62	199.46	1386.79	200.24	1386.59
201.02	1386.39	202.56	1386	207.62	1385.5	207.73	1385.49	208.66	1385.99
234.91	1379.43	250	1379.13	265.09	1379.43	291.34	1385.99	291.36	1386
303.69	1386	307	1386	308.59	1386	312.64	1386	314.92	1386.57

316.64	1387	320.05	1387.85	320.64	1388	320.9	1388.07	321.08	1388.11
321.58	1388.24	321.65	1388.25	321.65	1388.24	321.68	1388	322.4	1387.93
332.07	1387	333.96	1387	334.69	1387	335.82	1387.07	341.99	1387.43
360.57	1387.8	370.64	1388	374.82	1388.08	378.02	1388.15	381.1	1388.06
383.4	1388	405.06	1387.6	410.64	1387.49	414.04	1387.43	414.55	1387.4
415.03	1387.37	421.52	1387	421.61	1387	422.21	1387	425.73	1387
430.43	1387.97	430.55	1388	430.66	1388.01	430.81	1388.02	434.68	1388.3
434.69	1388.15	434.71	1388	437.8	1387.7	445.06	1387	445.65	1386.96
446.3	1386.91	447.09	1386.85	454.5	1386.32	455.11	1386.28	456.27	1386.2
458.98	1386	459	1386	459.03	1386	461.14	1385.84	464.51	1385.59
467.23	1385.54	469.72	1385.49	471.74	1385.89	472.01	1385.94	472.32	1386
472.42	1386.02	473.09	1386.14	474.96	1386.49	482.86	1386.62	488.07	1386.7
493.67	1386.78	495.02	1386.97	495.21	1387	495.26	1387	495.27	1387
495.28	1387	497.44	1387.28	497.52	1387.29	497.59	1387.3	497.66	1387.3
498.41	1387.38	498.47	1387.39	498.54	1387.4	498.6	1387.4	498.66	1387.41
499.8	1387.53	499.83	1387.53	499.86	1387.53	500.7	1387.62	501.31	1387.55
501.76	1387.5	502.97	1387.34	505.73	1387	505.81	1387	505.83	1387
505.85	1387	505.87	1387	505.89	1387	505.91	1387	505.95	1387
505.96	1387	505.97	1387	506	1387	506.16	1386.98	506.28	1386.96
506.37	1386.95	506.44	1386.94	506.5	1386.93	506.81	1386.89	506.94	1386.88
507	1386.87	507.14	1386.86	508.8	1386.9	513.55	1387	513.67	1387
513.86	1387	517.87	1387.08	518.95	1387.1	521.04	1387.16	521.18	1387.03
521.22	1387	521.94	1386.35	522.33	1386	522.61	1385.76	523.45	1385
523.87	1384.63	524.58	1384	525.14	1383.5	525.7	1383	525.96	1382.77
525.99	1382.74	530.51	1382.67	531.38	1382.66	532.08	1382.71	535.85	1383
536.16	1383.02	536.98	1383.08	537.59	1383.53	538.24	1384	539.04	1384.58
539.62	1385	540.54	1385.66	541	1386	541.53	1386.38	542.38	1387
542.57	1387.13	543.72	1387.95	543.76	1387.97	543.84	1388	545.42	1388.64
546.31	1389	547.19	1389.35	548.81	1390	550.04	1390.49	550.89	1390.83
551.32	1391	552.2	1391.35	553.84	1392	554.09	1392.1	556.35	1393
556.87	1393.21	558.86	1394	560.03	1394.46	560.32	1394.58	560.64	1394.71
562.79	1394.76	566.85	1394.87	571.97	1395	572.53	1395.01	573.03	1395.03
573.1	1395.01	573.16	1395	574.07	1394.8	577.65	1394	581.08	1393.24
582.14	1393	586.01	1392.13	586.6	1392	586.64	1391.99	589.23	1391.41
593.26	1391.1	594.56	1391	594.61	1391	594.96	1390.97	594.99	1390.96
595.04	1390.96	595.05	1390.96	595.08	1390.95	595.14	1390.94	595.18	1390.94
595.22	1390.94	595.22	1390.93	595.25	1390.93	595.26	1390.93	596.33	1390.84
596.54	1390.82	604.91	1390.96	606.39	1390.96	608.07	1390.97	638.53	1391.03
640.55	1391.03	642.55	1391.02	644.51	1391.01	646.43	1391.01	647.85	1391.06
651.8	1391.07								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	321.65	.03	542.38	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
321.65	542.38	99.78	100	100.25	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	321.65	1392	F
434.68	651.8	1388.3	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13500

INPUT
Description: Channel Station 48399.16
Station Elevation Data num= 211

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.69	107.79	1386	110.06	1386	110.44	1386	136.59	1386
136.66	1386	138.94	1386.16	146.17	1386.1	148.31	1386.11	149.58	1386.08
152.49	1386	154.38	1386	162.09	1386	163.82	1386.01	164.84	1386
165.19	1386	166.8	1386	167.76	1385.99	181.4	1386.38	184.3	1386.46
198.71	1386.9	200.11	1386.55	200.93	1386.35	202.31	1386	207.98	1385.43
208.66	1385.91	234.91	1379.35	250	1379.05	265.09	1379.35	291.34	1385.91
291.69	1386	294.49	1386	303.02	1386	306.9	1386	312.97	1386
316	1386.76	316.97	1387	319.71	1387.69	320	1387.76	321.28	1387.18
321.36	1387.13	323.37	1387.11	334.51	1387	336.38	1387	337.95	1387
340.69	1387.21	343.53	1387.43	346.06	1387.63	350.22	1387.71	357.6	1387.86
364.69	1388	377.58	1388.26	381.13	1388.33	382.09	1388.35	383.21	1388.32
383.68	1388.3	384.95	1388.26	388.77	1388.15	393.68	1388	403.31	1387.85
406.44	1387.81	411.02	1387.74	413.83	1387.7	415.37	1387.67	418.13	1387.63
419.11	1387.55	419.42	1387.53	419.85	1387.5	420.62	1387.44	422.33	1387.3
426.26	1387	426.47	1387	427.89	1387	436.14	1387.84	437.73	1388
437.84	1388.01	437.87	1388.01	437.91	1388.02	437.96	1388.02	437.98	1388.02
438.15	1388.04	438.78	1388.11	438.78	1388.08	438.79	1388	439.46	1387.92
440.93	1387.75	441.94	1387.63	442.38	1387.58	442.75	1387.54	443.41	1387.46
447.24	1387	454.42	1386.54	463.02	1386	466.06	1385.79	466.79	1385.74
467.83	1385.7	472.22	1385.49	475.01	1385.88	475.9	1386	477.55	1386.22
477.62	1386.23	477.69	1386.24	478.22	1386.26	496.39	1386.71	498.47	1386.73
498.58	1386.73	505.86	1386.79	514.44	1386.86	521.91	1386.93	522.66	1386.23
522.9	1386	523.45	1385.49	523.99	1385	524.23	1384.78	525.09	1384
525.94	1383.24	526.2	1383	526.41	1382.81	527.05	1382.23	530.26	1382.09
532	1382	533.41	1381.92	533.71	1381.9	533.83	1381.91	534.05	1381.92
535.11	1382	536.55	1382.1	539.27	1382.29	539.58	1382.57	539.94	1382.88
540.07	1383	540.29	1383.19	540.74	1383.6	541.19	1384	541.65	1384.36
542.2	1384.78	542.47	1385	542.73	1385.19	543.84	1386	544.65	1386.6
545.21	1387	545.32	1387.08	545.42	1387.16	546.12	1387.43	547.53	1388
548.69	1388.46	550.02	1389	550.03	1389	551.19	1389.46	552.54	1390
554.4	1390.73	555.07	1391	556.07	1391.39	557.65	1392	559.4	1392.68
560.22	1393	560.73	1393.2	562.8	1394	563.28	1394.19	563.38	1394.22
564.56	1394.26	569.71	1394.44	575.96	1394.63	577.49	1394.29	578.77	1394
579.02	1393.94	583.25	1393	583.43	1392.96	586.62	1392.24	587.72	1392
587.88	1391.96	592.19	1391	593.21	1390.77	593.35	1390.74	593.44	1390.72
593.69	1390.71	594.59	1390.7	597.4	1390.64	597.41	1390.61	597.42	1390.61
597.45	1390.59	597.48	1390.58	597.51	1390.57	597.54	1390.56	597.59	1390.55
597.62	1390.53	597.66	1390.52	597.7	1390.51	597.74	1390.5	597.77	1390.49
597.82	1390.44	597.86	1390.43	597.91	1390.39	597.96	1390.39	598.01	1390.36
598.07	1390.36	598.12	1390.33	598.17	1390.33	598.22	1390.33	598.27	1390.29
598.31	1390.29	598.35	1390.26	598.39	1390.25	617.73	1390.3	619.64	1390.29
620.79	1390.28	621.44	1390.28	623.23	1390.26	625	1390.25	626.76	1390.23
633.51	1390.21								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	382.09	.03	546.12	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
382.09	546.12	100.01	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	382.09	1392	F
438.78	633.51	1388.11	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13400

INPUT
Description: Channel Station 48499.16
Station Elevation Data num= 177

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.67	115.81	1386	118.45	1386	118.89	1386	140.21	1386
140.36	1386	145.5	1386.37	161.81	1386.23	166.65	1386.24	169.5	1386.17
171.27	1386.12	171.29	1386.12	171.34	1386.12	171.39	1386.12	171.4	1386.12
171.43	1386.12	199.16	1386.47	200.04	1386.49	200.18	1386.45	200.34	1386.41
201.99	1386	203.74	1385.86	207.41	1385.56	208.66	1385.83	234.91	1379.27
250	1378.97	265.09	1379.27	291.34	1385.83	292.01	1386	293.99	1386
299.02	1386	307.79	1386	313.29	1386	315.01	1386.43	317.29	1387
319.11	1387.45	319.44	1387.54	320.22	1387.44	320.85	1387.37	323.84	1387
323.85	1386.85	323.85	1386.79	338.2	1387	338.22	1387	338.24	1387
338.25	1387	346.25	1387.55	350.21	1387.82	353.69	1387.89	356.48	1387.94
359.23	1388	378.41	1388.38	383.57	1388.49	386.24	1388.54	388.15	1388.44
396.16	1388	415.86	1387.87	419.84	1387.84	422.27	1387.82	423.64	1387.7
424.87	1387.58	428.5	1387.25	431.17	1387	431.56	1387	432.85	1387
436.04	1387.29	442.94	1387.92	447.21	1387.27	449.55	1387	457.8	1386.5
465.28	1386	466.04	1385.95	473.05	1385.54	477.36	1385.23	478.02	1385.19
478.97	1385.43	479.65	1385.61	481.2	1386	481.46	1386.07	481.8	1386.15
482.25	1386.27	489.18	1386.05	490.74	1386	491.07	1386	491.55	1385.99
491.82	1385.99	492.83	1385.96	494.13	1385.98	494.36	1385.98	494.7	1385.99
495.2	1385.99	496.03	1385.99	496.87	1386	497.83	1386.02	499.46	1386.05
500.45	1386.07	503.02	1386.11	508.67	1386.34	508.99	1386.35	509.34	1386.36
509.74	1386.38	510.2	1386.4	524.28	1387	524.29	1387	524.31	1387
525.09	1387.03	525.66	1387.06	525.69	1387.03	525.72	1387	526.26	1386.44
526.68	1386	527.43	1385.22	528.25	1384.38	528.62	1384	528.69	1383.92
528.93	1383.67	529.06	1383.53	529.54	1383	529.81	1382.7	529.84	1382.67
530.16	1382.66	535.05	1382.56	540.38	1382.97	540.75	1383	540.99	1383.02
542.43	1383.13	543.99	1383.25	544.45	1383.57	545.05	1384	546.13	1384.75
546.48	1385	547.01	1385.37	547.92	1386	548.98	1386.74	549.35	1387
549.42	1387.05	549.69	1387.24	550.01	1387.36	551.21	1387.83	551.66	1388
551.87	1388.08	554.24	1389	556.07	1389.71	556.82	1390	559.06	1390.87
559.4	1391	560.75	1391.52	561.99	1392	562.93	1392.37	564.56	1393
565.14	1393.23	566.83	1393.9	568.72	1393.95	570.23	1394	571.19	1394.03
573.66	1394.1	579.28	1394.28	580.5	1394.03	580.65	1394	581.65	1393.79
585.46	1393	586.61	1392.76	590.27	1392	591.72	1391.7	595.08	1391
598.16	1390.36	598.6	1390.27	598.95	1390.19	599.11	1390.18	599.23	1390.16
599.57	1390.12	600.6	1390	601.44	1389.9	602.4	1389.79	604.63	1389.52
604.67	1389.53	625.24	1389.72						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	386.24	.03	559.06	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
386.24	559.06	102.36	100	97.83	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	386.24	1392	F
442.94	625.24	1387.92	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13300

INPUT
Description: Channel Station 48599.16

Station Elevation Data num= 168

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.65	122.65	1386	125.66	1386	126.16	1386	142.44	1386
142.67	1386	150.77	1386.58	171.81	1386.4	173.04	1386.38	174.29	1386.41
193.34	1386.82	197.15	1386.91	199.03	1386.44	200.79	1386	201.34	1385.86
204.79	1385	204.85	1385	204.94	1385	205.15	1385	208.66	1385.75
234.91	1379.19	250	1378.89	265.09	1379.19	291.34	1385.75	291.45	1386
293.57	1386	294.16	1386	298	1386	312.73	1386	314.97	1386.56
316.1	1386.84	320.63	1386.74	320.83	1386.73	321.68	1386.67	324.37	1386.49
324.85	1386.46	327.92	1386.55	328.52	1386.57	328.71	1386.57	328.92	1386.58
329.15	1386.59	329.4	1386.59	330.87	1386.64	338.84	1386.86	343.87	1387
344.49	1387.06	352.81	1387.84	359.95	1387.98	361.04	1388	364.71	1388.07
388.81	1388.55	392.03	1388.29	395.48	1388	423.22	1387.84	424.82	1387.83
425.42	1387.78	426.15	1387.71	433.75	1387	435.74	1387	438.42	1387
442.63	1387.44	444.26	1387.61	445.48	1387.73	446.63	1387.63	453.83	1387
459.43	1386.51	465.18	1386	473.54	1385.26	476.45	1385	476.95	1384.96
478.07	1384.86	478.84	1384.79	479.48	1384.95	479.65	1385	482.01	1385.58
483.74	1386	483.98	1386.06	484.21	1386.11	491.2	1386.1	498.56	1386.09
502.37	1386.06	506.51	1386.05	509.17	1386.02	524.31	1386.18	524.42	1386.18
525.01	1386.2	525.24	1386.05	525.32	1386	526	1385.57	526.89	1385
528.09	1384.26	528.51	1384	528.55	1383.97	529.13	1383.62	531.9	1383.5
533.35	1383.43	536.97	1383.54	545.53	1383.8	545.7	1383.91	545.83	1384
546.13	1384.2	547.32	1385	547.64	1385.22	548.59	1385.85	548.81	1386
549.06	1386.17	549.23	1386.29	550.17	1386.92	550.29	1387	550.44	1387.09
550.48	1387.11	551.41	1387.42	551.91	1387.58	553.22	1388	553.45	1388.08
556.31	1389	558.27	1389.64	559.4	1390	560.46	1390.35	562.48	1391
563.82	1391.43	565.57	1392	568.1	1392.82	568.66	1393	569.22	1393.18
569.9	1393.4	577.13	1393.83	579.99	1394	580.49	1394.03	580.8	1394.05
580.87	1394.05	580.89	1394.05	581.13	1394	583.24	1393.58	586.2	1393
588.37	1392.57	591.27	1392	593.94	1391.47	596.34	1391	601.3	1390.02
601.41	1390	602.28	1389.83	602.4	1389.8	602.49	1389.79	602.88	1389.75
607.4	1389.35	607.46	1389.36	607.58	1389.37	607.69	1389.39	607.74	1389.39
607.85	1389.4	607.96	1389.41	608.05	1389.41	608.12	1389.39	608.19	1389.37
608.25	1389.35	608.32	1389.34	608.44	1389.34	608.51	1389.32	608.57	1389.31
608.63	1389.3	608.68	1389.29	608.73	1389.28	608.78	1389.27	608.82	1389.26
608.86	1389.26	608.87	1389.26	627.02	1389.04				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	388.81	.03	556.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
388.81	556.31	103.02	100	97.3	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	388.81	1392	F
445.48	627.02	1387.73	T

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13200

INPUT
Description: Channel Station 48699.16
Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.64	126.09	1386	129.48	1386	130.05	1386	141.27	1386
141.59	1386	152.67	1386.79	163.22	1386.7	169.85	1386.61	170.22	1386.62
171.14	1386.61	175.62	1386.32	183.4	1386.14	185.4	1386.1	189.45	1386

189.64	1386	190.04	1385.99	202.54	1385.71	204.05	1385.33	205.12	1385.07
205.39	1385	205.61	1385	206.39	1385	208.66	1385.67	234.91	1379.11
250	1378.81	265.09	1379.11	291.34	1385.67	297.88	1385.36	313.97	1386
314.23	1386.07	315.5	1386.38	316.28	1386.38	318.37	1386.39	319.72	1386.31
322.76	1386.13	337.96	1386.74	339.14	1386.79	342.15	1386.91	344.28	1387
346.7	1387.19	348.88	1387.36	352.35	1387.62	362.85	1387.83	370.39	1387.98
371.41	1388	373.21	1388.04	382.29	1388.22	384.57	1388.26	385.62	1388.29
388.37	1388.35	388.51	1388.33	391.53	1388	392.26	1388	411.47	1387.77
424.41	1387.63	427.2	1387.41	429.29	1387.25	432.55	1387	434.97	1387
438.01	1387	439.15	1387.1	445.1	1387.56	448.95	1387.25	452.18	1387.04
452.74	1387	457.15	1386.66	465.89	1386	471.27	1385.59	477.77	1385.1
482.31	1385.54	485.7	1385.88	488.6	1385.91	495.08	1386	497.58	1386.02
504.72	1386.09	511.1	1386.01	512.19	1386	526.41	1385.62	528.66	1385.55
529.59	1385.53	529.73	1385.52	530.45	1385.34	531.38	1385.11	531.81	1385
532	1384.95	532.42	1384.86	533.4	1384.64	533.79	1384.73	533.83	1384.74
533.9	1384.76	534.66	1385	534.7	1385	534.71	1385	536.81	1385.7
536.86	1385.71	536.91	1385.73	537.2	1385.84	543.85	1385.91	546.8	1385.94
547.13	1385.94	547.3	1386	547.45	1386.05	549.93	1386.89	550.25	1387
552.58	1387.79	553.2	1388	554.08	1388.3	556.15	1389	558.18	1389.69
559.1	1390	560.14	1390.35	562.05	1391	563.92	1391.63	565	1392
565.31	1392.1	567.95	1393	568.33	1393.13	568.8	1393.29	576.23	1393.83
578.57	1394	579.38	1394.06	579.42	1394.06	579.43	1394.06	579.75	1394
580.54	1393.85	585.09	1393	590.14	1392.05	590.41	1392	590.5	1391.98
595.72	1391	597.23	1390.71	598.72	1390.43	600.57	1390.4	601.3	1390.38
602.52	1390.22	603.19	1390.14	604.23	1390	605.48	1389.84	606.55	1389.7
606.9	1389.66	607.06	1389.63	607.53	1389.57	607.62	1389.55	607.65	1389.54
607.77	1389.51	607.87	1389.48	607.95	1389.43	608.02	1389.37	608.09	1389.33
608.16	1389.29	608.22	1389.25	608.28	1389.22	608.34	1389.18	608.4	1389.14
628.44	1389.25								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	388.37	.03	550.25	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
388.37	550.25	103.09	100	97.23	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	388.37	1392	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
520	628.44	1385.48

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13100

INPUT
Description: Channel Station 48799.16
Station Elevation Data num= 154

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.65	122.75	1386	126.53	1386	127.17	1386	133.33	1386
133.74	1386	147.78	1387	148.1	1387	149.42	1387	156.51	1387
158.11	1387	158.89	1387	159.69	1386.96	164.43	1386.75	168.85	1386.39
173.6	1386	174.16	1385.96	178.64	1385.59	199.3	1385.39	201.83	1385.36
202.22	1385.36	203.6	1385.35	204.12	1385.22	205	1385	205.81	1385
206.64	1385	206.89	1385	208.66	1385.59	234.91	1379.03	250	1378.73
265.09	1379.03	291.34	1385.59	306.52	1385.62	313.76	1385.89	314.14	1385.81
314.23	1385.8	315.49	1385.83	322.51	1386	323.09	1386.03	324.6	1386.11

342.26	1387	343.2	1387.05	344.21	1387.1	344.58	1387.12	345.51	1387.16
351.26	1387.28	381.63	1387.9	416.81	1387.21	417.72	1387.19	418.17	1387.17
419.41	1387.11	421.6	1387	424.16	1387	432.31	1387	436.65	1387.27
438.46	1387.38	438.8	1387.22	438.87	1387	438.93	1387	439	1387
439.06	1387	439.11	1387	439.13	1387	439.14	1387	439.7	1387
439.79	1387	440.78	1387	441.19	1387	443.03	1387	452	1386.51
458.05	1386.22	459.34	1386.16	462.56	1386	463.72	1385.95	466.76	1385.82
472.24	1385.91	475.84	1385.93	478.43	1385.81	485.45	1385.53	497.52	1385.52
502.88	1385.51	509.99	1385.46	515.62	1385.42	524.92	1385.36	534.05	1385.48
537.85	1385.53	541.06	1385.57	541.28	1385.66	541.52	1385.74	542.2	1386
543.68	1386.56	544.85	1387	547.07	1387.84	547.5	1388	548.66	1388.44
550.06	1388.97	550.15	1389	552.47	1389.86	552.84	1390	555.28	1390.9
555.55	1391	556.09	1391.2	558.26	1392	559.53	1392.47	560.98	1393
561.22	1393.09	562.6	1393.6	566.59	1393.82	567.64	1393.88	569.65	1394
570.74	1394.06	572.47	1394.17	573.3	1394.21	573.73	1394.11	574.23	1394
576.24	1393.54	578.61	1393	582.12	1392.2	582.98	1392	584.84	1391.58
587.35	1391	588.44	1390.75	590.05	1390.38	591.7	1390	592.35	1389.85
592.64	1389.78	593.03	1389.79	594.48	1389.77	595.3	1389.76	595.67	1389.76
595.73	1389.75	596.15	1389.69	596.49	1389.64	596.77	1389.6	597.03	1389.57
597.9	1389.44	598.1	1389.41	598.28	1389.39	598.45	1389.36	598.74	1389.32
598.91	1389.29	599.05	1389.27	599.17	1389.25	599.28	1389.23	599.38	1389.21
599.47	1389.2	599.55	1389.18	599.62	1389.17	599.68	1389.16	599.77	1389.14
600.62	1389.02	600.69	1389.01	600.74	1389	622.39	1389.19		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	381.63	.03	547.07	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
381.63	547.07	95.48	100	104.29	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	381.63	1392	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13000

INPUT
Description: Channel Station 48899.16
Station Elevation Data num= 169

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.65	122.46	1386	126.57	1386	127.26	1386	129.01	1386
129.49	1386	132.84	1386.24	133.15	1386.22	133.53	1386.22	142.27	1386.18
152.03	1386.26	152.5	1386.26	159.27	1386.1	160.32	1386	163.82	1385.65
167.18	1385.33	170.52	1385	170.73	1384.98	171.08	1384.94	174.57	1384.96
177.03	1384.96	199.71	1384.98	200.86	1384.98	201.44	1384.99	201.89	1385
203.19	1385	204.69	1385	204.74	1384.99	204.77	1384.99	204.99	1384.99
205.77	1384.99	207.01	1385	208.66	1385.51	234.91	1378.95	250	1378.65
265.09	1378.95	291.34	1385.51	300.31	1385	310.5	1385	310.53	1385
310.59	1385	311.5	1385.23	313.28	1385.67	323.61	1385.84	328.64	1385.92
333.18	1386	334.46	1386.1	341	1386.56	357.92	1386.89	358.87	1386.91
360.24	1386.94	362.19	1386.98	363.25	1387	364.71	1387.03	366.3	1387.06
367.31	1387.08	367.94	1387.1	368.49	1387.11	368.98	1387.12	369.41	1387.13
369.8	1387.13	377	1387.28	383.39	1387.16	386.75	1387.09	391.16	1387
393.22	1386.96	398.71	1386.85	400.99	1386.8	413	1386.56	417.96	1386.23
421.29	1386	423.28	1386	424.14	1386	425.83	1386.23	431.56	1387
433.24	1387.13	433.7	1387.17	433.71	1387.08	433.72	1387	437.39	1386.7
445.98	1386	450.09	1385.82	461.04	1385.32	467.67	1385.44	472.54	1385.46

478.59	1385.26	478.87	1385.25	480.54	1385.24	487.42	1385.19	492.99	1385.15
501.45	1385.05	502.2	1385.04	503.1	1385.04	504.2	1385.03	505.56	1385.02
507.29	1385	507.79	1385	507.84	1385	509.51	1384.98	511.25	1384.96
512.4	1384.95	517.37	1384.9	517.67	1384.91	517.93	1384.91	523.24	1385
523.33	1385	523.4	1385	523.92	1385.01	532.69	1385.14	533.23	1385.15
536.67	1385.21	537.44	1385.55	538.23	1385.9	538.46	1386	540.47	1386.89
540.73	1387	540.79	1387.03	543.01	1388	543.74	1388.32	545.28	1389
547.16	1389.82	547.56	1390	548.1	1390.24	549.84	1391	550.05	1391.09
551.93	1391.91	552.14	1392	552.27	1392.06	554.44	1393	556.63	1393.95
556.7	1393.98	556.71	1393.98	557.34	1394	558.6	1394.04	566.17	1394.29
567.29	1394.01	567.33	1394	568.29	1393.77	571.38	1393	573.07	1392.58
575.42	1392	578.84	1391.15	579.46	1391	581.18	1390.57	583.5	1390
584.08	1389.86	584.97	1389.64	585.33	1389.55	586.1	1389.55	588.22	1389.57
588.25	1389.56	588.33	1389.54	588.41	1389.53	589.39	1389.4	589.45	1389.4
589.54	1389.38	589.59	1389.39	613.35	1389.26	614.48	1389.26	615.59	1389.27
616.68	1389.27	617.76	1389.28	618.83	1389.28	620.97	1389.29	622.36	1389.3
623.74	1389.3	625.12	1389.3	626.48	1389.31	628.36	1389.31		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	377	.03	543.01	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
377	543.01	96.55	100	103.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	377	1392	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12900

INPUT
Description: Channel Station 48999.16
Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.64	127.76	1386	129.1	1386	129.22	1386	132.64	1386
134.08	1386	147.33	1385.61	160.25	1385.26	161.98	1385.22	165.55	1385.11
173.6	1385.08	193.78	1385	200.52	1384.97	201.78	1384.97	202.63	1385
202.76	1385	203.85	1385.04	204.21	1385.05	204.24	1385.04	204.39	1385
204.8	1385	207.19	1385	207.33	1385	208.66	1385.43	234.91	1378.87
250	1378.57	265.09	1378.87	291.34	1385.43	292.69	1385	310.18	1385
310.56	1385	310.9	1385	311.93	1385.26	313.6	1385.67	323.24	1385.78
342.88	1385.96	342.89	1385.96	342.9	1385.96	342.91	1385.96	342.92	1385.96
342.94	1385.96	343.13	1385.96	344.92	1386	345.25	1386.01	347.71	1386.11
365.44	1387	367.83	1387	368.41	1387	368.78	1387	374.7	1386.81
377.19	1386.73	377.88	1386.7	378.19	1386.69	378.94	1386.67	385.99	1386.53
392.53	1386.39	396.17	1386.32	411.93	1386	413.13	1385.98	413.96	1385.96
414.98	1385.94	418.85	1385.96	421.91	1385.97	428.66	1386	429.95	1386.17
431.27	1386.35	435.71	1386.96	442.32	1386.5	449.28	1386	452.76	1385.87
457.72	1385.7	462.85	1385.51	471.54	1385.23	478.35	1385	481.26	1384.91
482.62	1384.87	485.71	1384.9	486.67	1384.91	495.26	1384.98	495.37	1384.99
496.33	1384.97	516.71	1384.71	517.86	1384.69	518.41	1384.69	518.73	1384.68
519.66	1384.67	520.44	1384.69	522.26	1384.72	531.86	1384.91	534.04	1384.87
536.99	1384.82	537.58	1384.81	537.62	1384.83	538.05	1385	538.35	1385.12
540.52	1386	542.42	1386.77	543	1387	543.6	1387.24	545.48	1388
547.13	1388.67	547.96	1389	549.35	1389.56	550.03	1389.83	550.45	1390
551.04	1390.23	552.96	1391	553.63	1391.27	555.47	1392	556.66	1392.48
557.98	1393	558.5	1393.21	558.99	1393.4	561.74	1393.52	568.15	1393.81

571.47	1393.03	571.58	1393	575.77	1392.01	575.81	1392	575.9	1391.98
580.01	1391	581.27	1390.7	584.19	1390	585.27	1389.74	586.96	1389.34
589.66	1389.27	591.36	1389.23	591.4	1389.23	591.44	1389.24	591.48	1389.24
591.5	1389.25	612.59	1389.01	623.61	1388.9				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	368.78	.03	542.42	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
368.78	542.42	101.64	100	98.37	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	368.78	1392	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12800

INPUT
Description: Channel Station 49099.16
Station Elevation Data num= 135

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.61	99.94	1385.89	100.71	1385.88	132.67	1385.62	134.01	1386
134.55	1386	134.8	1386	134.89	1386	135.34	1386	136.02	1386
136.88	1386	141.56	1386	143.02	1386	163.75	1385.28	169.83	1385.1
173.16	1385.05	176.18	1385	178.69	1384.96	182.04	1384.91	193.57	1384.92
201.57	1384.93	203.2	1384.95	204.07	1384.97	205.8	1384.99	207.52	1385
208.66	1385.35	234.91	1378.79	250	1378.49	265.09	1378.79	291.34	1385.35
308.19	1385	309.77	1385	309.88	1385	311.13	1385	312.53	1385.35
313.34	1385.55	313.37	1385.23	313.39	1385	313.7	1385	313.71	1385
313.72	1385	313.73	1385	314.58	1385.08	322.6	1385.84	324.29	1386
326.06	1386	331.94	1386	333.4	1385.63	335.94	1385	338.11	1385
340.38	1385	341.27	1385.05	347.72	1385.4	358.52	1385.83	361.07	1385.94
362.51	1386	364.82	1386.01	368.78	1386.03	383.72	1386.12	387.71	1386.03
389.43	1386	406.23	1385.66	413.19	1385.52	419.76	1385.39	421.43	1385.29
422.88	1385.22	426.97	1385	428.57	1385	431.14	1385	431.65	1385
435.55	1385.97	435.66	1386	435.72	1386.01	437.6	1386.31	440.51	1386.77
445.9	1386.41	452.8	1386	465.35	1385.65	468.82	1385.55	471.31	1385.44
481.44	1385	482.3	1384.97	486.79	1384.77	494.05	1384.72	500.19	1384.67
518	1384.5	520.72	1384.48	522.64	1384.47	528.88	1384.46	528.91	1384.46
529.53	1384.48	536.24	1384.72	536.56	1384.72	537.22	1384.7	542.63	1384.6
543.2	1384.83	543.62	1385	544.98	1385.55	546.08	1386	547.2	1386.45
548.55	1387	549.9	1387.55	550.28	1387.7	551.01	1388	552.8	1388.73
553.47	1389	553.74	1389.11	555.94	1390	556.76	1390.33	558.42	1391
560.08	1391.67	560.9	1392	563.37	1393	563.38	1393	563.77	1393.16
563.82	1393.18	564.8	1393.19	573.73	1393.33	574.56	1393.13	575.12	1393
578.58	1392.19	579.36	1392	583.44	1391.04	583.6	1391	583.94	1390.92
587.82	1390	590.72	1389.31	591	1389.24	591.1	1389.24	592.85	1389.25
593.47	1389.16	594.53	1389	594.98	1388.93	597.53	1388.68	627.85	1388.39

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	383.72	.03	546.08	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
383.72	546.08	103.54	100	96.09	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent

```
       0  383.72    1392       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 12700

INPUT
Description: Channel Station 49199.16
Station Elevation Data    num=     151
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1385.6   53.32 1385.75   55.17 1385.71  130.82 1385.13  131.65 1385.36
  131.76 1385.39  131.93 1385.41  132.13 1385.42  150.22 1385.14  151.67 1385.16
  152.44 1385.17  157.09    1385  165.32 1384.82  171.18 1384.73  172.69 1384.69
   178.3 1384.59  180.23 1384.55  181.43 1384.53  183.44 1384.55   201.1 1384.73
  202.88 1384.72  204.68 1384.71  208.66 1385.27  234.91 1378.71     250 1378.41
  265.09 1378.71  291.34 1385.27  294.22    1385  298.25    1385  309.31    1385
  309.92    1385  311.31    1385   311.9 1385.15  312.44 1385.28  312.82 1385.38
  312.83 1385.28  312.86    1385  313.55    1385  314.14    1385  314.39    1385
  314.55    1385   314.9    1385  316.32 1385.14   317.3 1385.23  325.24    1386
  325.88    1386  329.31    1386  332.55 1385.19  333.31    1385  333.53 1384.95
   345.2  1384.7  347.24 1384.87  348.52 1384.92  349.83 1384.97  350.55    1385
  351.05 1385.05  359.14    1386     368    1386   370.8    1386  373.16 1385.41
  374.81    1385  385.79 1384.91  388.42 1384.85  388.72 1384.88  388.91 1384.89
   389.1 1384.89  391.94    1385  393.98 1385.21   400.7    1386  407.91    1386
  412.55    1386  416.58 1385.87  422.09  1385.7  424.78 1385.61  449.92 1385.12
   455.8    1385   456.8 1384.98  459.23 1384.93  460.83  1384.9  471.78 1384.98
  474.63    1385  476.43 1385.45  478.63    1386  480.29 1386.34  481.01 1386.49
  481.59 1386.61  484.23 1386.44  491.55    1386  497.59 1385.82  508.65 1385.48
  518.65 1385.08   520.5    1385  522.35 1384.92  528.84 1384.65  535.31 1384.57
  541.26 1384.56  553.97 1384.36  560.23 1384.28  571.29 1384.39  572.38  1384.4
  573.84 1384.45   580.9  1384.7  582.68 1384.73  584.36 1384.77  584.54 1384.83
  584.98    1385  585.26  1385.1  587.63    1386  589.08 1386.55  590.27    1387
  591.12 1387.32  591.94 1387.63  592.92    1388  594.91 1388.75  595.57    1389
  597.92 1389.89  598.22    1390  600.15 1390.73  600.87    1391  601.02 1391.06
  603.51    1392  603.87 1392.14  605.49 1392.75   608.6 1392.88   611.3    1393
  613.59 1393.11  615.28 1393.19  615.79 1393.07  616.11    1393  618.14 1392.54
  620.48    1392  622.54 1391.52   624.8    1391  627.47 1390.37  629.03    1390
  629.77 1389.82  631.71 1389.36  633.21 1389.22  634.03 1389.14  634.32 1389.09
  634.84    1389  635.66 1388.86  636.61 1388.72  637.32 1388.64  637.95 1388.55
  638.48 1388.48  638.91 1388.41   639.9 1388.32  662.34 1388.12  669.78 1388.15
  670.53 1388.14

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .025   370.8     .03  590.27    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         370.8  590.27           100.41     100   99.62              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   370.8    1392       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 12600

INPUT
```

Description: Channel Station 49299.16
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.61	3.15	1385.62	6	1385.55	91.73	1384.9	92.39	1384.89
95.52	1384.9	108.33	1384.94	113.28	1384.96	124.21	1384.77	124.36	1384.88
124.6	1385	126.51	1385.19	141.93	1385.34	143.15	1385.32	144.35	1385.31
150.75	1385.2	151.6	1385.2	152.53	1385.2	155.99	1385	159.4	1385
159.48	1385	159.53	1385	159.62	1384.99	161.9	1384.64	167.23	1384.48
171.5	1384.33	175.61	1384.35	195.03	1384.4	198.09	1384.43	201.94	1384.46
205.54	1384.49	207.33	1384.38	207.95	1384.34	208.66	1385.19	234.91	1378.63
250	1378.33	265.09	1378.63	291.34	1385.19	293.01	1385	309.28	1385
311.62	1385	311.92	1385	312.02	1385.03	312.83	1385.23	315.62	1385.57
319.23	1386	320.63	1386	320.76	1386	320.94	1385.95	322.21	1385.64
324.34	1385.11	324.76	1385	325.91	1384.71	328.77	1384	329.17	1384
331.53	1384	337.71	1384.42	339.89	1384.57	341.12	1384.7	343.99	1385
344.83	1385.33	371.3	1385.46	371.45	1385.45	371.68	1385.45	371.97	1385.44
372.3	1385.43	372.62	1385.43	372.92	1385.42	373.2	1385.41	373.46	1385.41
373.7	1385.4	373.92	1385.4	374.12	1385.39	374.31	1385.39	374.49	1385.38
378.07	1385.3	382.18	1385.21	385.1	1385.16	392.96	1385	399.69	1384.87
404.08	1384.78	406.65	1384.73	414.12	1384.58	418.93	1384.25	421.76	1384.05
422.5	1384	423.02	1384	425.21	1384	429.07	1384.96	429.22	1385
429.52	1385.08	432.35	1385.78	433.22	1386	433.51	1386.07	434.89	1386.42
442.16	1386.09	444.13	1386	445.89	1385.92	462.89	1385.15	466.53	1385.03
467.54	1385	472.63	1384.84	476.24	1384.73	481.14	1384.57	484.46	1384.55
495.08	1384.5	509.97	1384.4	513.3	1384.37	517.86	1384.3	527.9	1384.15
530.73	1384.33	533.88	1384.54	536.68	1384.55	538.29	1384.56	538.96	1384.83
539.39	1385	541.8	1385.97	541.89	1386	541.97	1386.03	544.4	1387
546.01	1387.64	546.95	1388	548.92	1388.77	549.52	1389	549.86	1389.13
552.12	1390	552.26	1390.06	554.41	1390.88	554.73	1391	555.09	1391.14
557.35	1392	558.47	1392.43	558.7	1392.51	559.12	1392.53	568.72	1392.98
570.27	1392.65	573.44	1392	576.24	1391.42	578.24	1391	579.86	1390.65
582.92	1390	586.96	1389.11	587.48	1389	587.69	1388.95	587.75	1388.94
588.41	1388.86	591.24	1388.52	592.18	1388.4	592.87	1388.32	594.64	1388.12
594.66	1388.12	616.39	1388.11	619.89	1388.04	625.42	1387.93	625.73	1387.93

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	320.76	.03	541.8	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
320.76	541.8	94.09	100	105.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	320.76	1391	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12500

INPUT
Description: Channel Station 49399.16
Station Elevation Data num= 163

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.24	56.38	1384.78	57.74	1384.76	60.71	1384.77	72.87	1384.82
77.56	1384.83	122.9	1383.99	124.55	1384	125.16	1384.01	125.17	1384.01
125.26	1384	125.93	1384	126.21	1384	127.74	1384.54	129.02	1385
131.51	1385.88	131.83	1386	132.85	1386	134.64	1386	135.83	1386
136.18	1386	140.26	1386	140.53	1386	144.34	1386	144.83	1386
151.78	1386	154.18	1386	155.39	1386	156.79	1385.71	158.34	1385.49

159.35	1385.49	159.85	1385	160.18	1385	160.57	1384.77	161.22	1384.6
167.18	1384.4	169.67	1384.33	173.17	1384.32	194.35	1384.35	200.45	1384.38
205.46	1384.42	208.66	1385.11	234.91	1378.55	250	1378.25	265.09	1378.55
291.34	1385.11	300.4	1385	308.89	1385	310.11	1385	312.18	1385
312.46	1385.07	312.94	1385.19	317.98	1385.86	318.98	1386	320.17	1386
321.02	1386	321.46	1385.89	323.8	1385.31	325.02	1385	325.26	1384.94
329.03	1384	329.37	1384	330.44	1384	337.69	1384.56	339.6	1384.71
339.69	1384.82	339.87	1385	341.08	1385	341.47	1385	345.8	1385
361.77	1385.17	363.3	1385.2	364.54	1385.21	375.63	1385.4	379.65	1385.32
382.3	1385.27	386.72	1385.18	390.21	1385.11	395.9	1385	396.73	1384.98
402.17	1384.88	404.68	1384.83	407.83	1384.76	409.5	1384.73	410.34	1384.71
410.68	1384.71	411.66	1384.69	412.52	1384.62	413.3	1384.56	416.18	1384.34
420.7	1384	421.65	1384	422.32	1384	423.58	1384.32	426.32	1385
429.71	1385.85	430.32	1386	430.39	1386.01	432.15	1386.18	433.81	1386.11
436.52	1386	440.42	1385.85	460.96	1385.04	461.98	1385.01	462.2	1385
472.1	1384.68	475.73	1384.56	476.41	1384.54	478.41	1384.47	480.17	1384.45
493.51	1384.3	502.45	1384.25	510.38	1384.21	518.81	1384.01	519.22	1384
519.72	1383.99	526.17	1383.85	526.46	1383.87	528.01	1384	528.64	1384.05
532.76	1384.36	535.57	1384.46	536.59	1384.5	537.64	1384.93	537.82	1385
538.25	1385.17	540.3	1386	541.2	1386.37	542.77	1387	544.22	1387.59
545.24	1388	547.34	1388.85	547.71	1389	548.93	1389.5	550.18	1390
550.45	1390.11	550.69	1390.21	552.65	1391	554.47	1391.74	555.11	1392
556.11	1392.41	556.22	1392.45	556.26	1392.47	556.29	1392.48	556.61	1392.49
566.87	1392.78	569.11	1392.26	570.25	1392	571.85	1391.63	574.56	1391
578.23	1390.15	578.87	1390	579.58	1389.83	583.17	1389	583.78	1388.86
584.58	1388.67	589.37	1388.13	590.47	1388	590.71	1387.97	592.94	1387.72
593.45	1387.67	594.5	1387.59	620.68	1387.31				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	321.02	.03	541.2	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
321.02	541.2	100.08	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	321.02	1391	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12400

INPUT
Description: Channel Station 49499.16
Station Elevation Data num= 144

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.8	19.17	1384.64	21.37	1384.62	24.28	1384.63	36.23	1384.67
40.85	1384.69	85.41	1383.86	87.02	1383.87	130.23	1384.46	131.11	1385
131.13	1385	131.83	1385.14	132.3	1385.16	136.35	1385.52	139.12	1385.6
141.21	1385.6	144.95	1385.59	147.22	1385.57	149.53	1385.55	152.56	1385.54
154.95	1385.51	162.97	1385	163.23	1385	163.64	1384.91	165.06	1384.55
165.37	1384.46	167.21	1384.43	181.56	1384.22	190.79	1384.26	194.9	1384.27
198.25	1384.35	203.35	1384.43	204.95	1384.46	206.19	1384.39	208.61	1384.25
208.66	1385.03	234.91	1378.47	250	1378.17	265.09	1378.47	291.34	1385.03
292.41	1385	308.57	1385	309.34	1385	312.41	1384.98	314.36	1384.99
315.92	1385	328.04	1385	328.33	1385	329.82	1385	336.22	1385
337.34	1385	338.29	1385	338.6	1385	338.77	1385	341.93	1384.95
343.98	1384.99	344.42	1385	350.92	1385.13	368.58	1385.49	379.54	1385.7
388.03	1385.54	390.5	1385.49	398.25	1385.33	414.55	1385.01	414.99	1385

415	1385	415.57	1384.99	425.43	1385	429.02	1385	429.93	1385.13
432.2	1385.44	433.21	1385.58	433.77	1385.65	434.12	1385.7	434.37	1385.74
435.78	1385.92	441.48	1385.74	464.51	1385	464.53	1385	465.21	1384.98
473.96	1384.68	481.56	1384.4	484.77	1384.37	497.97	1384.21	502.81	1384.15
504.09	1384.14	505.04	1384.12	512.32	1384.02	514.19	1384	515.2	1383.99
529.8	1383.84	531.06	1383.92	532.48	1384	540.24	1384.42	540.48	1384.44
540.53	1384.46	541.82	1384.97	541.89	1385	541.9	1385.01	544.4	1386
545.28	1386.35	546.91	1387	549.28	1387.94	549.42	1388	549.59	1388.07
550.02	1388.24	551.93	1389	552.89	1389.38	554.42	1390	555.73	1390.53
556.88	1391	558.2	1391.54	559.33	1392	559.66	1392.14	560.03	1392.29
566.46	1392.27	570.1	1392.27	570.5	1392.18	571.37	1392	572.79	1391.7
576.11	1391	579.36	1390.32	580.87	1390	584.77	1389.19	585.66	1389
587.44	1388.63	590.27	1388.04	591.22	1388.03	592.41	1388	595.19	1387.59
595.82	1387.51	596.48	1387.55	598.12	1387.76	598.79	1387.57	601.06	1387.16
601.45	1387.09	602.06	1387	602.22	1386.95	602.34	1386.94	602.42	1386.93
602.53	1386.93	607.95	1386.87	625.37	1387.07	626.79	1387.08		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	379.54	.03	544.4	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
379.54	544.4	102.09	100	97.8	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	379.54	1391	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12300

INPUT
Description: Channel Station 49599.16
Station Elevation Data num= 121

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.52	44.08	1383.72	45.69	1383.72	134.42	1384.92	134.54	1385
134.56	1385	135.1	1385	135.49	1385	136.43	1385	137.33	1385
138.88	1385	143.54	1384.89	147.79	1384.9	152.3	1384.91	164	1384.58
165.24	1384.6	166.81	1384.59	168.05	1384.46	172.78	1384.32	181.31	1384.08
185.2	1384.09	197.5	1384.13	205.36	1384.21	205.57	1384.21	206.19	1384.2
208.66	1384.95	234.91	1378.39	250	1378.09	265.09	1378.39	291.34	1384.95
292.31	1385	292.92	1385	304.95	1385	306.71	1384.97	312.27	1384.88
319.58	1384.99	320.24	1385	323.03	1385	330.3	1385	335.84	1385
339.45	1385	339.85	1385.02	342.99	1385.18	368.8	1385.69	382.32	1385.96
389.81	1385.81	418.33	1385.24	421.55	1385.08	423.1	1385	423.13	1385
423.19	1385	427.38	1385	431.26	1385.26	434.42	1385.46	435.62	1385.54
436.26	1385.58	438.3	1385.71	445.27	1385.52	464.43	1385	466.35	1384.93
468.4	1384.87	480.32	1384.48	484.22	1384.34	489.48	1384.24	500.61	1384
500.81	1384	501.03	1384	501.13	1384	502.59	1383.99	509.61	1383.95
511.74	1383.94	512.7	1383.94	515.25	1383.93	518.27	1383.91	521.47	1383.91
533.32	1383.88	534.54	1383.95	535.58	1384	537.1	1384.08	543.54	1384.41
544.46	1384.78	545.01	1385	546.74	1385.69	547.5	1386	548.73	1386.49
549.88	1386.95	550	1387	550.42	1387.17	552.49	1388	553.88	1388.55
555	1389	557.12	1389.85	557.5	1390	558.03	1390.21	560	1391
561.25	1391.5	562.53	1392	562.61	1392.03	562.7	1392.07	563.35	1392.07
573.46	1392.2	574.22	1392.04	574.42	1392	575.57	1391.75	578.98	1391
582.38	1390.25	583.24	1390.07	583.54	1390	587.19	1389.2	588.1	1389
591.47	1388.26	592.66	1388	593.02	1387.92	594.39	1387.61	595.85	1387.55
601.99	1387.25	602.86	1387.09	603.44	1387.01	603.83	1387.02	604.06	1387

631.25 1387.09

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	382.32	.03	548.73	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
382.32	548.73	103.82	100	96.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	382.32	1391	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12200

INPUT
Description: Channel Station 49699.16
Station Elevation Data num= 130

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.66	89.76	1384.85	92.09	1384.86	94.11	1384.87	95.84	1384.88
97.25	1384.88	130.26	1385	130.96	1385	130.99	1385	132.47	1385
136.74	1385	140.02	1385	142.29	1384.89	164.48	1384.21	168.75	1384.14
176.83	1384.07	181.15	1384.1	192.08	1384.16	202.9	1384.1	206.19	1384.08
207.1	1384.07	208.66	1384.87	234.91	1378.31	250	1378.01	265.09	1378.31
291.34	1384.87	292.2	1385	295.63	1385	301.38	1385	306.02	1384.76
311.41	1384.48	312.88	1384.64	313	1384.65	313.61	1384.7	315.68	1384.88
317.02	1385	318.68	1385	326.55	1385	329.48	1385	329.91	1385
336.15	1385.34	336.72	1385.37	337.24	1385.4	338.62	1385.43	339.07	1385.44
340.27	1385.46	343.37	1385.52	360.55	1385.86	367.51	1386	371.26	1386.07
374.11	1386.13	375.68	1386.16	378.36	1386.13	384.36	1386.01	385	1386
390.81	1385.88	401.49	1385.67	414.47	1385.41	418.51	1385.18	420	1385.12
422.23	1385	429.02	1385.32	431.29	1385.41	434.37	1385.57	436.24	1385.53
458.24	1385	458.97	1384.98	463.02	1384.89	464.92	1384.84	469.55	1384.67
480.89	1384.23	490.98	1384.05	493.89	1384	495.91	1383.97	496.58	1383.96
497.04	1383.96	498.6	1383.96	511.82	1383.91	528.39	1383.76	529.67	1383.76
530.37	1383.8	531.58	1383.87	533.65	1384	535.87	1384.13	540.52	1384.42
541.75	1384.9	542.02	1385	544.44	1385.93	544.61	1386	546.03	1386.55
547.19	1387	547.37	1387.07	548.51	1387.51	549.78	1388	550.41	1388.24
552.37	1389	553.54	1389.45	554.96	1390	556.82	1390.71	557.56	1391
558.61	1391.4	559.76	1391.85	560.15	1392	560.29	1392	560.31	1392
560.6	1392	561.34	1392.02	562.01	1392.02	562.61	1392.03	570.16	1392.14
570.45	1392.08	570.84	1392	573.51	1391.44	575.62	1391	579.81	1390.12
580.39	1390	581.76	1389.71	585.17	1389	586.21	1388.78	589.93	1388
590.41	1387.89	591.65	1387.63	594.88	1387.38	598.24	1387.1	598.35	1387.09
598.72	1387.1	599.29	1387.02	600.36	1387.04	601	1387	631.37	1387.1

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	375.68	.03	544.44	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
375.68	544.44	92.68	100	106.55	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	375.68	1391	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12100

INPUT
Description: Channel Station 49799.16
Station Elevation Data num= 135

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.98	54.06	1384.73	56.25	1384.73	58.15	1384.74	59.77	1384.75
61.1	1384.75	129.92	1385	130.18	1385	130.36	1385	130.46	1385
130.72	1385	131.25	1385	133.65	1385	136.25	1385	140.17	1385
149.49	1384.72	159.38	1384.7	166.55	1384.48	174.04	1384.27	176.78	1384.18
187.1	1384.23	190.34	1384.24	197.69	1384.26	202.29	1384.27	204.14	1384.28
204.66	1384.28	204.94	1384.21	205.1	1384.18	205.62	1384.05	205.8	1384
205.82	1384	205.84	1384	208.4	1384	208.66	1384.79	234.91	1378.23
250	1377.93	265.09	1378.23	291.34	1384.79	292.13	1385	294.02	1385
296.97	1385	301.89	1384.82	311.27	1384.46	316.73	1384.93	317.56	1385
319.27	1385	321.15	1385	324.08	1385	325.18	1385	326.03	1385
329.49	1385.26	334.86	1385.66	345.72	1385.88	351.93	1386	372.57	1386.42
375.07	1386.47	376	1386.48	376.49	1386.49	377.97	1386.52	380.98	1386.46
381.61	1386.45	382.86	1386.42	386.14	1386.36	399.95	1386.09	404.27	1386
411.76	1385.85	412.81	1385.83	414.02	1385.81	415.28	1385.77	433.51	1385.22
446.51	1385.03	448.8	1385	449.44	1385	451.04	1384.97	465.65	1384.69
474.44	1384.36	479.58	1384.15	483.14	1384.08	486.89	1384	493.43	1383.87
496.38	1383.81	504.59	1383.82	510.61	1383.83	513.88	1383.78	525.7	1383.59
529.09	1383.53	530.08	1383.6	535.4	1384	539.53	1384.3	540.3	1384.36
540.49	1384.37	540.55	1384.39	540.69	1384.44	542.1	1385	544.29	1385.86
544.65	1386	544.98	1386.13	547.2	1387	549	1387.71	549.75	1388
550.08	1388.13	550.6	1388.33	552.3	1389	554.37	1389.81	554.85	1390
555.19	1390.14	557.4	1391	558.88	1391.58	559.61	1391.87	562.25	1391.98
562.57	1392	563.55	1392.05	568.41	1392.3	570.46	1392.4	570.54	1392.38
572.3	1392	574.98	1391.38	576.68	1391	580.37	1390.16	581.09	1390
585.42	1389.01	585.47	1389	585.81	1388.92	589.82	1388	592.18	1387.46
592.84	1387.31	594.51	1387.22	596.95	1387.1	598.92	1387	600.11	1386.96
600.96	1386.93	601.36	1386.91	601.39	1386.91	622.54	1387.06	636.28	1387.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	377.97	.03	547.2	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
377.97	547.2	99.46	100	100.61	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	377.97	1391	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12000

INPUT
Description: Channel Station 49899.16
Station Elevation Data num= 145

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.32	18.09	1384.57	20.23	1384.58	22.09	1384.59	23.67	1384.59
24.98	1384.6	113.27	1384.92	135.14	1385	138.2	1385	139.86	1385
141.22	1385	145.12	1385	148.58	1385	154.58	1385	156.35	1385
160.95	1385	167.33	1384.6	171.77	1384.34	172.11	1384.33	172.55	1384.3
172.99	1384.29	181.76	1384.11	194.13	1384.23	204.22	1384.32	205.44	1384.02

205.51	1384	205.68	1384	206.2	1384	208.47	1384	208.56	1384
208.66	1384.71	234.91	1378.15	250	1377.85	265.09	1378.15	291.34	1384.71
292.49	1385	292.89	1385	293.01	1385	297.88	1384.81	301.92	1384.65
310.98	1384.3	310.99	1384.19	311.01	1384	311.86	1384	313.97	1384
321.95	1384.75	324.69	1385	330.34	1385.35	333.93	1385.57	339.23	1385.89
340.72	1385.92	341.9	1385.95	344.61	1386	355.81	1386.23	384.19	1386.8
401.04	1386.46	420.26	1386.08	421.12	1386.04	421.85	1386	421.9	1386
428.79	1385.52	437.4	1385	437.61	1385	439.27	1384.98	439.52	1384.98
439.52	1384.99	439.52	1385	440.94	1385	442.54	1385	443.65	1385
445.15	1385	449.86	1385	450.41	1385	450.58	1385	450.85	1385
451.05	1385	457.94	1384.81	471.48	1384.42	475.23	1384.27	477.91	1384.15
479.18	1384.09	480.87	1384	481.41	1383.97	484.94	1383.79	497.25	1383.64
501.8	1383.58	504.29	1383.61	512.65	1383.68	529.37	1383.44	535.61	1383.35
537.06	1383.44	537.82	1383.49	538.51	1383.54	540.09	1383.63	540.72	1383.67
541.89	1383.74	545.3	1383.95	545.78	1383.97	545.78	1383.98	545.8	1384
545.96	1384.06	546.72	1384.34	547.04	1384.46	547.23	1384.53	548.51	1385
549.32	1385.3	550.02	1385.57	551.18	1386	551.62	1386.17	553.84	1387
555.44	1387.6	556.49	1388	558.3	1388.69	559.12	1389	561.38	1389.86
561.75	1390	563.55	1390.68	564.38	1391	565.64	1391.48	566.41	1391.78
566.46	1391.79	566.54	1391.8	572.06	1392	572.72	1392.02	577.53	1392.21
577.61	1392.19	578.46	1392	578.64	1391.96	583	1391	586.67	1390.19
587.51	1390	588.23	1389.84	591.99	1389	592.07	1388.98	593	1388.77
596.44	1388	596.52	1387.98	598.25	1387.59	600.93	1387.45	607.37	1387.1
607.72	1387.12	608.05	1387.19	625.81	1387.44	630.93	1387.45	642.9	1387.31

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	384.19	.03	555.44	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
384.19	555.44	0	0	0	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	384.19	1391	F

SUMMARY OF MANNING'S N VALUES

River:River

Reach	River Sta.	n1	n2	n3
Ellsworth	14500	.025	.03	.025
Ellsworth	14499	Lat Struct		
Ellsworth	14400	.025	.03	.025
Ellsworth	14300	.025	.03	.025
Ellsworth	14200	.025	.03	.025
Ellsworth	14100	.025	.03	.025
Ellsworth	14000	.025	.03	.025
Ellsworth	13900	.025	.03	.025
Ellsworth	13800	.025	.03	.025
Ellsworth	13700	.025	.03	.025
Ellsworth	13600	.025	.03	.025
Ellsworth	13500	.025	.03	.025
Ellsworth	13400	.025	.03	.025
Ellsworth	13300	.025	.03	.025
Ellsworth	13200	.025	.03	.025
Ellsworth	13100	.025	.03	.025
Ellsworth	13000	.025	.03	.025
Ellsworth	12900	.025	.03	.025

Ellsworth	12800	.025	.03	.025
Ellsworth	12700	.025	.03	.025
Ellsworth	12600	.025	.03	.025
Ellsworth	12500	.025	.03	.025
Ellsworth	12400	.025	.03	.025
Ellsworth	12300	.025	.03	.025
Ellsworth	12200	.025	.03	.025
Ellsworth	12100	.025	.03	.025
Ellsworth	12000	.025	.03	.025

SUMMARY OF REACH LENGTHS

River: River

Reach	River Sta.	Left	Channel	Right
Ellsworth	14500	100	100	100
Ellsworth	14499	Lat Struct		
Ellsworth	14400	100	100	100
Ellsworth	14300	100	100	100
Ellsworth	14200	100	100	100
Ellsworth	14100	100	100	100
Ellsworth	14000	100	100	100
Ellsworth	13900	100	100	100
Ellsworth	13800	98.87	100	101.06
Ellsworth	13700	98.65	100	101.34
Ellsworth	13600	99.78	100	100.25
Ellsworth	13500	100.01	100	100
Ellsworth	13400	102.36	100	97.83
Ellsworth	13300	103.02	100	97.3
Ellsworth	13200	103.09	100	97.23
Ellsworth	13100	95.48	100	104.29
Ellsworth	13000	96.55	100	103.25
Ellsworth	12900	101.64	100	98.37
Ellsworth	12800	103.54	100	96.09
Ellsworth	12700	100.41	100	99.62
Ellsworth	12600	94.09	100	105.5
Ellsworth	12500	100.08	100	100
Ellsworth	12400	102.09	100	97.8
Ellsworth	12300	103.82	100	96.25
Ellsworth	12200	92.68	100	106.55
Ellsworth	12100	99.46	100	100.61
Ellsworth	12000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River

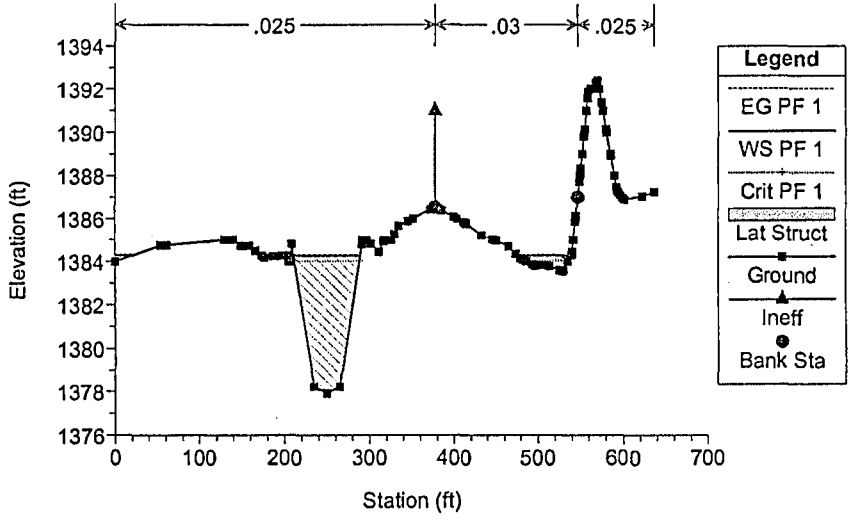
Reach	River Sta.	Contr.	Expan.
Ellsworth	14500	.1	.3
Ellsworth	14499	Lat Struct	
Ellsworth	14400	.1	.3
Ellsworth	14300	.1	.3
Ellsworth	14200	.1	.3

Ellsworth	14100	.1	.3
Ellsworth	14000	.1	.3
Ellsworth	13900	.1	.3
Ellsworth	13800	.1	.3
Ellsworth	13700	.1	.3
Ellsworth	13600	.1	.3
Ellsworth	13500	.1	.3
Ellsworth	13400	.1	.3
Ellsworth	13300	.1	.3
Ellsworth	13200	.1	.3
Ellsworth	13100	.1	.3
Ellsworth	13000	.1	.3
Ellsworth	12900	.1	.3
Ellsworth	12800	.1	.3
Ellsworth	12700	.1	.3
Ellsworth	12600	.1	.3
Ellsworth	12500	.1	.3
Ellsworth	12400	.1	.3
Ellsworth	12300	.1	.3
Ellsworth	12200	.1	.3
Ellsworth	12100	.1	.3
Ellsworth	12000	.1	.3

Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

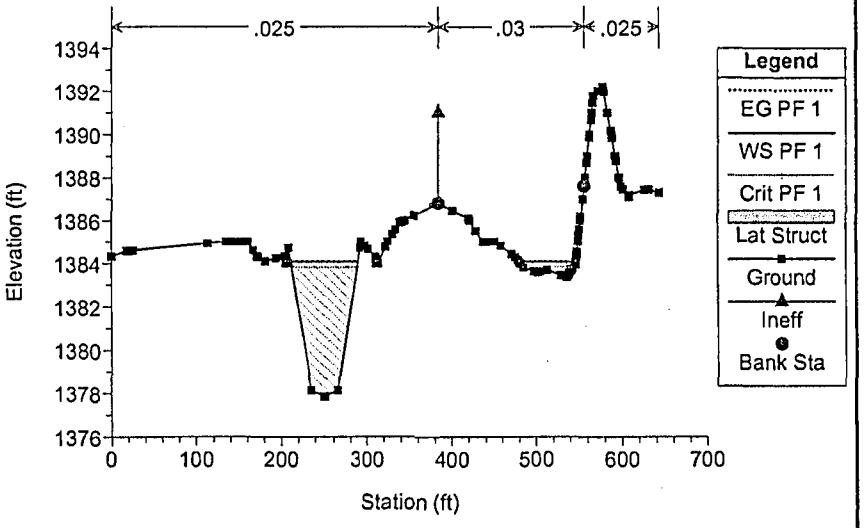
RS = 12100 Channel Station 49799.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

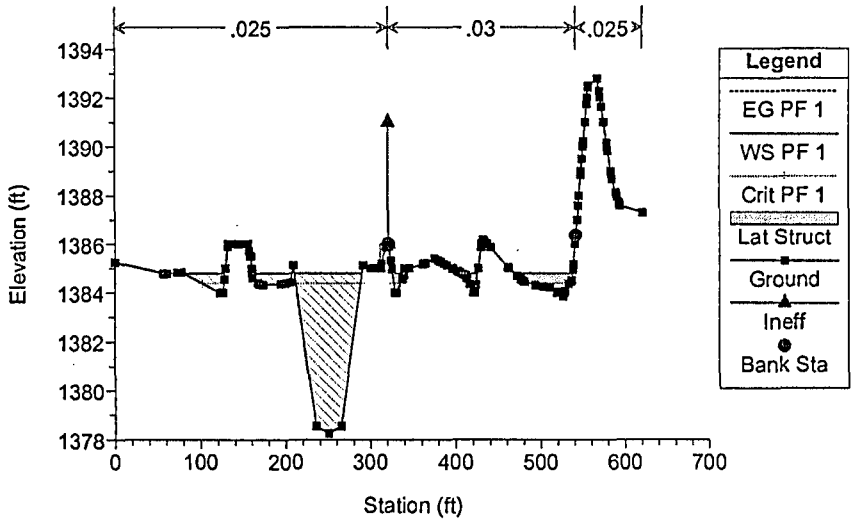
RS = 12000 Channel Station 49899.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

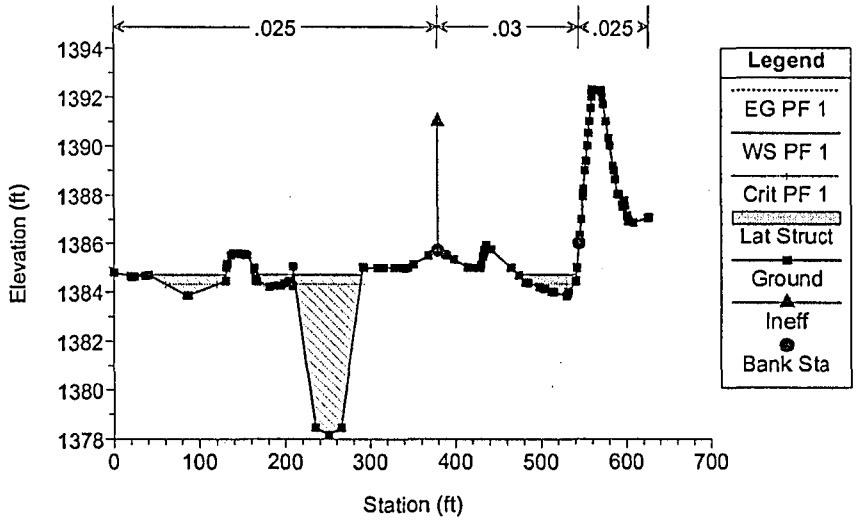
RS = 12500 Channel Station 49399.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

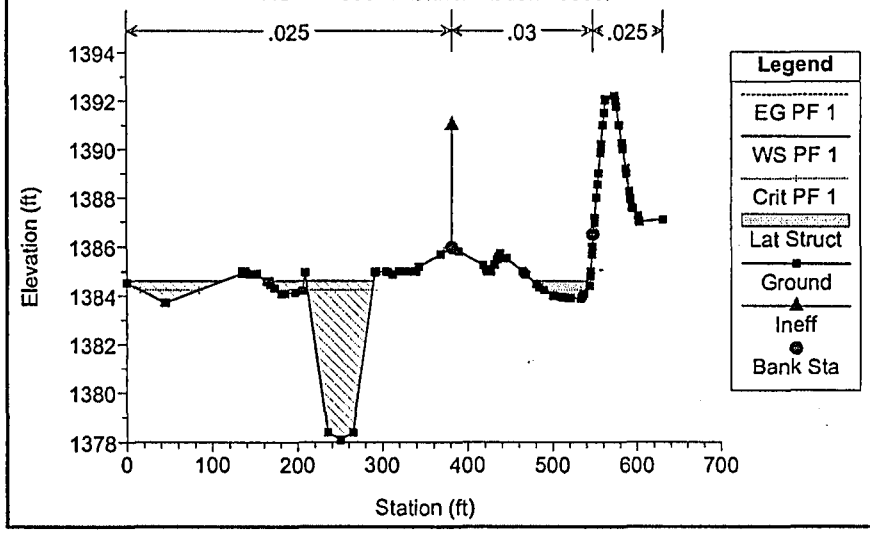
RS = 12400 Channel Station 49499.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

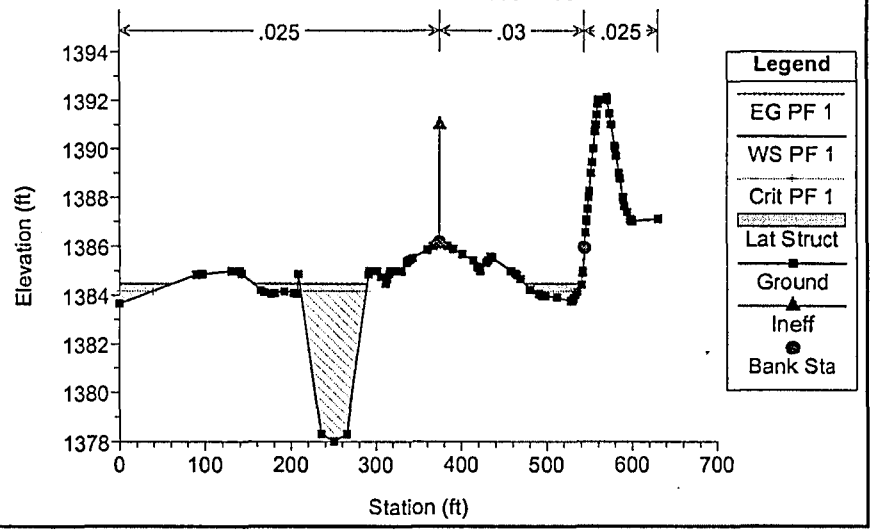
RS = 12300 Channel Station 49599.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

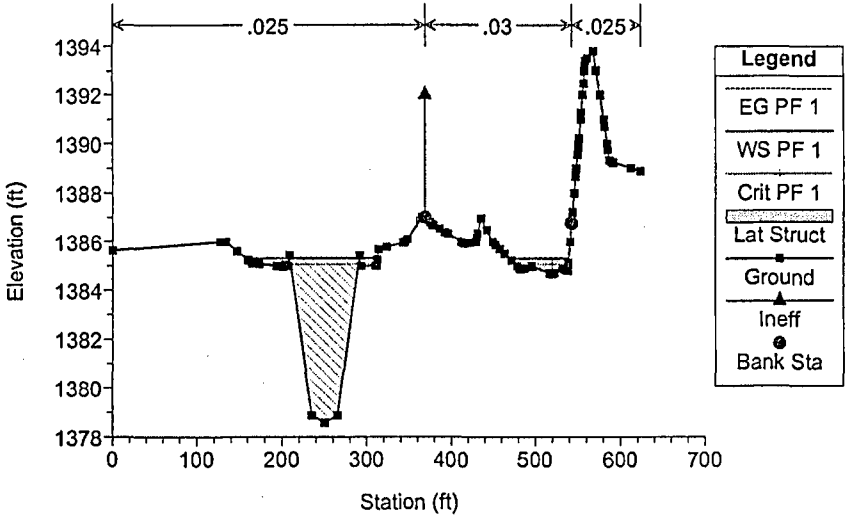
RS = 12200 Channel Station 49699.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

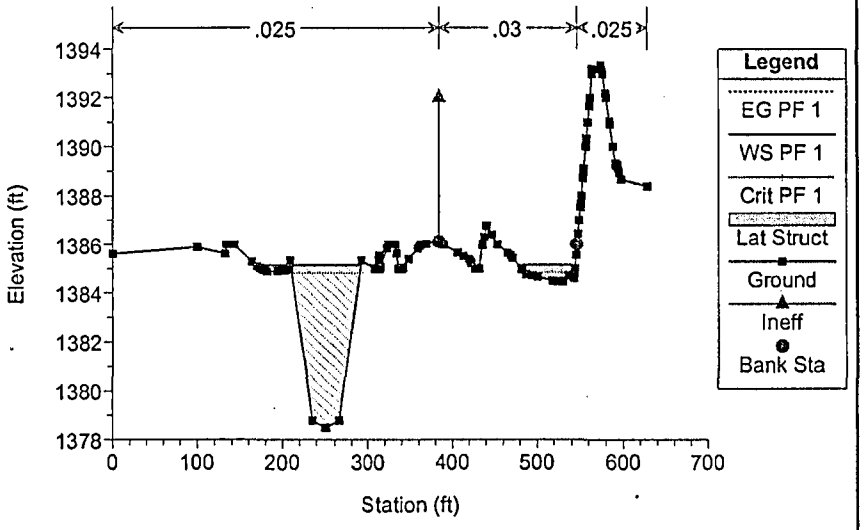
RS = 12900 Channel Station 48999.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

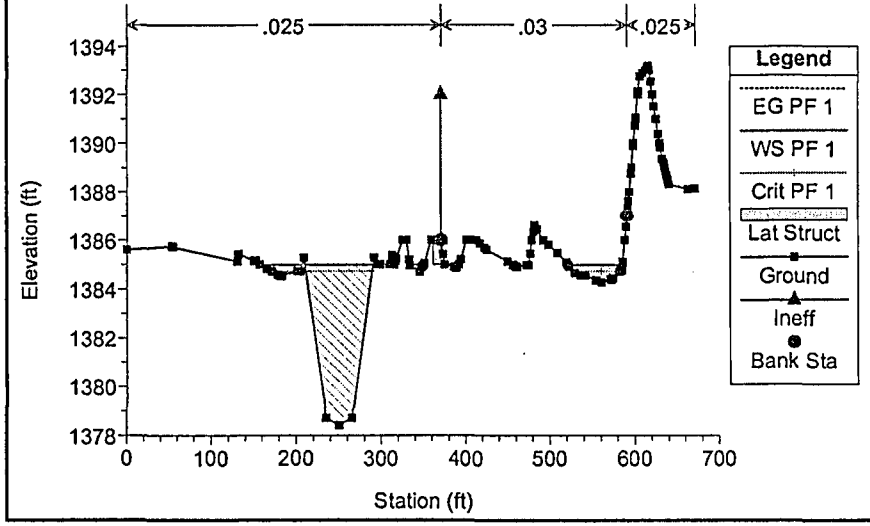
RS = 12800 Channel Station 49099.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

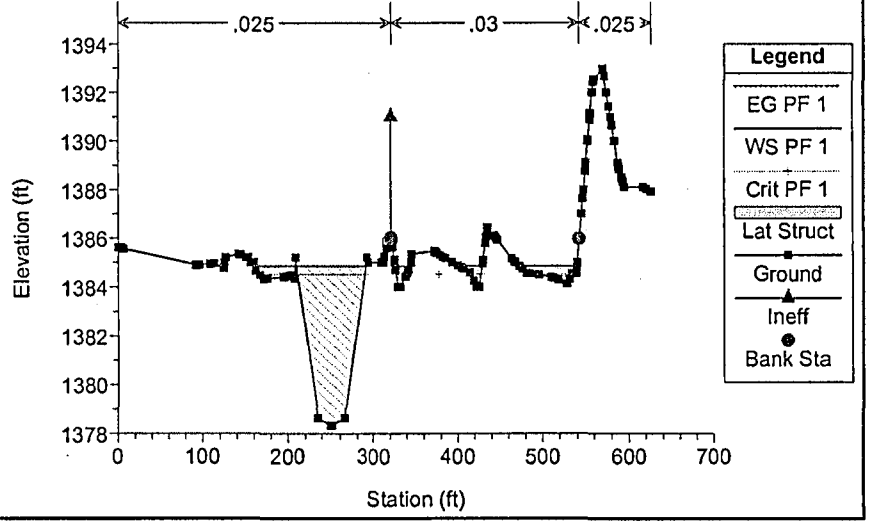
RS = 12700 Channel Station 49199.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

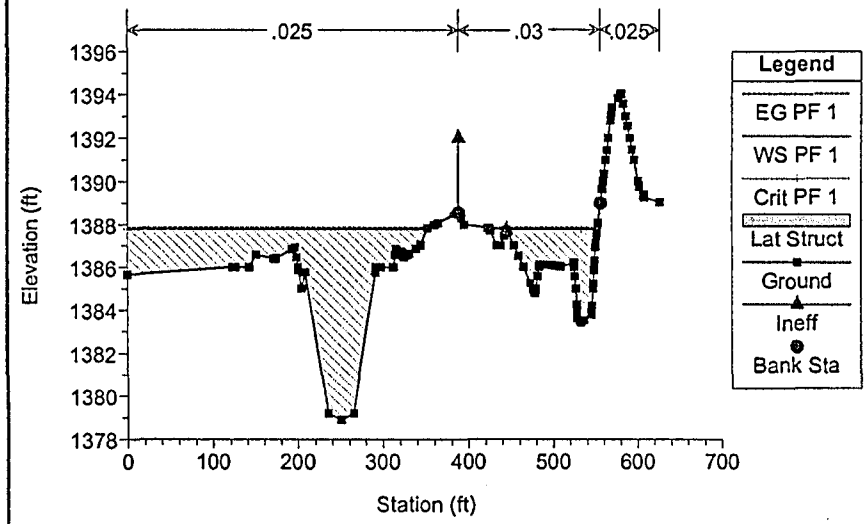
RS = 12600 Channel Station 49299.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

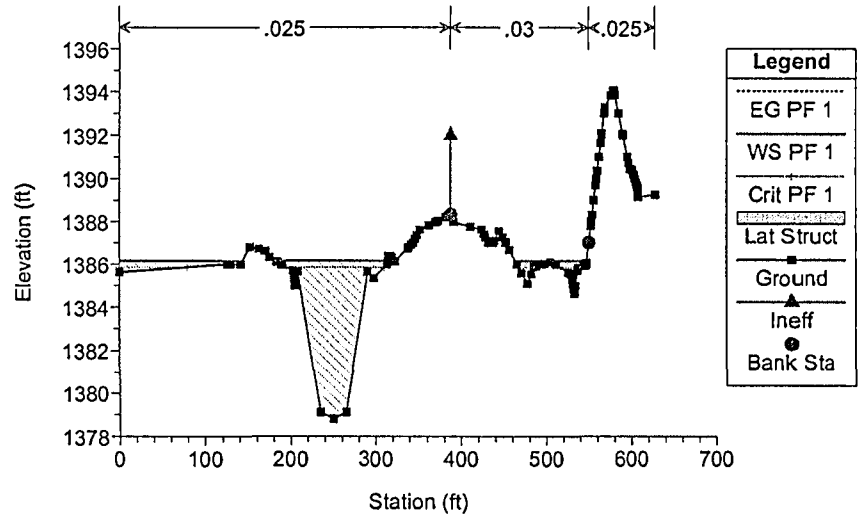
RS = 13300 Channel Station 48599.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

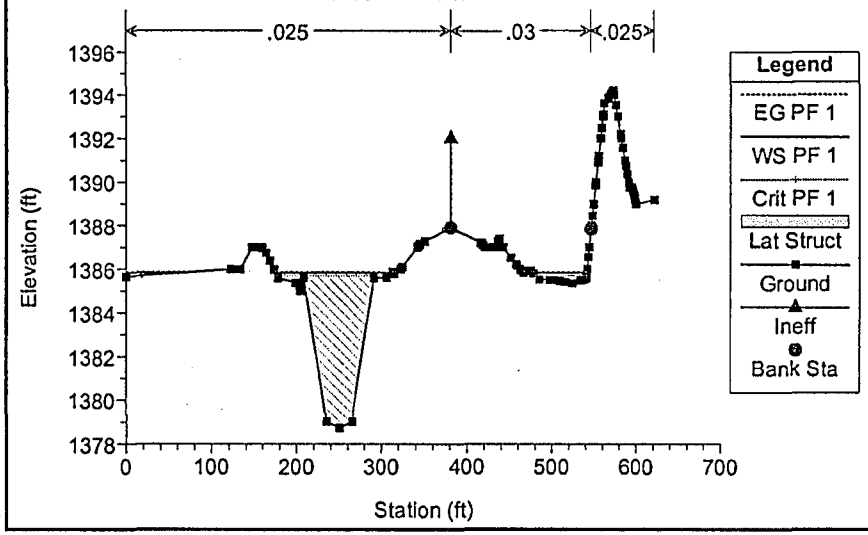
RS = 13200 Channel Station 48699.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

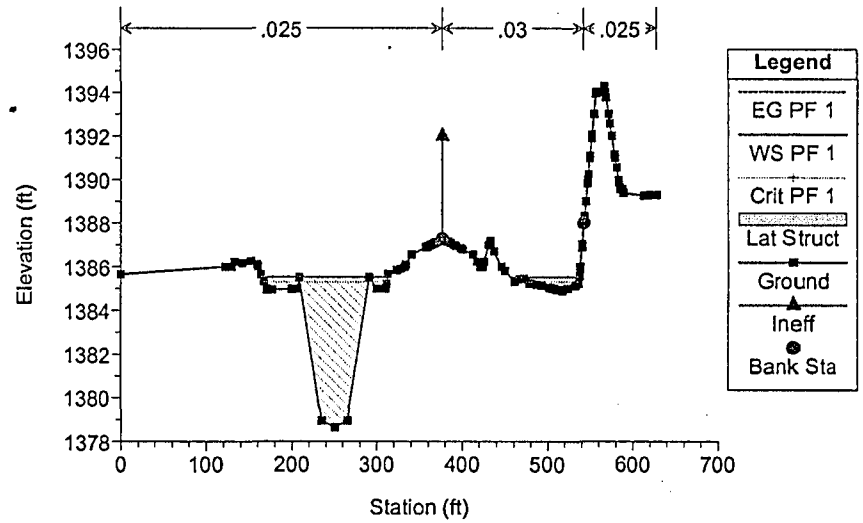
RS = 13100 Channel Station 48799.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

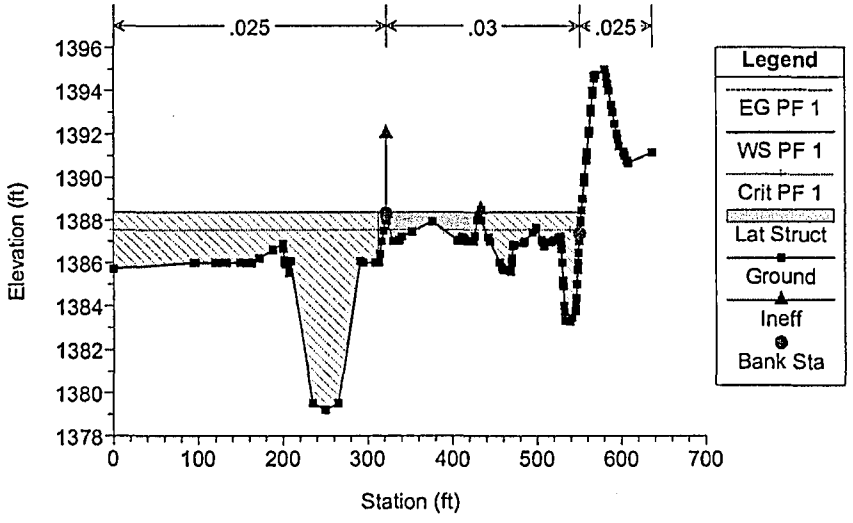
RS = 13000 Channel Station 48899.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

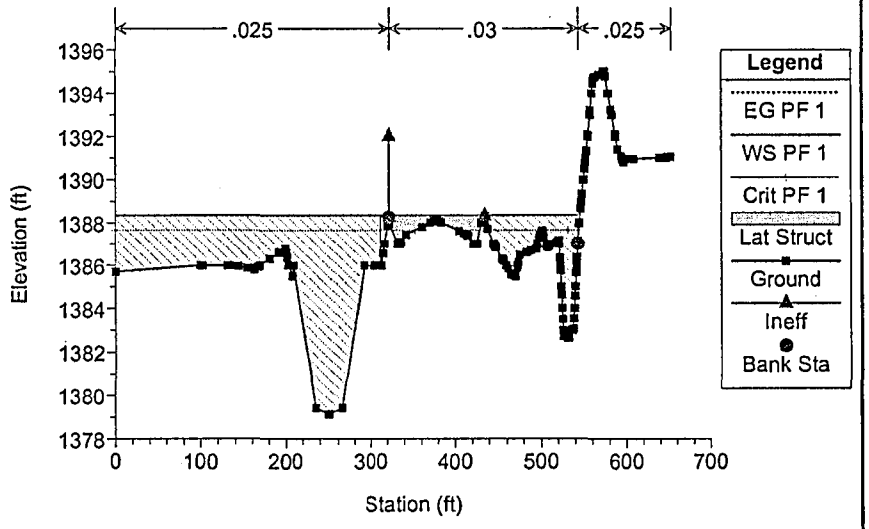
RS = 13700 Channel Station 48199.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

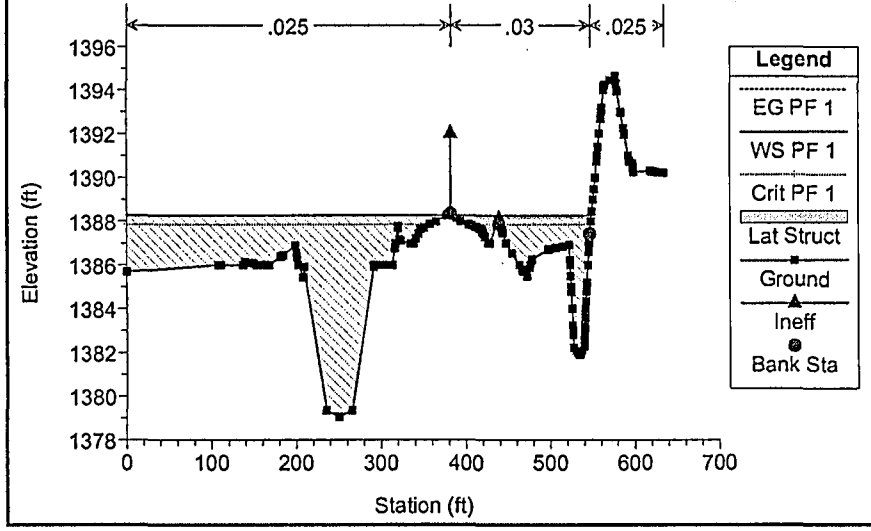
RS = 13600 Channel Station 48299.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

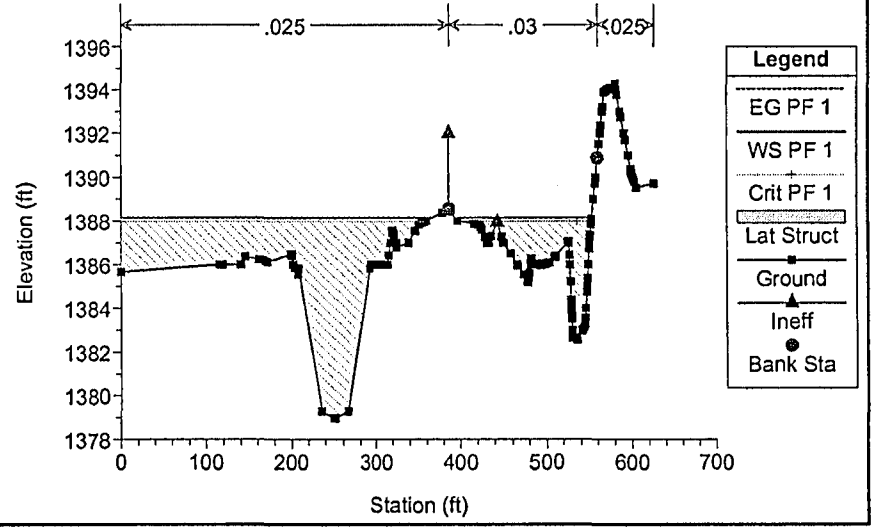
RS = 13500 Channel Station 48399.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

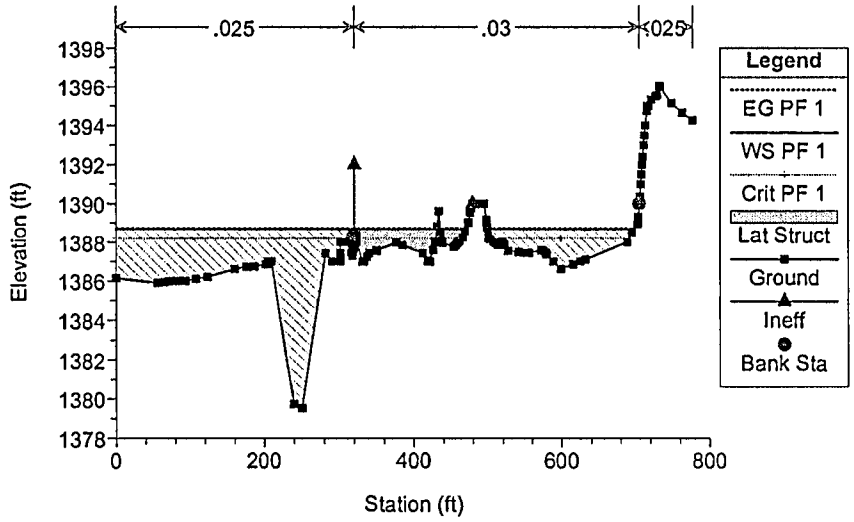
RS = 13400 Channel Station 48499.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

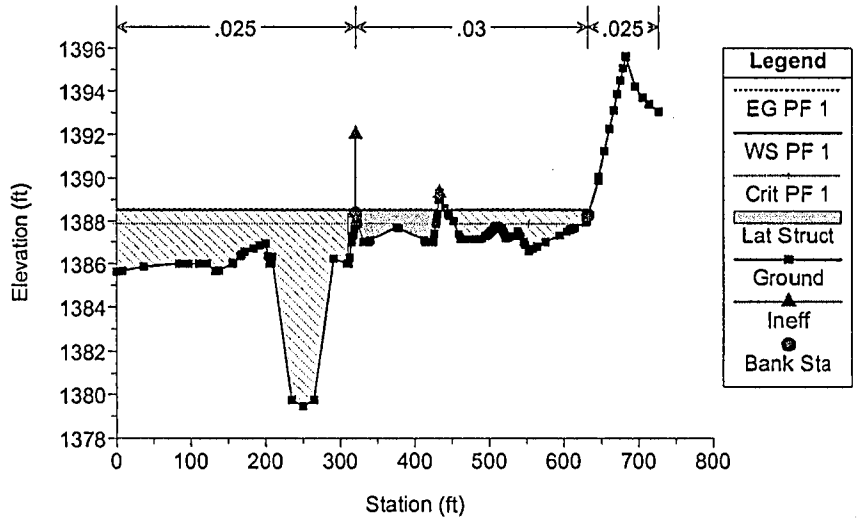
RS = 14100 Channel Station 47799.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

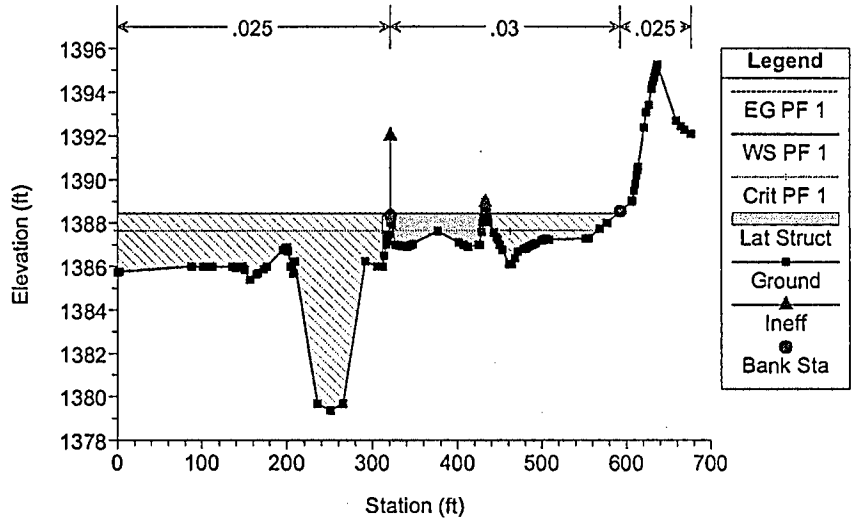
RS = 14000 Channel Station 47899.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

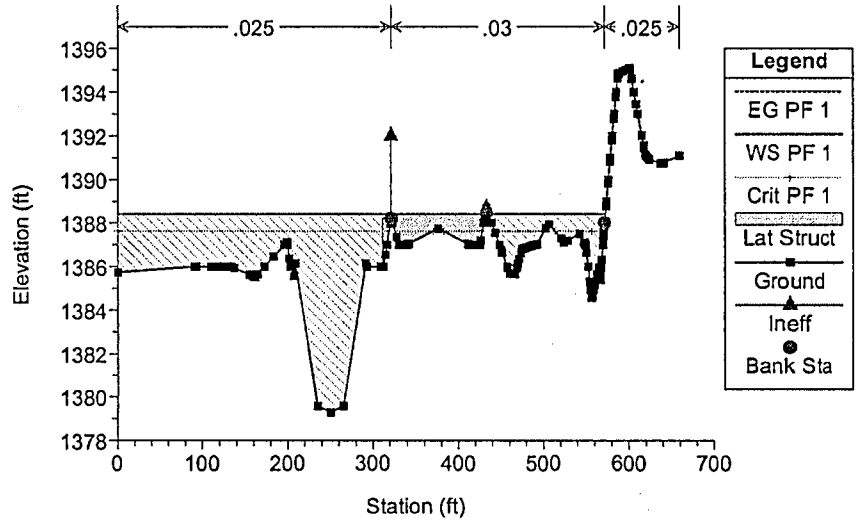
RS = 13900 Channel Station 47999.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

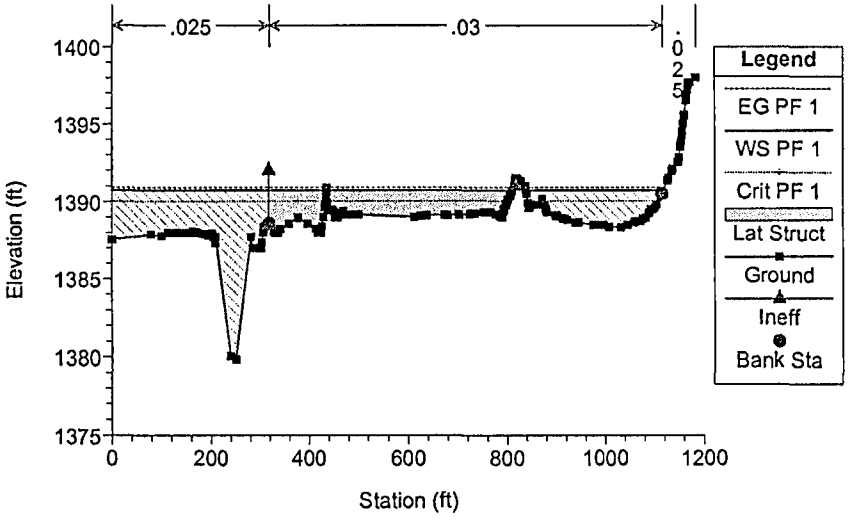
RS = 13800 Channel Station 48099.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

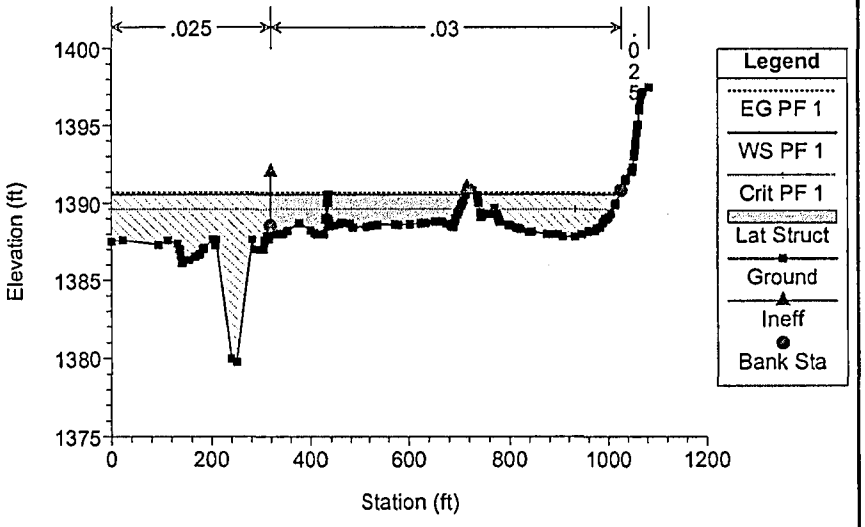
RS = 14500 Channel Station 47938.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

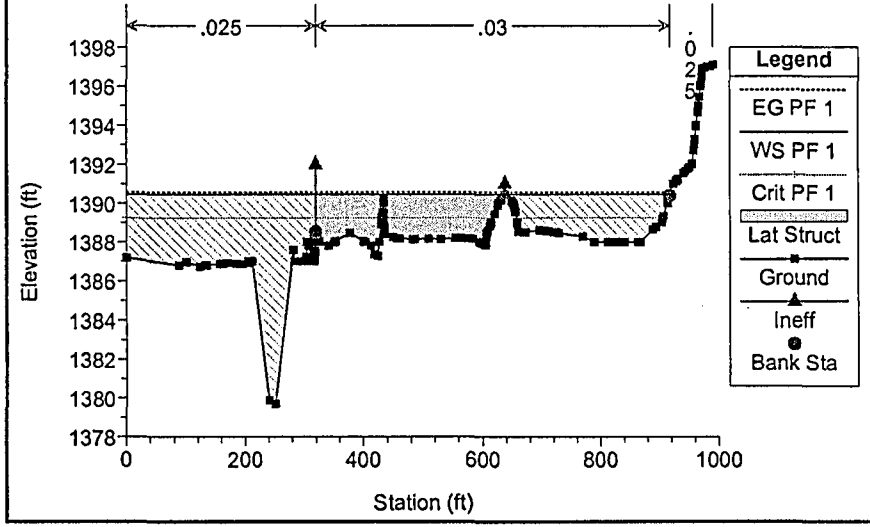
RS = 14400 Channel Station 47499.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

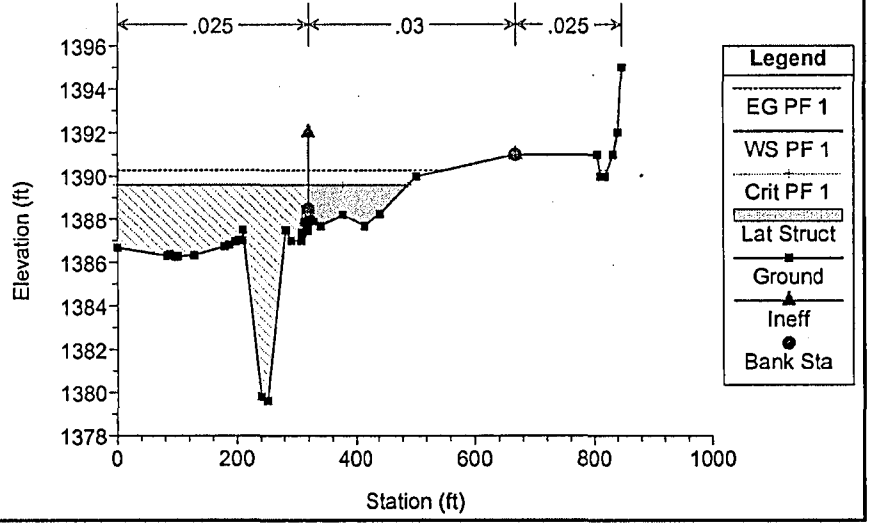
RS = 14300 Channel Station 45799.16



Ellsworth Road overtopping Plan: Ellsworth Rd overtopping (existing Q) 12/07/2004

Flow: Exiting condition flows

RS = 14200 Channel Station 47699.16 (Modified to Include GM Access Road Be



amec

Registered Professional Engineer (Civil) CERTIFICATE NO. 40209 ALEX F. CORONEL Date Signed 7-19-05 ARIZONA, U.S.A.

Memo

To	**Sami Ayoub, P.E., MCDOT** **Bobbie Ohler, P.E., FCDMC** **Tom Kmetz, P.E., City of Mesa**
From	**Alex Coronel, P.E., AMEC**
Date	**November 28, 2004** **Revised: May 19, 2005** **Revised: July 19, 2005**

Subject **Design Memorandum for Ellsworth Channel Overtopping**
W.O. #68927 (Ellsworth Road Phase I)

PURPOSE: The purpose of this memorandum is to document the results of the evaluation of the proposed Ellsworth Channel hydraulic design. The results of the hydraulic design and analysis demonstrate that the new channel, which is designed for developed watershed conditions runoff, will not make flooding conditions worse during a 100-year storm event under existing watershed conditions. The evaluation focused on the channel reach from the existing Pecos Road alignment extending 3200 feet north (See attached exhibits). **This revision dated July 19, 2005 does not differ from the May 19, 2005 memorandum in terms of calculated results, but rather serves to further clarify the implications of said results. (Additions are shown in bold.)**

HYDROLOGY: The developed watershed peak discharges are significantly lower than the peak discharges under existing watershed conditions due to on-site retention requirements imposed on new development. Of greater impact in this area is the impact of the proposed Pecos detention basins planned at the Maricopa / Pinal County boundary as outlined in the East Mesa Area Drainage Master Plan (ADMP) (See attached ADMP Area 1 Preliminary Plan, by Dibble and Associates). The developed conditions channel design discharge at existing Pecos Road is 600 cfs. The existing conditions peak discharge at the same location is 2858 cfs.

The ADMP existing conditions hydrology model shows runoff generated south and east of existing Pecos Road, draining west to Ellsworth Road, crossing Ellsworth Road and continuing west along the Pecos Road alignment. Runoff generated north and east of the existing Pecos Road as well as runoff generated in Pinal County, is diverted along the north side of the existing Pecos Road to Ellsworth Road. At Ellsworth Road this runoff flows north along Ellsworth Road and crosses Ellsworth Road into the Williams Gateway Airport North Perimeter Channel.

HYDRAULIC EVALUATION: This evaluation considers the impact of the proposed channel construction on overtopping flows leaving the channel and continuing west along the historic flow path. Two HEC-RAS models were developed to estimate overtopping flows.

HEC-RAS model *EllsworthChannel.prj (Plan: Final Unplugged Int CIP Q Weir No Berm.p03)* was developed based on proposed channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow leaving the channel and continuing west onto WGA property. The

AMEC Infrastructure, Inc.
4435 East Holmes Avenue
Mesa, Arizona 85206-3372
Tel (480) 830-3700
Fax (480) 830-3903
www.amec.com

lateral weir location is shown on the attached Figure: *Weir Exhibit – Proposed Condition.* The highest ground elevation adjacent to the channel was used as the weir elevation for the proposed condition; this coincided with the top of the WGA access road throughout much of the reach.

HEC-RAS model *EllsworthExistingOT.prj* was developed based on existing channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow overtopping the Ellsworth Road and existing channel. Again, the highest ground elevation adjacent to the existing channel was used as the weir elevation for the existing conditions. This consists of the GM access road at the upstream end of the model and the WGA access road at the downstream end. This is shown on the attached Figure: *Weir Exhibit – Existing Condition.*

RESULTS:

- The existing watershed flow escapes the proposed Ellsworth Channel and continues west onto WGA property from channel station 14451 to channel station 12800 see Figure: *Weir Exhibit – Proposed Condition.* Approximately 1160 cfs escapes to the west. The amount of existing watershed flow crossing existing Ellsworth Road and channel from the same reach, from Pecos road to channel station 12800, is approximately 1780 cfs see Figure: *Weir Exhibit – Existing Condition.* Note that the proposed HEC-RAS Channel Stationing = Existing Channel Stationing – 100, upstream of station 11400, this is accounted for on the attached figures and the attached *Channel Depth Check.xls* Table. The amount of existing watershed flow leaving the proposed channel and continuing west (1160 cfs) is less the existing watershed flow crossing the existing road and channel and continuing west (1780 cfs). Therefore the channel construction does not have a negative impact on overtopping flow to the west as the total amount of flow that escapes is decreased and the extent of the escaping reach is not altered.

- As shown on the attached *Channel Depth Check.xls* Table, although the proposed channel will retain and convey higher flows the computed water surface elevation is decreased throughout the breakout reach (station 14451 to 12800).

- **As shown on the attached *Channel Depth Check.xls* Table, from Channel Station 500+00 to 502+00 the computed water surface elevation for the proposed geometry is less than the computed water surface elevation for the existing geometry. Therefore the proposed berm shown on the Final Improvement Plans is <u>NOT NECESSARY and should NOT be constructed</u>.**

- **As shown on the attached Figures: *Weir Exhibit – Existing Condition* and *Weir Exhibit – Proposed Condition* , the interim condition flow that overtops the control weir and travels westward will follow well defined flow paths parallel to or in-between the existing elevated WGA runways. The channel construction will not change the ultimate path of the overtopping flow when compared to the existing condition.**

Client: Flood Control District of Maricopa County
Project: Ellsworth Channel Design
Design: **Comparison of Magnitude and Location of Flow that will overtop Ellsworth Channel and adjacent high ground and continue towards the west, in both the Existing and Proposed Conditions. Analysis for the proposed conditions assumes that the berm from channel stations 500+00 to 502+00 fails.**

Sheet
Date: 05/16/2005
Checked By:
File Name: CHANNEL DEPTH CHECK.XLS

Conclusion: **The analysis shows that the location of breakout to the west occurs at approximately the same location for both the existing and proposed conditions. Also the total amount of flow that escapes will be reduce from approximately 1800 cfs to 1200 cfs.**
Finally the computed water surface elevation for the proposed condition is consistently lower throughout the overtopping reach (from station 505+00 downstream the flow is contained within the channel for both the existing and proposed conditions).
Note: River Stationing is offset by approximately 100 ft. upstream of RS 11400, this is accounted for in the following tables.

Prepared By: AFC

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

PROPOSED GEOMETRY (See Exhibit for Weir Location)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Freeboard at Left Channel Bank	Weir Flow
		(cfs)	(ft)	(ft)	(ft)	(ft)	(cfs)
14490	47409.16	Lat Struct					
14451	47448.16	342.01	1379.81	1387.3	7.5	0.4	33
14400	47499.16	309.37	1379.77	1387.3	7.5	0.5	64
14300	47599.16	245.87	1379.69	1387.3	7.6	0.3	56
14200	47699.16	190	1379.61	1387.3	7.7	0.2	49
14100	47799.16	140.56	1379.53	1387.3	7.8	0.1	120
14000	47899.16	20.58	1379.45	1387.3	7.8	-0.4	197
13900	47999.16	2330.39	1379.37	1386.8	7.4	0.1	182
13800	48099.16	2148.67	1379.29	1386.7	7.4	0.6	163
13700	48199.16	1985.61	1379.21	1386.6	7.4	0.3	109
13600	48299.16	1876.27	1379.13	1386.53	7.4	0.3	50
13500	48399.16	1825.82	1379.05	1386.43	7.4	0.6	25
13400	48499.16	1800.59	1378.97	1386.33	7.4	0.3	11
13300	48599.16	1789.83	1378.89	1386.24	7.3	0.8	9
13200	48699.16	1780.5	1378.81	1386.15	7.3	-0.4	3
13100	48799.16	1777.05	1378.73	1386.06	7.3	-0.4	0
13000	48899.16	1777.05	1378.65	1385.99	7.3	-0.4	15
12900	48999.16	1761.71	1378.57	1385.9	7.3	-0.4	50
12800	49099.16	1711.4	1378.49	1385.84	7.3	-0.4	20
12700	49199.16	1691.75	1378.41	1385.78	7.4	-0.5	2
12600	49299.16	1690.12	1378.33	1385.75	7.4	-0.5	2
12500	49399.16	1688.5	1378.25	1385.67	7.4	-0.5	0
12400	49499.16	1688.4	1378.17	1385.59	7.4	-0.5	0
12300	49599.16	1688.4	1378.09	1385.52	7.4	-0.5	0
12200	49699.16	1688.4	1378.01	1385.45	7.4	-0.5	0
12100	49799.16	1688.4	1377.93	1385.37	7.4	-0.5	0
12000	49899.16	1688.4	1377.85	1385.3	7.5	-0.6	0
11900	49999.16	1688.4	1377.77	1385.22	7.5	-0.6	0
11800	50099.16	1688.4	1377.69	1385.13	7.4	-0.5	0
11700	50199.16	1688.4	1377.61	1385.06	7.5	-0.5	0
11400	50499.16	1688.4	1377.37	1384.87	7.5	0.12	0
11300	50599.16	1688.4	1377.29	1384.74	7.5	0.51	0
						Total Weir Flow =	1161

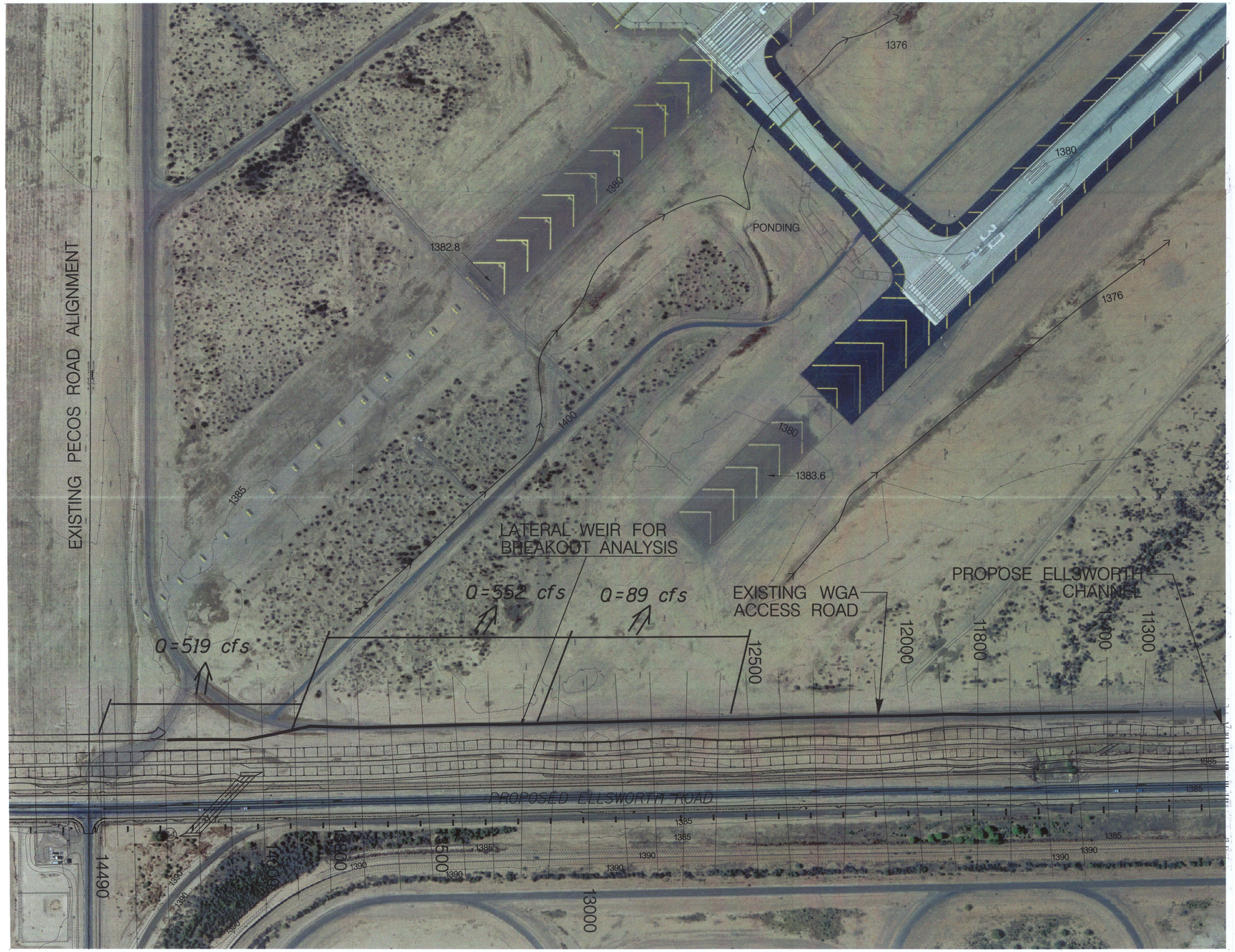
HEC-RAS Project: Ellsworth Existing Channel Overtopping.prj
HEC-RAS Plan: Ellsworth Existing Channel Overtopping.p01

EXISTING GEOMETRY (See Exhibit for Weir Location)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Freeboard at Left Channel Bank	Weir Flow	Prop. Conditions CWSEL - Exist. Conditions CWSEL
		(cfs)	(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)
14200	47699.16	2856	1386.67	1389.63	3.0	0.37	300	-2.3
14100	47799.16	2555.97	1386.59	1389.41	2.8	-0.77	468	-2.1
14000	47899.16	2087.76	1386.04	1389.14	2.8	-0.69	412	-2.3
13900	47999.16	1675.36	1385.46	1388.94	3.1	-1.11	139	-2.2
13800	48099.16	1536.69	1385.56	1388.76	3.5	-0.58	84	-2.2
13700	48199.16	1452.35	1385.4	1388.49	3.2	-0.58	26	-2.0
13600	48299.16	1426.65	1385.38	1388.26	3.1	-0.67	17	-1.8
13500	48399.16	1410.1	1385.13	1387.98	2.9	-0.59	34	-1.7
13400	48499.16	1376.17	1384.9	1387.42	2.8	-0.16	56	-1.2
13300	48599.16	1320.64	1385.24	1387.25	2.5	-0.25	67	-1.1
13200	48699.16	1253.85	1385.08	1387.07	2.0	-0.07	29	-1.0
13100	48799.16	1225.34	1384.85	1386.92	2.0	-0.25	0	-0.9
13000	48899.16	1225.33	1384.52	1386.76	2.1	-0.22	35	-0.9
12900	48999.16	1190.01	1384.43	1386.57	2.2	-0.03	88	-0.7
12800	49099.16	1101.7	1384.28	1386.43	2.1	0.05	23	-0.7
12700	49199.16	1078.86	1383.98	1386.3	2.2	0.1	0	-0.5
12600	49299.16	1078.86	1383.84	1386.19	2.3	0.07	0	-0.5
12500	49399.16	1078.86	1383.86	1386.05	2.4	-0.11	0	-0.5
12400	49499.16	1078.86	1383.77	1385.92	2.2	-0.04	0	-0.4
12300	49599.16	1078.86	1383.65	1385.8	2.2	-0.2	0	-0.3
12200	49699.16	1078.86	1383.48	1385.67	2.1	-0.49	0	-0.3
12100	49799.16	1078.86	1383.31	1385.54	2.2	-0.3	0	-0.2
12000	49899.16	1078.86	1383.37	1385.42	2.2	-0.36	0	-0.2
11900	49999.16	1078.86	1383.28	1385.29	2.1	-0.29	0	-0.2
11800	50099.16	1078.86	1383.45	1385.18	2.0	-0.1	0	-0.1
11400	50499.16	1078.86	1380.34	1384.32	4.0	0.68	0	0.5
11300	50599.16	1078.86	1380.16	1383.81	3.6	1.09	0	0.9
						Total Weir Flow =	1777	

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927		130	

☐ **REMOVAL /RELOCATE** ☐



50 0 50 100 150 200 300
Scale In Feet

CONTOUR INTERVAL = 1 FOOT

NO.	REVISION	BY	DATE
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	ALEX CORONEL	05/17/05
DRAWN	JIM EDISON	05/17/05
CHECKED		

Registered Professional Engineer (Civil) CERTIFICATE NO. 21674 ROBERT L. DAVIES Date Signed ARIZONA U.S.A.

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499

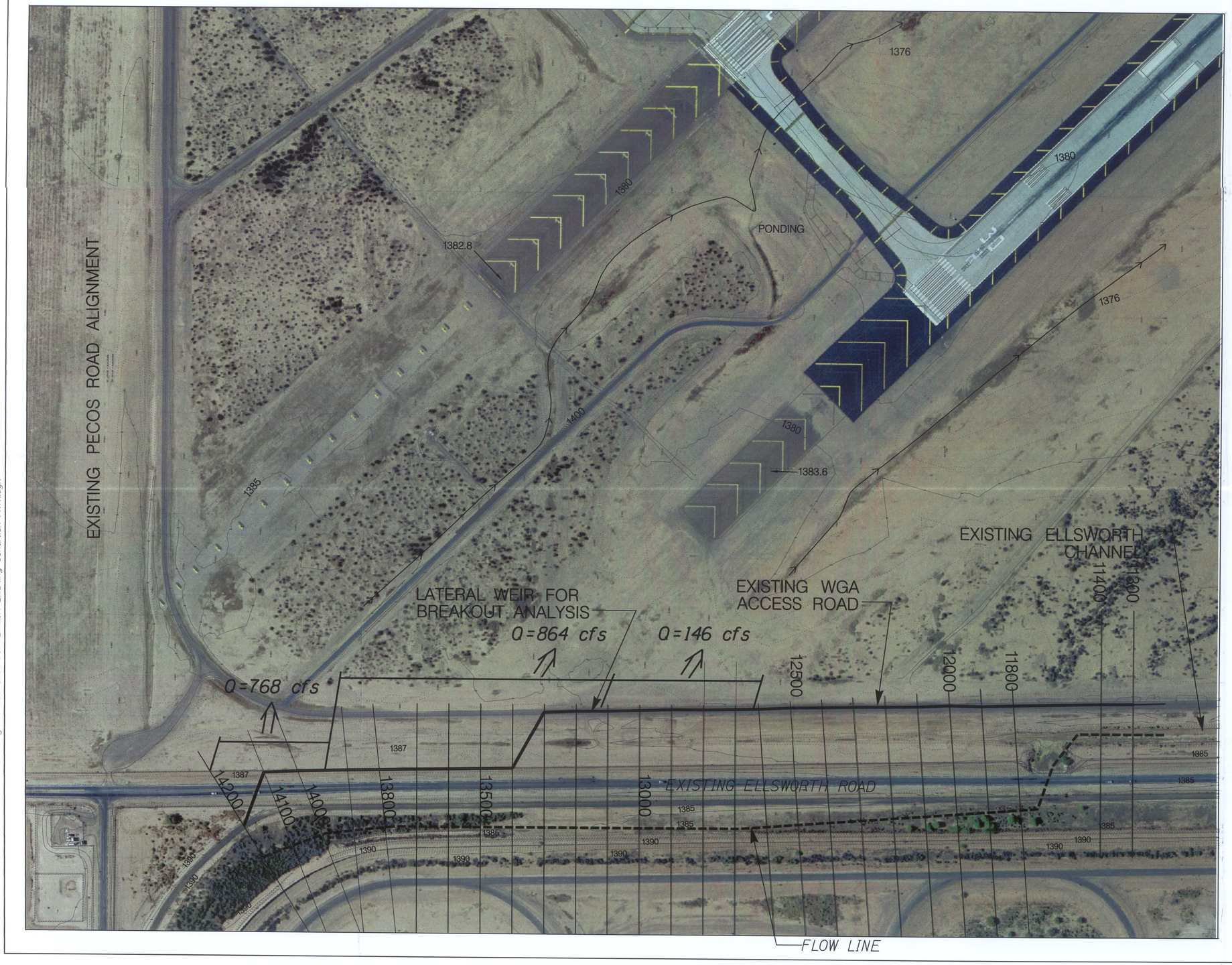
WEIR EXHIBIT PROPOSE CONDITION

SHEET 1 OF 1

TRACS NO.

English

S:\Working\Alex Coronel\Weir Exhibit-Propose Condition-Path of Over topping.dgn 07/20/2005 7:13:48 AM



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927		130	

☐ **REMOVAL /RELOCATE** ☐

N

50 0 50 100 150 200 300
Scale In Feet

CONTOUR INTERVAL = 1 FOOT

NO.	REVISION	BY	DATE
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	ALEX CORONEL	05/17/05
DRAWN	JIM EDISON	05/17/05
CHECKED		

Registered Professional Engineer (Civil) CERTIFICATE NO. 21674 ROBERT L. DAVIES Date Signed ARIZONA U.S.A.

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499

WEIR EXHIBIT-EXISTING CONDITION

SHEET 1 OF 1

TRACS NO.

usigEn

S:\Working\Alex Coronel\Weir Exhibit-Existing Condition-PATHdgn 7:10:34 AM 07/20/2005

SEE ADDITIONAL INFO BETWEEN RED SHEETS IN FRONT OF THIS MEMORANDUM

Design Memorandum
For Ellsworth Channel Overtopping

November 28, 2004
Revised: May 19, 2005

PURPOSE: The purpose of this memorandum is to document the evaluation of the proposed Ellsworth Channel design to ensure that the new channel, which is designed for developed watershed conditions runoff, will not make flooding conditions worse during a 100-year storm event under existing watershed conditions. The evaluation is focused on the channel reach from existing Pecos Road alignment extending from approximately 3200 feet north of the existing Pecos Road.

HYDROLOGY: The developed watershed peak discharges are significantly lower than the peak discharges under existing watershed conditions due to on-site retention requirements imposed on new development. Of greater impact in this area is the impact of the proposed Pecos detention basins planned at the Maricopa / Pinal county boundary (east Mesa ADMP). The developed conditions channel design discharge at existing Pecos Road is 600 cfs. The existing conditions peak discharge at the same location is 2858 cfs.

The East Mesa ADMP existing conditions hydrology model shows runoff generated south of existing Pecos Road, draining west to Ellsworth Road, crossing Ellsworth Road and continuing west along the Pecos Road alignment. Runoff generated north of the existing Pecos Road as well as runoff generated in Pinal County, is diverted along the north side of the existing Pecos Road to Ellsworth Road. At Ellsworth Road this runoff flows north along Ellsworth Road and crosses Ellsworth Road into the Williams Gateway Airport North Perimeter Channel.

This evaluation considers the impact of the channel construction on overtopping flows leaving the channel and continuing west along the historic flow path. Two HEC-RAS models were developed to estimate overtopping flows.

HEC-RAS model *EllsworthChannel.prj (Plan: Final Unplugged Int CIP Q Weir No Berm.p03)* was developed based on proposed channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow leaving the channel and continuing west onto WGA property. The lateral weir location is shown on the attached Figure: *Weir Exhibit – Proposed Condition"*. The highest ground elevation adjacent to the channel was used as the weir elevation, for the proposed condition this coincided with the top of the WGA access road throughout much of the reach.

HEC-RAS model E*llsworthExistingOT.prj* was developed based on existing channel and road geometry. HEC-RAS lateral weir routing was used to estimate the flow overtopping the Ellsworth Road and existing channel. Again the highest ground

Client:	Flood Control District of Maricopa County	Sheet	
Project	Ellsworth Channel Design	Date:	05/16/2005
Design:	**Comparison of Magnitude and Location of Flow that will overtop Ellsworth Channel and adjacent high ground and continue towards the west, in both the Existing and Proposed Conditions. Analysis for the proposed conditions assumes that the berm from channel stations 500+00 to 502+00 fails.**	Checked By:	
		File Name:	CHANNEL DEPTH CHECK.XLS
Conclusion:	**The analysis shows that the location of breakout to the west occurs at approximately the same location for both the existing and proposed conditions. Also the total amount of flow that escapes will be reduce from approximately 1800 cfs to 1200 cfs. Finally the computed water surface elevation for the proposed condition is consistently lower throughout the overtopping reach (from station 505+00 downstream the flow is contained within the channel for both the existing and proposed conditions). Note: River Stationing is offset by approximately 100 ft. upstream of RS 11400, this is accounted for in the following tables.**		
Prepared By:	AFC		

HEC-RAS Project: Ellsworth Channel.prj
HEC-RAS Plan: Final Unplugged Int CIP Q Weir No Berm.p03

PROPOSED GEOMETRY (See Exhibit for Weir Location)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Freeboard at Left Channel Bank	Weir Flow
		(cfs)	(ft)	(ft)	(ft)	(ft)	(cfs)
14490	47409.16	Lat Struct					
14451	47448.16	342.01	1379.81	1387.3	7.5	0.4	33
14400	47499.16	309.37	1379.77	1387.3	7.5	0.5	64
14300	47599.16	245.87	1379.69	1387.3	7.6	0.3	56
14200	47699.16	190	1379.61	1387.3	7.7	0.2	49
14100	47799.16	140.56	1379.53	1387.3	7.8	0.1	120
14000	47899.16	20.58	1379.45	1387.3	7.8	-0.4	197
13900	47999.16	2330.39	1379.37	1386.8	7.4	0.1	182
13800	48099.16	2148.67	1379.29	1386.7	7.4	0.6	163
13700	48199.16	1985.61	1379.21	1386.6	7.4	0.3	109
13600	48299.16	1876.27	1379.13	1386.53	7.4	0.3	50
13500	48399.16	1825.82	1379.05	1386.43	7.4	0.6	25
13400	48499.16	1800.59	1378.97	1386.33	7.4	0.3	11
13300	48599.16	1789.83	1378.89	1386.24	7.3	0.8	9
13200	48699.16	1780.5	1378.81	1386.15	7.3	-0.4	3
13100	48799.16	1777.05	1378.73	1386.06	7.3	-0.4	0
13000	48899.16	1777.05	1378.65	1385.99	7.3	-0.4	15
12900	48999.16	1761.71	1378.57	1385.9	7.3	-0.4	50
12800	49099.16	1711.4	1378.49	1385.84	7.3	-0.4	20
12700	49199.16	1691.75	1378.41	1385.78	7.4	-0.5	2
12600	49299.16	1690.12	1378.33	1385.75	7.4	-0.5	2
12500	49399.16	1688.5	1378.25	1385.67	7.4	-0.5	0
12400	49499.16	1688.4	1378.17	1385.59	7.4	-0.5	0
12300	49599.16	1688.4	1378.09	1385.52	7.4	-0.5	0
12200	49699.16	1688.4	1378.01	1385.45	7.4	-0.5	0
12100	49799.16	1688.4	1377.93	1385.37	7.4	-0.5	0
12000	49899.16	1688.4	1377.85	1385.3	7.5	-0.6	0
11900	49999.16	1688.4	1377.77	1385.22	7.5	-0.6	0
11800	50099.16	1688.4	1377.69	1385.13	7.4	-0.5	0
11700	50199.16	1688.4	1377.61	1385.06	7.5	-0.5	0
11400	50499.16	1688.4	1377.37	1384.87	7.5	0.12	0
11300	50599.16	1688.4	1377.29	1384.74	7.5	0.51	0
						Total Weir Flow =	1161

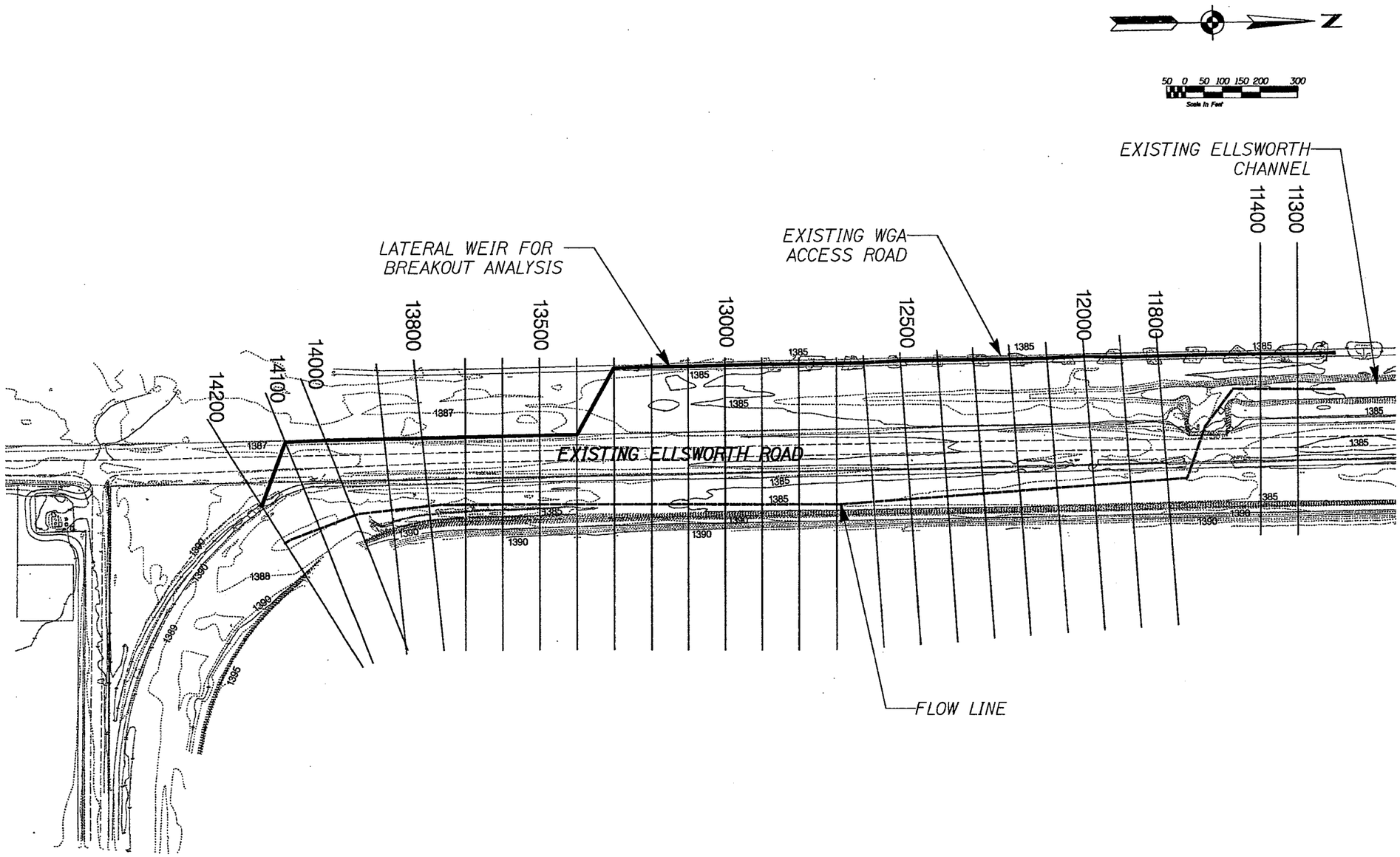
HEC-RAS Project: Ellsworth Existing Channel Overtopping.prj
HEC-RAS Plan: Ellsworth Existing Channel Overtopping.p01

EXISTING GEOMETRY (See Exhibit for Weir Location)

River Station	Channel Station	Q Total	Min Ch El	W.S. Elev	Flow Depth	Freeboard at Left Channel Bank	Weir Flow	Prop. Conditions CWSEL - Exist. Conditions CWSEL
		(cfs)	(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)
14200	47699.16	2856	1386.67	1389.63	3.0	0.37	300	-2.3
14100	47799.16	2555.97	1386.59	1389.41	2.8	-0.77	468	-2.1
14000	47899.16	2087.76	1386.04	1389.14	2.8	-0.69	412	-2.3
13900	47999.16	1675.36	1385.46	1388.94	3.1	-1.11	139	-2.2
13800	48099.16	1536.69	1385.56	1388.76	3.5	-0.58	84	-2.2
13700	48199.16	1452.35	1385.4	1388.49	3.2	-0.58	26	-2.0
13600	48299.16	1426.65	1385.38	1388.26	3.1	-0.67	17	-1.8
13500	48399.16	1410.1	1385.13	1387.98	2.9	-0.59	34	-1.7
13400	48499.16	1376.17	1384.9	1387.42	2.8	-0.16	56	-1.2
13300	48599.16	1320.64	1385.24	1387.25	2.5	-0.25	67	-1.1
13200	48699.16	1253.85	1385.08	1387.07	2.0	-0.07	29	-1.0
13100	48799.16	1225.34	1384.85	1386.92	2.0	-0.25	0	-0.9
13000	48899.16	1225.33	1384.52	1386.76	2.1	-0.22	35	-0.9
12900	48999.16	1190.01	1384.43	1386.57	2.2	-0.03	88	-0.7
12800	49099.16	1101.7	1384.28	1386.43	2.1	0.05	23	-0.7
12700	49199.16	1078.86	1383.98	1386.3	2.2	0.1	0	-0.5
12600	49299.16	1078.86	1383.84	1386.19	2.3	0.07	0	-0.5
12500	49399.16	1078.86	1383.86	1386.05	2.4	-0.11	0	-0.5
12400	49499.16	1078.86	1383.77	1385.92	2.2	-0.04	0	-0.4
12300	49599.16	1078.86	1383.65	1385.8	2.2	-0.2	0	-0.3
12200	49699.16	1078.86	1383.48	1385.67	2.1	-0.49	0	-0.3
12100	49799.16	1078.86	1383.31	1385.54	2.2	-0.3	0	-0.2
12000	49899.16	1078.86	1383.37	1385.42	2.2	-0.36	0	-0.2
11900	49999.16	1078.86	1383.28	1385.29	2.1	-0.29	0	-0.2
11800	50099.16	1078.86	1383.45	1385.18	2.0	-0.1	0	-0.1
11400	50499.16	1078.86	1380.34	1384.32	4.0	0.68	0	0.5
11300	50599.16	1078.86	1380.16	1383.81	3.6	1.09	0	0.9
						Total Weir Flow =	1777	

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927		130	

☐ REMOVAL /RELOCATE ☐



NO.	REVISION	BY	DATE
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	ALEX CORONEL	05/17/05
DRAWN	Jim EDISON	05/17/05
CHECKED		

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499

WEIR EXHIBIT-EXISTING CONDITION

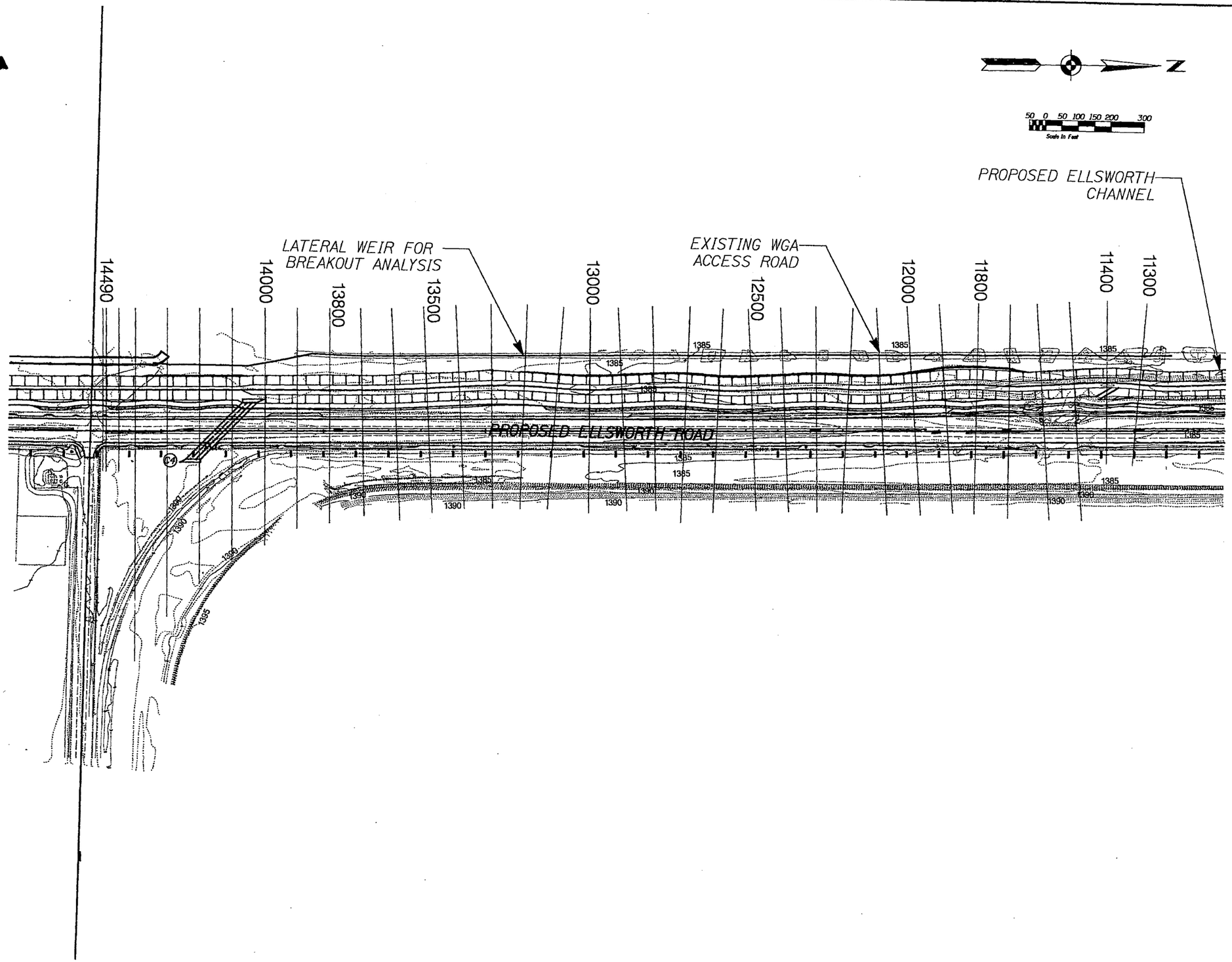
SHEET 1 OF 1

TRACS NO.

S:\Working\Alex Coronel\Weir Exhibit-Existing Condition.dgn

05/19/2005 PM

English



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	68927		130	

☐ REMOVAL /RELOCATE ☐

NO.	REVISION	BY	DATE
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

ELLSWORTH ROAD
GERMANN RD TO RAY RD
PROJECT NO. 68927

	BY	DATE
DESIGNED	ALEX CORONEL	08/31/05
DRAWN	JIM EDISON	08/31/05
CHECKED		

AMEC Infrastructure, Inc.
2001 WEST CAMELBACK ROAD, SUITE 300
PHOENIX, ARIZONA 85015
PHONE (602) 343-2400
FAX (602) 343-2499

amec

WEIR EXHIBIT-PROPOSED CONDITION

SHEET 1 OF 1

TRACS NO.

S:\Working\Alex Coronel\Weir Exhibit-Propose Conditionedgn

PN

05/19/2005

English

```
                    HEC-RAS Version 3.1.2 April 2004
                      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: Ellsworth Existing Channel Overtopping
Project File : EllsworthExistingOT.prj
Run Date and Time: 05/19/2005 8:46:21 PM

Project in English units

Project Description:
Existing Ellsworth Channel Overtopping

****

PLAN DATA

Plan Title: Existing Ellsworth Channel Overtopping
Plan File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthExistingOT.p01

Geometry Title: Existing Ellsworth Channel
Geometry File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthExistingOT.g01

Flow Title : existing condition flow
Flow File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthExistingOT.f02

Plan Description:
Existing Ellsworth Channel:
Existing Channel Geometry
Interim CIP flow
Condition
Lateral Weir Used to compute flow that breaks to the east adjacent
to the WGA Property (See Exhibit in Drainage Report for weir location).

Plan Summary Information:

Number of:	Cross Sections	= 27	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	1

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

****

FLOW DATA

Flow Title: existing condition flow
Flow File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthExistingOT.f02

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER1	EXIST	14200	2856

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER1	EXIST	PF 1		Normal S = 0.0049

GEOMETRY DATA

Geometry Title: Existing Ellsworth Channel
Geometry File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthExistingOT.g01

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 14200

INPUT
Description:
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
265.78	1390	273.61	1390	276.66	1389.6	281.63	1389	282.06	1389
287.64	1388.41	288.02	1388.36	289.64	1388.3	294.43	1388.13	298.03	1388
298.41	1387.99	301.09	1387.89	301.79	1387.92	303.58	1388	305.61	1388.07
311.06	1388.22	311.81	1388.15	312.25	1388.11	313.01	1388.03	313.27	1388
314.07	1387.91	314.54	1387.85	317.48	1387.45	322.78	1387.45	327.62	1387.47
342.42	1387.46	353.71	1387.5	361.16	1387.55	371.14	1387.13	374.36	1387
383.67	1386.7	385.09	1386.67	408.81	1386.99	409.74	1387	413.25	1387.05
414.83	1387.07	473.19	1388	485.23	1388.88	486.62	1389	487.09	1389.25
488.42	1390	489.53	1390.58	490.33	1391	491.41	1391.59	492.19	1392
492.8	1392.33	493.68	1392.81	494.03	1393	495.42	1393.47	496.49	1394
498.3	1394.28	503.59	1394.54	508.15	1394.64	510.55	1395	516.62	1395.93

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
265.78	.04	273.61	.04	488.42	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
273.61	488.42		129.01	100	79.86	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
265.78	265.78	1390	F

LATERAL STRUCTURE

RIVER: RIVER1
REACH: EXIST RS: 14199

INPUT
Description:
Lateral structure position = Left overbank
Distance from Upstream XS = 0
Deck/Roadway Width = 10
Weir Coefficient = 2
Weir Flow Reference = Energy Grade
Weir Embankment Coordinates num = 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390	129.01	1387.84	229.33	1387.7	367.26	1388.25	467.59	1388.28
580.63	1388.38	680.65	1388.34	780.67	1388	880.69	1387.41	980.71	1386.88
1080.73	1386.66	1180.75	1387	1280.77	1387	1380.79	1386	1480.81	1386
1580.83	1386.5	1670	1386.4	1770.14	1386.4	1870.28	1386.5	1970.46	1386.5
2070.7	1386.7	2170.94	1386.8	2271.18	1387	2371.42	1387.1	2501.37	1387
2776.37	1387.1	2876.39	1387.1						

Weir crest shape = Broad Crested

LATERAL STRUCTURE OUTPUT Profile #PF 1 Lat Struct

E.G. US. (ft)	1390.32	Weir Sta US (ft)	0.00
W.S. US. (ft)	1389.63	Weir Sta DS (ft)	1557.64
E.G. DS (ft)	1384.22	Weir Max Depth (ft)	1.84
W.S. DS (ft)	1383.81	Weir Avg Depth (ft)	0.64
Q US (cfs)	2856.00	Weir Submerg	0.00
Q Leaving Total (cfs)	1777.75	Min El Weir Flow (ft)	1386.00
Q DS (cfs)	1078.86	Wr Top Wdth (ft)	1435.26
Perc Q Leaving	62.22	Q Gate Group (cfs)	
Q Weir (cfs)	1777.75	Gate Open Ht (ft)	
Q Gates (cfs)		Gate #Open	
Q Culv (cfs)		Gate Area (sq ft)	
Q Lat RC (cfs)		Gate Submerg	
Weir Flow Area (sq ft)	917.00	Gate Invert (ft)	

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 14100

INPUT
Description:
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
139.39	1387.84	142.68	1387.67	147.3	1387.44	148.22	1387.39	149	1387.21
149.89	1387	152.29	1386.44	152.98	1386.28	161.43	1386.51	162.04	1386.53
162.3	1386.54	169.28	1386.85	169.4	1386.86	169.54	1386.86	169.7	1386.87
170.27	1386.88	182.04	1387.23	183.68	1387.22	203.17	1387.15	218.43	1387.14
220.29	1387.04	220.97	1387	222.01	1386.95	226.1	1386.77	237.02	1386.49
240.61	1386.36	242.63	1386.96	242.78	1387	242.94	1387.05	243.67	1387.26
244.04	1387.38	254.38	1387.67	257.29	1388.64	266.28	1388.23	272.15	1388
273.56	1388	280.46	1387.42	281.61	1387.35	284.31	1387.11	286.27	1387.06
288.05	1387.04	291.81	1387.05	295.8	1387.05	304.22	1387.05	306.2	1387.06
307.7	1387.09	308.47	1387.09	309.22	1387.1	309.92	1387.1	318.51	1387.31
319.18	1387.34	320.21	1387.35	320.94	1387.39	321.85	1387.4	322.65	1387.44
323.59	1387.48	324.27	1387.49	325.28	1387.55	326.12	1387.58	327.11	1387.63
328.29	1387.68	328.4	1387.68	329.03	1387.71	329.7	1387.69	330.94	1387.66
331.26	1387.64	332.39	1387.62	333.31	1387.59	334.19	1387.58	334.87	1387.55
335.65	1387.54	336.33	1387.54	337.16	1387.49	338.24	1387.49	339.18	1387.43
339.57	1387.43	340.67	1387.35	340.92	1387.34	342.13	1387.25	342.23	1387.24
342.96	1387.18	344.11	1387.2	346.29	1387.22	349.6	1387.29	352.02	1387.33
354.83	1387.38	355.71	1387.39	356.22	1387.4	360.2	1387.52	367.62	1387.06
368.55	1387	370.16	1386.9	371.7	1386.8	375.12	1386.59	431.29	1387.59
435.52	1387.66	436.58	1387.68	437.49	1387.7	438.99	1387.72	439.62	1387.73
452.31	1387.96	452.82	1387.97	453.8	1388	455.06	1388.26	468.77	1389.89
469.45	1390.04	469.57	1390.07	475.97	1391.04	477.33	1391.25	489.56	1393.1
502.57	1395.08	505.95	1395.59						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
139.39	.025	257.29	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
257.29	468.77	100.32	100	100.59	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
139.39	257.79	1388.65	F

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 14000

INPUT
Description:
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

175.93	1387.7	184.18	1387.46	185.51	1387.15	186.17	1387	188.3	1386.52
189.6	1386.22	199.99	1386.8	204.2	1387.01	204.32	1387.02	212.14	1387.07
218.65	1387.13	237.5	1387.22	253.24	1387.07	253.82	1387.01	253.98	1387
259.51	1386.48	260.94	1386.35	269.78	1386.03	270.33	1386.13	274.48	1386.86
285	1387.08	287.73	1387.13	289.77	1387.18	291.06	1387.64	292.13	1388
292.53	1388.15	293.36	1388.45	297.9	1388.07	298.8	1388	310.84	1387
316.17	1386.56	316.73	1386.51	317.77	1386.42	321.59	1386.04	323.56	1386.06
325.13	1386.07	328	1386.3	331.96	1386.63	336.64	1386.72	337.11	1386.72
337.63	1386.73	338.22	1386.74	339	1386.76	340.06	1386.77	346.03	1386.88
348.86	1386.92	350.38	1386.95	351.95	1386.97	353.59	1387	354.07	1387.01
356.15	1387.04	359.02	1387.09	366.87	1387.21	367.33	1387.21	367.99	1387.22
406.75	1387.54	416.49	1387.78	432.51	1387.93	438.41	1387.97	439.48	1388
457.95	1388.63	462.21	1388.79	462.6	1388.96	462.69	1389	463.77	1389.47
464.97	1390	466.42	1390.63	467.25	1391	468	1391.33	468.15	1391.39
469.53	1392	471.31	1392.78	471.81	1393	472.15	1393	473.3	1393.37
474.19	1393.54	475.23	1393.72	476.93	1394	478.42	1394.21	479.06	1394.33
481.52	1394.69	483.24	1395	483.44	1395	484.03	1395.01	490.13	1395.08
491.12	1395.17	492.66	1394.9	515.45	1392.26	519.13	1392.07	522.5	1391.95
529.16	1391.78	532.8	1391.74	535.93	1391.74	543.14	1391.65	546.24	1391.6
559.65	1391.4	560.66	1391.39	562.61	1391.42	636.83	1392.7	658.81	1392.71
661.46	1392.69	662.76	1392.69	664.03	1392.68	664.97	1392.72	685.2	1392.72
686.31	1392.71	686.97	1392.7	687.35	1392.7	689.42	1392.68	690.44	1392.66
696.93	1392.62	698.07	1392.61	700.31	1392.61	701.4	1392.6	766.08	1389.52
775.08	1389.45	776.54	1389.46	777.98	1389.48	780	1389.5		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
175.93	.025	293.36	.04	462.21	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
293.36	462.21	137.93	100	76.1	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
175.93	293.64	1388.41	F

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13900

INPUT
Description:
Station Elevation Data num= 191

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
199.14	1388.25	200.97	1388.11	202.52	1388	206.41	1387.69	208.75	1387.08
209.07	1387	209.32	1386.94	212.29	1386.13	224.18	1386.57	226.33	1386.66
227.67	1386.69	230.04	1386.75	231.71	1386.8	239.38	1387	239.56	1387
243.96	1386.97	244.91	1386.97	245.49	1386.96	254.51	1386.91	267.04	1386.88
269.48	1386.88	271.82	1386.71	275.28	1386.45	284.89	1386.05	286.04	1386
287.24	1385.95	290.56	1385.8	291.08	1385.94	291.28	1386	294.68	1386.9
295.05	1387	295.2	1387.04	295.52	1387.12	296.76	1387.2	306.91	1387.83
314.42	1387.29	318.63	1387	320.48	1387	323.65	1386.76	331.61	1386.17
333.5	1386	333.78	1386	339.51	1385.55	340.52	1385.48	340.77	1385.46
340.88	1385.47	341.05	1385.48	344.96	1385.72	346.64	1386	351.13	1386.79
352.39	1386.8	362.75	1386.9	363.86	1386.96	364.46	1387	370.38	1387.51
372.61	1387.73	396.13	1387.03	396.19	1387.02	406.29	1387.23	406.66	1387.24
410.26	1387.32	410.43	1387.31	411.54	1387.31	411.81	1387.3	412.23	1387.31
413.09	1387.31	413.52	1387.32	413.95	1387.32	414.37	1387.33	414.8	1387.33
415.83	1387.28	416.81	1387.26	416.99	1387.25	417.47	1387.24	417.69	1387.23
418.13	1387.22	419.68	1387.18	419.83	1387.17	419.88	1387.15	419.97	1387.1
420.16	1387	420.22	1386.96	420.32	1386.89	420.58	1386.72	420.75	1386.6
420.87	1386.52	420.96	1386.45	421.04	1386.4	421.1	1386.35	421.16	1386.31
421.56	1386	423.04	1385.19	423.2	1385.11	423.34	1385	423.52	1384.94
424.24	1384.71	425.46	1384.63	426.48	1384.54	429.84	1384.9	430.17	1384.94
430.72	1385	431.24	1385.06	431.64	1385.1	431.86	1385.12	431.99	1385.14
432.08	1385.15	432.15	1385.16	432.23	1385.16	432.3	1385.17	432.41	1385.18
432.53	1385.2	432.7	1385.21	433.32	1385.26	437.81	1385.66	438.22	1385.89
438.4	1386	439.14	1386.48	439.73	1386.85	439.96	1387	440.82	1387.55
441.01	1387.68	441.15	1387.74	442.63	1388.38	443.87	1388.92	444.05	1389
445.55	1389.65	446.34	1390	448.21	1390.82	448.64	1391	448.91	1391.12
452.81	1392.82	453.23	1393	454.92	1393.73	455.55	1394	455.93	1394.16
457.4	1394.79	467.54	1394.98	468.47	1395	471.2	1395.05	471.52	1395.06
471.8	1395	476.39	1394.04	476.6	1394	477.43	1393.83	478.14	1393.67

479	1393.49	481.32	1393	481.57	1392.95	482.02	1392.85	484.2	1392.39
484.85	1392.25	486.03	1392	486.67	1391.87	490.05	1391.15	490.89	1391.1
491.18	1391.08	491.6	1391.06	492.91	1390.99	493.89	1390.94	494.3	1390.92
494.46	1390.91	494.84	1390.89	494.94	1390.89	495.13	1390.9	495.2	1390.91
509.55	1390.77	510.88	1390.76	511.75	1390.77	512.61	1390.79	513.45	1390.8
607.45	1392.4	608.61	1392.4	609.95	1392.41	633.95	1392.47	635.54	1392.46
637.11	1392.46	638.65	1392.45	640.16	1392.45	641.28	1392.49	665.01	1392.54
666.3	1392.53	667.07	1392.53	667.51	1392.52	671.09	1392.49	678.57	1392.46
683.69	1392.46	755.41	1389.52	765.87	1389.45	767.56	1389.46	769.22	1389.48
780	1389.58								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
199.14	.025	306.91	.04	441.15	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
306.91	441.15	100.33	100	100.1	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
400	780	1385.92

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13800

INPUT
Description:
Station Elevation Data num= 153

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
205.85	1388.28	207.72	1388.13	211.5	1387.85	214.49	1387.64	216.08	1387.22
216.93	1387	219.85	1386.27	220.9	1386	221.29	1385.91	221.43	1385.88
224.38	1385.98	224.72	1385.99	224.92	1386	233	1386.28	235.88	1386.37
247.53	1386.91	261.51	1386.87	273.06	1386.87	275.82	1386.86	277.13	1386.79
283.09	1386.45	293	1386.06	294.4	1386	295.58	1385.96	296.04	1385.94
299.71	1385.82	300.04	1385.93	300.24	1386	303.04	1386.97	303.16	1387.01
304.02	1387.33	306.36	1387.5	312.78	1388	315.38	1388.18	323.53	1387.5
329.69	1387	330.09	1386.97	333.75	1386.69	342.52	1386	344.47	1385.82
346.07	1385.69	349.37	1385.61	353.1	1385.57	353.41	1385.56	353.48	1385.58
354.98	1386	357.27	1386.61	357.73	1386.73	369.09	1386.84	371.34	1386.92
373.3	1387	380.17	1387.3	384	1387	384.09	1387	388.39	1386.7
395.91	1386.83	396.59	1386.84	397.38	1386.85	398.34	1386.86	404.75	1386.96
406.43	1386.98	407.73	1387	408.22	1387.01	409.19	1387.02	409.49	1387.02
410.29	1386.49	410.79	1386.15	411.02	1386	411.23	1385.86	412.48	1385
413.16	1384.53	413.94	1384	414.61	1383.54	415.24	1383.11	419.64	1383.08
420.06	1383.07	426.34	1383.58	426.53	1383.73	426.89	1384	429.55	1386
430.89	1387	431.44	1387.4	431.87	1387.7	432.01	1387.8	432.12	1387.89
432.41	1388	434.62	1388.9	434.88	1389	435.09	1389.09	435.26	1389.16
436.9	1389.82	437.35	1390	437.44	1390.03	440.84	1391.41	442.32	1392
444.8	1393	445.21	1393.17	448.18	1394.36	449.02	1394.7	452.3	1394.79
453.78	1394.82	460.84	1395	460.9	1395	461.28	1395.01	461.42	1394.98
470.81	1393.03	470.95	1393	475.31	1392.09	475.72	1392	476.98	1391.74
478.2	1391.48	479.75	1391.39	483.33	1391.2	483.43	1391.19	484.72	1391
485.2	1391	487.2	1390.8	487.48	1390.8	488.81	1390.69	488.92	1390.67
539.32	1391.53	540.7	1391.53	542.27	1391.54	570.55	1391.61	572.42	1391.6
574.27	1391.6	577.87	1391.58	579.19	1391.63	607.15	1391.69	608.67	1391.69
609.58	1391.68	610.1	1391.68	611.52	1391.66	614.32	1391.64	623.12	1391.6
629.17	1391.6	679.57	1389.53	686.57	1389.49	688.28	1389.47	691.65	1389.45
712.44	1389.65	713.91	1389.67	715.36	1389.68	716.92	1389.68	718.46	1389.67
760.56	1389.15	760.83	1389.14	762.65	1389.12	764.62	1389.09	765.85	1389.11
767.02	1389.12	769.51	1389.15	780	1389.21				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
205.85	.025	315.38	.04	432.41	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
315.38	432.41	113.04	100	92.22	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
400	780	1385.81

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13700

INPUT
Description:
Station Elevation Data num= 164

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
207.46	1388.38	217.24	1387.4	217.36	1387.39	218.69	1387	222.29	1386.09
222.64	1386	223.35	1385.83	224.09	1385.86	227.43	1386	237.25	1386.34
241.31	1386.5	249.2	1386.83	257.53	1386.8	262.95	1386.79	272.4	1386.73
276.9	1386.71	283.98	1386.35	284.67	1386.31	301.86	1385.73	302.61	1386
302.72	1386.03	305.57	1387	305.73	1387.04	306.04	1387.1	306.62	1387.12
307.46	1387.16	311.25	1387.46	316.65	1387.91	329.4	1387.16	345.93	1386.2
349.52	1386	349.62	1385.99	351.77	1385.78	354.55	1385.5	355.56	1385.4
355.91	1385.5	356.43	1385.65	357.65	1386	358.78	1386.32	360.24	1386.75
370.13	1387	370.82	1387	375.87	1387.14	376.06	1387.14	376.47	1387.15
384.87	1387.37	385.76	1387.21	386.35	1387.1	386.91	1387	387.21	1386.95
387.78	1386.84	388.22	1386.76	388.84	1386.65	389.45	1386.55	389.86	1386.48
390.22	1386.43	391.55	1386.22	394.78	1386.48	400.01	1387	400.76	1387
401.39	1387.04	404.06	1387.28	404.35	1387.08	404.46	1387	405.65	1386.16
405.88	1386	406.93	1385.23	407.24	1385	407.6	1384.73	408.56	1384
409.8	1383.06	409.92	1382.97	410.58	1382.46	415.15	1382.25	415.97	1382.21
416.76	1382.29	421	1382.78	421.27	1382.95	421.34	1383	424.34	1385
425.68	1385.89	425.84	1386	426.68	1386.55	426.95	1386.73	427.37	1387
427.55	1387.12	428.21	1387.55	428.29	1387.6	429.25	1388	430.58	1388.55
431.68	1389	432.86	1389.48	433.78	1389.86	434.11	1390	434.42	1390.13
438.85	1391.95	438.97	1392	439.07	1392.04	443.83	1394	444.09	1394.11
444.81	1394.4	445.38	1394.64	448.89	1394.77	455.54	1395	457.26	1395.06
457.35	1395.04	457.52	1395	459.66	1394.5	464.49	1393.36	466.04	1393
470.3	1392	472.02	1391.6	472.98	1391.37	474	1391.13	474.51	1391.1
474.77	1391.08	475.2	1391.05	475.8	1391.01	476.01	1391	477.51	1390.9
478.17	1390.86	478.47	1390.84	478.7	1390.82	479.27	1390.79	479.35	1390.79
479.47	1390.78	479.61	1390.78	508.56	1390.86	510.85	1390.85	513.1	1390.85
515.31	1390.84	517.47	1390.84	519.07	1390.9	552.89	1390.99	554.71	1390.99
555.81	1390.98	556.43	1390.98	558.14	1390.96	561.5	1390.94	572.06	1390.91
579.28	1390.91	615.63	1389.54	619.88	1389.52	621.97	1389.5	630.14	1389.46
632.48	1389.47	654.98	1389.67	658.45	1389.71	660.31	1389.7	662.14	1389.7
711.9	1389.12	712.22	1389.12	716.67	1389.06	719.48	1389.1	722.4	1389.12
758.57	1389.32	760.42	1389.27	762.26	1389.23	764.09	1389.18	765.64	1389.15
765.91	1389.14	767.72	1389.1	769.51	1389.05	780	1389.16		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
207.46	.025	316.65	.04	429.25	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
316.65	429.25	100.02	100	100.1	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
400	780	1385.7

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13600

INPUT
Description:
Station Elevation Data num= 140

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
205.4	1388.34	206.55	1388.22	208.51	1388	216.06	1387.17	216.45	1387.05
216.62	1387	220.06	1386	220.87	1385.76	221.37	1385.62	223.31	1385.68
237.74	1386.18	237.86	1386.18	238.05	1386.19	247.13	1386.56	260.79	1386.57
273.76	1386.66	275.13	1386.66	276.1	1386.61	284.59	1386.2	287.21	1386.09
289.24	1386	300.02	1385.54	301.34	1385.96	301.48	1386	304.89	1386.91
305.46	1386.93	306.75	1387	311.04	1387.3	314.98	1387.59	319.03	1387.34
320.4	1387.26	324.54	1387	325.52	1386.94	338.37	1386.11	340.93	1385.95
343.49	1385.78	345.58	1385.65	349.09	1385.52	352.52	1385.38	355.65	1385.98

355.75	1386	356.26	1386.09	357.15	1386.25	365.52	1386.42	366.85	1386.45
367.2	1386.45	367.49	1386.46	367.81	1386.46	368.2	1386.45	377.62	1386.36
384.66	1386.6	400.16	1386.97	401.31	1386.97	401.51	1386.75	401.82	1386.41
402.18	1386	402.5	1385.65	403.08	1385	403.77	1384.24	403.99	1384
404.04	1383.94	404.9	1383	405.11	1382.77	405.61	1382.24	408.64	1382.1
411.26	1382	411.94	1381.97	412.58	1381.94	412.92	1381.96	413.48	1382
417.92	1382.29	418.2	1382.31	419.37	1382.39	419.6	1382.59	420.52	1383.41
421.17	1384	421.68	1384.46	422.28	1385	422.73	1385.4	423.39	1386
424.5	1387	424.74	1387.21	424.91	1387.28	425.33	1387.44	428.54	1388.69
431.48	1389.83	431.91	1390	432.14	1390.09	434.48	1391	437.03	1392
437.12	1392.03	441.58	1393.79	442.11	1394	442.44	1394.13	455.03	1394.47
456.17	1394.21	457.13	1394	465.67	1392.11	466.16	1392	469.39	1391.29
470.67	1391	471.13	1390.9	473.22	1390.44	475.9	1390.22	477.6	1390.09
477.72	1390.08	480.34	1390.09	482.43	1390.08	483.68	1390.07	484.4	1390.07
486.34	1390.06	488.28	1390.04	490.19	1390.03	502.27	1389.99	510.53	1389.99
522.1	1389.56	524.52	1389.54	529.29	1389.52	531.63	1389.5	533.96	1389.49
536.26	1389.47	538.55	1389.46	543.8	1389.5	570.63	1389.75	574.81	1389.73
631.19	1389.08	631.55	1389.08	633.97	1389.05	636.6	1389.01	639.78	1389.05
643.09	1389.08	684.08	1389.3	692.09	1389.11	692.4	1389.1	694.45	1389.05
696.48	1389.01	742.33	1389.48	743.76	1389.5	778.2	1389.32	780	1389.32

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
205.4	.025	314.98	.04	425.33	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
314.98	425.33	100.02	100	100.1	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
400	780	1385.59

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13500

INPUT
Description:
Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
203.77	1388	206.47	1387.75	214.32	1387	215.01	1386.93	215.08	1386.93
215.77	1386.71	217.83	1386.09	218.11	1386	219.33	1385.62	219.39	1385.6
232.02	1386	234.47	1386.07	235.1	1386.09	244.19	1386.42	244.82	1386.44
254.16	1386.35	258.93	1386.32	267.51	1386.41	272.75	1386.48	280.72	1386.04
281.35	1386.02	293.78	1385.58	295.41	1385.53	295.63	1385.57	297.85	1386
298.82	1386.18	301.48	1386.69	301.84	1386.67	302.9	1386.76	307.7	1387
312.95	1387.39	316.78	1387.16	321.64	1386.86	321.94	1386.84	344	1385.5
347.67	1385.27	348.37	1385.25	350.65	1385.13	352.01	1385.4	354.98	1386
355.04	1386.01	361.82	1386.01	366.14	1386.03	367.9	1386.02	368.77	1386.02
369.59	1386.01	370.86	1386.01	372.64	1386	373.08	1386	376.41	1385.99
377.1	1385.98	377.69	1385.98	377.91	1385.99	378.06	1386	397.56	1386.94
397.82	1386.75	397.95	1386.66	398.27	1386.44	398.9	1386	399.2	1385.74
400.12	1385	400.86	1384.27	401.14	1384	401.22	1383.92	402.13	1383.03
402.6	1383.02	405.22	1383	406.5	1383	407.48	1382.97	408.29	1382.95
408.52	1382.96	409.32	1383	409.95	1383.03	412.24	1383.15	416.5	1383.36
417.1	1383.76	417.45	1384	418.64	1384.8	418.93	1385	419.41	1385.33
420.41	1386	421.07	1386.43	421.63	1386.81	421.92	1387	422.28	1387.24
422.34	1387.28	423.76	1387.76	424.48	1388	425.79	1388.47	426.48	1388.73
429.37	1389.8	429.9	1390	430.1	1390.07	434.95	1391.87	435.31	1392
435.48	1392.06	438.02	1393	439.7	1393.62	442.54	1393.75	443.66	1393.79
444.85	1393.84	448.47	1394	449.3	1394.04	452.17	1394.16	452.79	1394.03
452.95	1394	457.25	1393.12	457.83	1393	458.29	1392.91	464.55	1391.62
467.59	1391	469.62	1390.58	470.97	1390.31	472.01	1390.09	472.28	1390.08
472.47	1390.07	473.02	1390.03	473.52	1390	474.41	1389.94	477.69	1389.73
478.4	1389.74	482.81	1389.78	485.16	1389.78	487.48	1389.77	550.49	1389.04
550.89	1389.04	556.52	1388.96	558.34	1388.99	560.09	1389.01	563.78	1389.04
609.59	1389.29	614.27	1389.17	616.59	1389.12	618.54	1389.07	618.89	1389.06
623.45	1388.96	674.69	1389.48	676.29	1389.51	714.77	1389.3	715.62	1389.31
717.26	1389.31	718.06	1389.32	718.86	1389.32	720.46	1389.33	722.53	1389.33
723.55	1389.34	724.57	1389.34	726.59	1389.35	727.6	1389.35	728.66	1389.34
739.85	1389.33	741.07	1389.34	742.27	1389.34	743.46	1389.35	744.3	1389.34
780	1388.99								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
203.77	.025	312.95	.04	422.34	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
312.95	422.34	100.02	100	100.1	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
395	780	1385.48

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13400

INPUT
Description:
Station Elevation Data num= 177

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
203.18	1387.41	207.03	1387.17	211.6	1386.88	212.81	1386.8	215.72	1386
216.24	1385.85	217.27	1385.56	223.92	1385.79	229.62	1386	232.78	1386.08
234.48	1386.09	242.99	1386.19	256.96	1386.24	259.09	1386.24	271.18	1386.22
274.88	1386	275.06	1385.99	276.23	1385.9	293.7	1385.61	295.43	1386
296.21	1386.21	297.99	1386.73	300.05	1386.52	300.64	1386.47	302.17	1386.59
307.26	1387	310.82	1387.26	319.14	1386.74	321.7	1386.58	345.28	1385
346.7	1384.9	346.81	1384.9	347.35	1385	352.17	1386	352.69	1386.12
360.61	1386.11	362.69	1386.1	364.23	1386.1	366.59	1386.09	369.72	1386.09
374.71	1386.1	377.87	1386	378.12	1386	385.05	1385.79	386.87	1385.74
390	1385.67	392.96	1385.41	393.14	1385.4	393.21	1385.39	395.63	1385.18
395.99	1385.16	396.12	1385.14	396.34	1385.12	396.42	1385.11	396.51	1385.11
396.66	1385.09	396.73	1385.09	396.81	1385.08	396.97	1385.06	397.56	1385
397.65	1385	397.72	1384.99	397.81	1384.99	397.95	1384.97	398.46	1384.92
399.45	1384.5	400.24	1384.22	401.2	1384.15	401.78	1384.12	402.26	1384.28
402.67	1384.43	403.28	1384.65	404.05	1384.94	404.65	1384.98	405	1385
405.31	1385.01	405.38	1385.02	405.49	1385.02	406.1	1385.04	406.22	1385.05
409.34	1385.25	409.52	1385.26	410.36	1385.32	411.39	1385.37	411.53	1385.37
411.63	1385.38	412.56	1385.45	412.73	1385.46	412.83	1385.46	413.15	1385.5
413.92	1385.68	414.01	1385.7	414.11	1385.72	414.35	1385.76	414.5	1385.78
414.66	1385.81	415.05	1385.88	415.2	1385.9	415.35	1385.93	415.52	1385.95
415.7	1385.98	415.8	1386	415.87	1386.02	416.01	1386.05	416.14	1386.08
416.46	1386.19	416.65	1386.25	416.81	1386.3	416.94	1386.34	417.06	1386.37
417.16	1386.4	417.25	1386.43	417.38	1386.47	417.51	1386.52	417.64	1386.58
417.75	1386.62	417.83	1386.65	418.6	1387	418.81	1387.12	420.31	1387.61
420.94	1387.81	421.51	1388	424.6	1389	427.68	1390	429.72	1390.67
430.75	1391	436.07	1392.73	436.91	1393	437.55	1393.21	437.77	1393.28
437.84	1393.3	438.5	1393.35	439.27	1393.4	448.12	1394	448.7	1394.04
448.77	1394.04	448.87	1394.02	448.99	1394	450.07	1393.78	458.72	1392.06
459.01	1392	459.79	1391.84	469.02	1390	469.18	1389.97	470.18	1389.77
475.8	1389.21	477.27	1389.06	477.79	1389.01	477.87	1389	478.45	1388.94
484.47	1389	535.1	1389.27	545	1389.04	545.38	1389.03	550.42	1388.91
607.05	1389.49	608.82	1389.52	651.35	1389.29	652.28	1389.3	654.1	1389.3
654.98	1389.31	655.87	1389.31	657.63	1389.32	658.78	1389.32	659.92	1389.33
662.17	1389.33	664.41	1389.34	665.53	1389.34	666.7	1389.33	679.06	1389.32
681.74	1389.34	683.06	1389.34	703.83	1389.12	764.83	1388.56	769.52	1388.58
776.83	1388.56	780	1388.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
203.18	.025	310.82	.04	418.81	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
310.82	418.81	100.02	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
380	780	1385.37

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13300

INPUT
Description:
Station Elevation Data num= 141

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
20.75	1386.88	26.61	1386.83	31.22	1386.77	37.61	1386.71	49.64	1386.01
49.79	1386.01	50.14	1386	50.4	1385.99	59.43	1385.8	75.97	1385.42
101.88	1385.39	122.96	1385.33	127.8	1385.31	143.64	1385.59	145.53	1385.62
148.24	1385.67	152.25	1385.73	168.14	1386	168.69	1386	169.54	1386.01
196.14	1386.28	199.27	1386.62	201.88	1386.91	210.13	1386.52	211.57	1386.1
211.93	1386	213.9	1385.42	215.17	1385.05	228.96	1385.75	231.74	1385.9
232.68	1385.92	233.02	1385.93	233.74	1385.95	235.92	1386	238.65	1386.09
240.99	1386.15	245.35	1386.17	255	1386.2	269.47	1386.09	270.92	1386.03
271.58	1386	273.89	1385.92	275.64	1385.87	276.31	1385.84	277.93	1385.78
294.11	1385.34	294.33	1385.4	296.35	1385.92	296.68	1386	298.37	1386.46
300.38	1386.58	307.63	1387	308.63	1387.06	309	1387.08	310.6	1387
316.68	1386.69	329.93	1386	337.36	1385.63	344.09	1385.79	345.66	1385.83
357.79	1385.62	358.33	1385.6	381.92	1385.58	386.12	1385.56	395.01	1385.55
395.69	1385.46	397.38	1385.26	397.56	1385.24	397.84	1385.27	400.42	1385.6
412.4	1385.61	414.02	1385.62	414.26	1385.7	414.75	1385.88	415.08	1386
420.31	1387.88	420.63	1388	420.94	1388.11	423.27	1388.95	423.41	1389
426.18	1390	426.51	1390.12	428.88	1390.97	428.97	1391	431.54	1391.92
431.75	1392	434.2	1392.88	434.53	1393	434.69	1393.06	435.72	1393.43
441.52	1393.83	444.87	1394.07	446.23	1394.17	446.49	1394.11	446.97	1394
451.47	1393	452.29	1392.82	457.88	1391.58	460.55	1391	464.63	1390.1
465.09	1390	465.28	1390.01	465.51	1390.01	467.9	1390.04	468.12	1390
468.28	1389.97	468.51	1389.93	474	1389	474.14	1388.97	474.34	1388.94
474.39	1388.93	474.64	1388.92	477.39	1388.86	539.41	1389.49	541.34	1389.52
587.92	1389.28	588.94	1389.28	589.94	1389.29	590.93	1389.29	591.9	1389.3
592.87	1389.3	594.8	1389.31	596.06	1389.31	597.31	1389.32	599.78	1389.32
602.23	1389.33	603.45	1389.33	604.73	1389.32	618.27	1389.31	621.21	1389.33
622.65	1389.33	645.4	1389.09	712.21	1388.48	717.34	1388.5	725.34	1388.48
732.91	1388.54	748.18	1388.53	750.49	1388.48	754.12	1388.41	761.52	1388.38
780	1388.18								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
20.75	.04	196.14	.025	309	.04	420.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
307.63	420.31	100.02	100	100	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13200

INPUT
Description:
Station Elevation Data num= 129

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
16.35	1386.66	35.6	1386.55	49.01	1385.57	50.48	1385.46	50.85	1385.44
51.68	1385.37	54.63	1385.36	74.91	1385.2	91.78	1385.19	100.5	1385.2
107.83	1385.09	116.43	1385	123.55	1384.87	125.11	1384.85	125.83	1384.86
131.87	1385	147.61	1385.27	165.42	1385.64	192.71	1385.83	194.66	1385.84
195.16	1385.9	196.06	1386	198.45	1386.3	200.19	1386.54	202.86	1386.39
205.78	1386.25	208.05	1386.13	208.51	1386.02	208.59	1386	210.32	1385.59
212.03	1385.18	215.35	1385.31	228.56	1385.81	237.42	1385.95	239.17	1385.97
248.02	1385.92	252.93	1385.88	267.64	1385.94	275.19	1385.6	292.25	1385.09
294.83	1385.91	295.1	1386	295.82	1386.23	296.18	1386.34	296.27	1386.37
298.75	1386.53	306.29	1387	306.53	1387.02	307.06	1387.05	307.36	1387.04
314.23	1386.68	325.58	1386.08	328.19	1385.94	338.06	1385.39	342.97	1385.72
343.15	1385.72	348.69	1385.5	352.91	1385.41	371.34	1385.21	394.04	1385.08
413.34	1385.29	414.87	1385.94	415	1386	417.09	1386.9	417.31	1387
419.59	1387.98	420.04	1388.18	420.94	1388.56	421.95	1389	422.25	1389.13
424.27	1390	424.98	1390.31	426.59	1391	427.79	1391.51	428.91	1392
430.69	1392.76	431.24	1393	431.59	1393.15	432.61	1393.59	433.28	1393.87
434.37	1393.92	435.8	1393.99	436.06	1394	439.06	1394.14	439.91	1394.17
443.03	1394.31	443.42	1394.22	443.78	1394.13	451.18	1392.32	452.51	1392
455.59	1391.25	460.7	1390	461.76	1389.74	462.15	1389.65	462.26	1389.62
462.39	1389.62	466.01	1389.54	466.09	1389.54	466.24	1389.52	466.53	1389.48
466.71	1389.45	471.77	1389.5	473.87	1389.53	524.5	1389.26	525.61	1389.27
526.69	1389.27	527.77	1389.28	528.82	1389.28	529.87	1389.29	531.97	1389.3

533.34	1389.3	534.69	1389.31	537.38	1389.31	540.05	1389.32	542.76	1389.32
557.49	1389.3	562.24	1389.33	563.34	1389.31	586.97	1389.06	659.58	1388.4
665.16	1388.42	673.86	1388.39	682.08	1388.46	698.68	1388.45	705.13	1388.32
713.18	1388.28	763.85	1387.76	775.18	1387.89	780	1387.91		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
16.35	.04	198.45	.025	307.06	.04	417.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
306.29	417.31	100.02	100	100	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13100

INPUT
Description:
Station Elevation Data num= 116

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19.15	1386	29.66	1385.71	38.87	1385.07	75.58	1384.96	77.55	1384.99
78.28	1385	79.32	1385.02	99.85	1385.27	120.25	1385	139.42	1385.23
164.05	1385.58	182.24	1385.59	193.55	1385.55	194.62	1385.82	195.25	1386
196.21	1386.28	197.13	1386.54	202.92	1386.19	204.97	1386.07	205.15	1386.03
205.27	1386	206.18	1385.82	208.01	1385.45	209.56	1385.13	225.54	1385.7
236.92	1385.73	237.17	1385.73	249.42	1385.69	252.03	1385.69	265.25	1385.65
271.54	1385.38	278.9	1385.12	283.93	1384.95	286.08	1385	288.7	1385.02
289.11	1385.02	292.49	1385.98	292.58	1386	293.63	1386.31	293.7	1386.33
294.06	1386.34	304.96	1386.67	311.59	1386.41	316.77	1386.22	335.44	1385.48
344.88	1385.29	354.36	1385.14	365.63	1385.1	367.62	1385.09	376.28	1385
376.42	1385	387.2	1384.89	390.43	1384.85	401.08	1385	401.59	1385.01
402.98	1385.04	407.16	1385.12	409.32	1385.18	409.89	1385.4	411.39	1386
412.83	1386.57	413.9	1387	415.45	1387.62	416.42	1388	418.11	1388.67
418.93	1389	420.76	1389.73	420.84	1389.76	421.44	1390	423.71	1390.9
423.95	1391	425.1	1391.45	426.47	1392	428.61	1392.85	428.98	1393
430.49	1393.6	431.01	1393.8	439.9	1394.18	440.14	1394.18	440.26	1394.15
441.48	1393.84	444.86	1393	445.55	1392.83	452.88	1391	454.33	1390.64
458.72	1389.54	458.93	1389.49	458.99	1389.47	459.1	1389.47	463.55	1389.26
464.6	1389.27	465.74	1389.27	466.88	1389.28	469.14	1389.29	470.62	1389.29
472.08	1389.3	473.54	1389.3	474.99	1389.31	477.86	1389.31	479.3	1389.32
480.8	1389.31	496.7	1389.29	501.83	1389.32	503.02	1389.3	528.54	1389.03
606.96	1388.32	612.98	1388.34	622.38	1388.31	631.25	1388.39	649.18	1388.37
651.9	1388.32	656.15	1388.23	664.85	1388.19	719.56	1387.63	731.8	1387.77
780	1387.92								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
19.15	.04	196.21	.025	304.96	.04	412.83	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
304.96	412.83	100.02	100	100	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 13000

INPUT
Description:
Station Elevation Data num= 118

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
27.44	1386	30.93	1385.88	34.85	1385.06	35.39	1385.05	42.37	1385
42.5	1385	47.92	1384.96	67.84	1384.89	68.56	1384.89	68.83	1384.9
71.8	1385	74.6	1385.11	77.63	1385.21	80.98	1385.31	87.81	1385.29
100.43	1385.1	100.67	1385.08	101.08	1385.06	101.25	1385.06	102.75	1385
115.08	1384.55	118.49	1384.42	128.42	1385	130.45	1385.09	133.53	1385.25
162	1385.57	190.48	1385.62	191.54	1385.85	192.19	1386	194.61	1386.54
194.66	1386.55	194.75	1386.55	203.36	1386.11	203.54	1386.07	203.88	1386
204.55	1385.86	206.76	1385.38	208.08	1385.1	210.19	1385.18	223.53	1385.72
234.87	1385.7	235.35	1385.7	248.94	1385.44	261.44	1385.59	262.38	1385.6

262.56	1385.59	267.83	1385.38	268.37	1385.36	275.51	1385	277.97	1384.88
279.02	1384.82	288.91	1384.95	288.97	1384.98	289.03	1385	290.36	1385.51
291.65	1386	291.83	1386.07	291.91	1386.1	296.37	1386.29	303.26	1386.54
308.82	1386.35	317.77	1386.03	332.94	1385.52	339.91	1385.27	352.12	1384.8
352.66	1384.8	365.48	1384.83	382.91	1384.59	388.36	1384.53	389.01	1384.52
391.52	1384.6	401.68	1384.86	406.74	1384.69	407.59	1384.66	407.81	1384.75
408.44	1385	408.9	1385.18	410.35	1385.76	410.96	1386	412.41	1386.58
415.99	1388	417.63	1388.66	418.5	1389	420.26	1389.7	420.93	1389.97
421	1390	421.3	1390.12	423.51	1391	423.93	1391.17	428.01	1392.79
428.52	1393	429.07	1393.22	438.29	1393.58	439.06	1393.4	449.28	1391
450.36	1390.75	453.54	1390	454.55	1389.76	456.94	1389.2	457.4	1389.2
460.43	1389.17	461.53	1389.08	461.59	1389.09	470.11	1389	554.33	1388.23
560.8	1388.25	570.89	1388.23	580.43	1388.31	599.68	1388.3	607.17	1388.14
616.51	1388.1	675.27	1387.49	688.41	1387.65	751.79	1387.84	752.35	1387.83
755.73	1387.79	769.87	1387.89	780	1388.02				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
27.44	.04	194.75	.025	303.26	.04	412.41	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
303.26	412.41	100.02	100	100	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12900

INPUT
Description:
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
16.39	1386	32.49	1385.07	46.39	1384.92	48.19	1384.92	75.66	1384.86
79.49	1384.86	97.58	1385.16	101.88	1384.89	112.42	1384.18	114.42	1384.18
118.42	1384.17	130.92	1385	133.11	1385.14	134.26	1385.22	157.94	1385.45
159.36	1385.44	162.63	1385.47	188.41	1385.6	189.7	1385.89	190.18	1386
192.25	1386.46	192.56	1386.52	200.84	1386.27	201.24	1386.17	201.97	1386
205.28	1385.14	205.81	1385	205.89	1384.98	206.06	1384.93	206.52	1384.96
207.4	1385	210.43	1385.13	222.01	1385.69	230.2	1385.67	233	1385.65
243.76	1385.5	246.9	1385.45	259.74	1385.64	260.6	1385.65	260.73	1385.65
268.51	1385.36	272.99	1385.1	274.51	1385	275.4	1384.95	277.64	1384.81
285.86	1384.81	287.74	1384.8	288.46	1384.98	288.55	1385	291.58	1385.8
291.74	1385.84	291.88	1385.85	292.61	1385.91	293.73	1386	293.97	1386.02
301.07	1386.54	306.04	1386.39	316.66	1386.07	320.6	1385.94	331.18	1385.61
344.64	1385	346.53	1384.91	350.96	1384.71	358.17	1384.62	383.25	1384.43
391.14	1384.45	393.26	1384.46	397.6	1384.69	401.19	1384.87	405.01	1384.69
405.96	1384.65	406.3	1384.79	406.83	1385	408.36	1385.62	409.29	1386
410.77	1386.6	411.75	1387	414.02	1387.92	414.4	1388.08	416.67	1389
417.48	1389.33	419.75	1390.23	420.19	1390.4	421.71	1391	423.83	1391.82
424.29	1392	425.56	1392.49	426.9	1393	427.02	1393.05	427.09	1393.08
428.38	1393.1	437.16	1393.27	438	1393.07	438.29	1393	440.21	1392.54
442.49	1392	444.53	1391.51	448.33	1390.61	452.25	1389.67	453.74	1389.31
455.53	1389.21	455.63	1389.21	456.93	1389.04	457.22	1389	457.4	1388.98
459.22	1388.71	461.1	1388.52	501.7	1388.15	508.62	1388.17	519.41	1388.14
529.6	1388.23	550.19	1388.22	553.3	1388.16	558.18	1388.05	568.17	1388.01
630.98	1387.36	645.03	1387.52	712.77	1387.73	713.37	1387.72	716.98	1387.67
732.1	1387.78	756.01	1388.11	759.52	1388.11	772.13	1387.97	780	1388.1

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
16.39	.04	188.41	.025	301.07	.04	409.29	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
301.07	409.29	100.02	100	100	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12800

INPUT
Description:

Station Elevation Data num= 132

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
18.73	1385.2	23.61	1385	31.72	1385	31.96	1384.82	32.23	1384.64
36.22	1384.55	42.3	1384.4	48.52	1384.45	64	1384.52	71.93	1384.57
92.47	1384.58	95.94	1384.62	100.5	1384.23	107.41	1383.61	109.72	1383.41
111.88	1383.42	115.42	1383.47	128.24	1384.6	130.57	1384.81	134.09	1384.85
148.42	1385.05	150.98	1385.09	168.99	1385.21	184.26	1385.23	186.45	1385.24
187.1	1385.42	188.61	1385.85	189.15	1386	190.27	1386.32	190.53	1386.39
193.08	1386.32	198.41	1386.16	198.78	1386.06	199.01	1386	202.27	1385.16
202.66	1385.06	202.9	1385	203.04	1384.96	203.72	1384.79	204.81	1384.84
209.1	1385	212.17	1385.13	219.42	1385.42	227.58	1385.52	230.23	1385.54
240.14	1385.45	244.86	1385.42	257.23	1385.56	258.66	1385.58	263.67	1385.31
267.75	1385.08	269.13	1385.01	269.23	1385	269.68	1384.98	275.22	1384.66
285.42	1384.76	286.37	1384.99	286.42	1385	286.5	1385.02	289.63	1385.63
292.16	1385.85	293.95	1386	294.9	1386.09	299.56	1386.48	303.27	1386.33
311.14	1386	329.08	1385.22	330.22	1385.18	335.65	1385	335.74	1385
348.59	1384.57	352.88	1384.54	361.55	1384.55	372.25	1384.47	379.99	1384.38
386.42	1384.36	393.92	1384.28	400.18	1384.59	400.52	1384.6	401.21	1384.61
404.62	1384.63	405.26	1384.87	405.59	1385	406.84	1385.48	408.22	1386
410.19	1386.75	410.86	1387	411.21	1387.13	413.49	1388	417.24	1389.42
418.76	1390	419.25	1390.18	420.12	1390.51	421.4	1391	422.69	1391.49
424.04	1392	424.39	1392.13	425.5	1392.55	431.68	1392.88	434.02	1393
435.25	1393.07	435.41	1393.03	435.57	1393	438.42	1392.39	440.26	1392
441.48	1391.72	444.47	1391	444.98	1390.88	448.83	1390	451.5	1389.38
451.94	1389.27	454.43	1389.06	454.64	1389.04	454.88	1389.01	461.03	1388.08
467.92	1388.06	478.77	1388.15	500.69	1388.14	504	1388.07	509.2	1387.97
519.83	1387.92	586.7	1387.23	601.65	1387.4	673.76	1387.62	674.4	1387.61
678.24	1387.56	694.33	1387.67	719.78	1388.02	723.52	1388.03	736.94	1387.88
746.51	1388.04	780	1387.56						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
18.73	.04	190.27	.025	299.56	.04	408.22	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
299.56	408.22	100.02	100	100	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12700

INPUT
Description:
Station Elevation Data num= 116

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26.72	1384.73	29.13	1384.66	37.41	1384.25	62.3	1384.33	93.41	1384.58
101.71	1383.72	106.94	1383.19	110.7	1383.22	112.81	1383.23	125.79	1384.39
128.12	1384.59	129.95	1384.61	144.8	1384.8	156.15	1384.99	157.04	1385
158.37	1385	184.07	1385.24	186.39	1385.84	187	1386	187.28	1386.07
188.8	1386.46	196.61	1386.07	196.76	1386.04	196.92	1386	199.77	1385.32
201.13	1385	201.33	1384.95	201.71	1384.86	206.92	1384.94	210.26	1385
216.72	1385.16	219.39	1385.23	228.43	1385.42	242.96	1385.37	256.73	1385.41
260.11	1385.31	264.66	1385.16	267.89	1385	273.25	1384.65	273.6	1384.63
274.16	1384.62	275.51	1384.62	283.39	1384.58	283.98	1384.8	284.49	1385
285.08	1385.26	285.68	1385.53	288.94	1385.78	291.92	1386	293.45	1386.12
297.11	1386.39	305.32	1386.04	306.39	1386	324.09	1385.26	328.26	1385.08
329.6	1385.06	332.34	1385	336.1	1384.93	346.15	1384.72	358.22	1384.43
360.34	1384.39	378.06	1384.3	391.37	1384.02	392.91	1383.99	393.14	1383.99
393.22	1383.98	399.38	1384.4	399.65	1384.42	400.47	1384.44	403.99	1384.53
404.9	1384.91	405.13	1385	405.29	1385.07	409.2	1386.67	410.75	1387.31
412.43	1388	413.64	1388.5	414.87	1389	416.63	1389.73	417.31	1390
418.74	1390.59	419.19	1390.77	422.19	1392	423.16	1392.4	423.33	1392.46
424.57	1392.52	433.73	1392.9	435.09	1392.58	437.64	1392	440.47	1391.35
442.02	1391	443.9	1390.57	450.24	1389.14	450.88	1389	451.31	1388.9
451.8	1388.79	454.64	1388.48	459.68	1387.91	459.86	1387.89	459.92	1387.89
460.22	1387.88	471.49	1387.83	542.41	1387.09	558.27	1387.28	634.75	1387.51
635.42	1387.5	639.5	1387.45	656.56	1387.57	683.55	1387.94	687.52	1387.94
701.76	1387.79	711.9	1387.95	754.62	1387.35	769.63	1387.41	777.25	1387.31
780	1387.31								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

```
*************************************************************
  26.72     .04  196.61    .025  297.11     .04   409.2    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        297.11   409.2             89.17     100   104.1              .1       .3

CROSS SECTION


RIVER: RIVER1
REACH: EXIST              RS: 12600

INPUT
Description:
Station Elevation Data    num=     129
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0    1385   20.82    1385   25.06  1384.9   29.14 1384.93   33.02 1384.64
    38.8 1384.52   43.46 1384.41   48.92 1384.41   65.06 1384.35   76.45 1384.42
   81.93 1384.44   95.42 1384.46   96.37 1384.35   98.87 1384.07   99.48    1384
   100.2 1383.92   100.5 1383.89  102.76 1383.63  108.38    1383  110.45    1383
  111.84 1382.99  117.26 1382.97  117.49 1382.99  117.59    1383  118.92 1383.11
  129.15    1384  135.85 1384.59  147.68 1384.83  159.31 1384.82  163.49 1384.81
   169.4    1385  171.43 1385.07  184.98 1385.07  190.67  1385.9  191.33    1386
  191.58 1386.04  193.05 1386.26  199.13 1386.03  200.06    1386   200.2    1386
  200.79 1385.98  205.23 1385.02  205.29 1385.01  206.22  1384.8  207.98 1384.84
  221.36 1385.12   233.2 1385.41  245.63 1385.31   247.5 1385.29  248.74 1385.29
   261.1 1385.25   266.9    1385  267.96 1384.95  268.93 1384.91  276.59 1384.57
  288.45 1384.55  289.16 1384.55  289.45 1384.64  290.68    1385  290.83 1385.05
  292.13 1385.44  298.34    1386  301.06 1386.25  301.23 1386.26  301.67 1386.24
  304.28 1386.14  331.93    1385   332.4 1384.98  332.84 1384.96   335.1 1384.89
  349.77 1384.41  357.92 1384.31     376 1384.16  381.94 1384.13  384.15 1384.08
  397.85 1383.84  398.89 1383.93  399.62    1384  400.32 1384.06  404.08  1384.4
  407.82 1384.43  408.39 1384.43   409.2 1384.76  409.77    1385  410.33 1385.23
  412.22    1386  414.48 1386.93  414.67    1387  416.56 1387.77  417.12    1388
  418.04 1388.38  419.56    1389  420.67 1389.45  423.94 1390.79  424.93 1391.19
  426.25 1391.73  426.92    1392  427.01 1392.04  427.95 1392.42  438.99 1392.56
  439.99 1392.34  441.46    1392  442.49 1391.77  449.97 1390.13  451.63 1389.77
  455.14    1389  455.96 1388.83  457.23 1388.55  461.67    1388  462.95 1387.91
  465.72 1387.63  466.23 1387.48  466.95 1387.42   467.5 1387.36  468.15 1387.31
   501.5 1386.95  517.85 1387.14  597.04 1387.39  601.98 1387.32  619.72 1387.44
  647.84 1387.83  651.98 1387.84  666.83 1387.67  677.43 1387.85  722.16  1387.2
  737.91 1387.27  745.92 1387.16  751.22 1387.16     780 1387.26

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
       0     .04  199.13    .025  301.23     .04  412.22    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        301.23  412.22            100.14     100  100.13              .1       .3

CROSS SECTION


RIVER: RIVER1
REACH: EXIST              RS: 12500

INPUT
Description:
Station Elevation Data    num=     132
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   18.07 1385.87   19.22 1385.82   22.26 1385.71   31.82    1385   32.33 1384.96
   37.82 1384.52   38.02 1384.48   38.32 1384.47   54.14 1384.17   68.05  1384.2
   70.49 1384.26   79.65 1384.41   90.53 1384.43   99.21 1384.51   103.1 1384.04
  103.49    1384  112.99    1383  113.64 1382.93  114.37 1382.86  116.23 1382.86
  122.53 1382.89  123.29 1382.96  123.71    1383  128.24  1383.4  134.83    1384
  139.45 1384.41  142.26 1384.67  149.69 1384.74  169.26  1384.7  176.99  1384.9
  188.45    1385  189.29    1385  193.58 1385.03   196.3 1385.59  196.89 1385.72
  198.21    1386  198.41 1386.04  198.48 1386.06  198.56 1386.06  200.27    1386
  202.41 1385.92  205.97  1385.8  207.87 1385.42  211.65 1384.68  211.81 1384.65
  223.94    1385  227.06  1385.1  238.55 1385.26  252.92 1385.14   266.4 1385.16
  269.07 1385.07  270.56 1385.01  270.91    1385   273.1 1384.92  273.44 1384.91
  273.59 1384.91  273.84  1384.9  274.34 1384.87  283.73 1384.46  294.52 1384.43
  296.03  1384.8  296.83    1385  297.44 1385.15  297.92 1385.28  305.55 1385.82
  306.15 1385.87  306.47 1385.89  307.14 1385.94   308.9 1385.88  309.59 1385.86
```

336.72	1385	336.88	1384.99	338.78	1384.93	349.43	1384.5	354.91	1384.27
357.59	1384.25	371.22	1384.11	375.05	1384.06	380.45	1384	384.42	1383.97
385.16	1383.97	385.72	1383.96	388.16	1383.95	403.3	1383.86	404.37	1383.91
413.9	1384.38	415.02	1384.84	415.4	1385	416.96	1385.64	417.82	1386
419.41	1386.65	420.24	1387	421.85	1387.66	422.66	1388	426.72	1389.67
427.51	1390	429.16	1390.68	429.93	1391	431.59	1391.68	431.82	1391.78
432.35	1392	432.8	1392.18	432.99	1392.26	443.62	1392.23	443.9	1392.17
449.28	1391	453.92	1390	455.19	1389.73	458.57	1389	461.55	1388.37
464	1387.84	464.2	1387.8	465.79	1387.7	473.37	1387.25	474.51	1387.07
475.02	1387	475.37	1386.93	482.99	1387.02	566.31	1387.28	571.51	1387.21
590.18	1387.34	619.76	1387.75	624.12	1387.76	639.75	1387.58	650.9	1387.77
697.97	1387.09	714.55	1387.15	722.97	1387.04	728.54	1387.04	766.76	1387.18
778.87	1387.11	780	1387.12						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
18.07	.04	196.3	.025	307.14	.04	416.96	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
307.14	416.96	100.14	100	100.13	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12400

INPUT
Description:
Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
37.14	1386	39.1	1385.44	40.67	1385	43.75	1384.44	43.84	1384.42
44.24	1384.41	55.99	1384.06	72.62	1384.15	73.92	1384.16	87.17	1384.21
104.38	1384.58	106.51	1384.31	108.85	1384	116.19	1383.04	116.49	1383
120.58	1382.49	123.44	1382.52	128.61	1382.6	132.15	1382.92	133.11	1383
144.12	1384	144.17	1384	145.5	1384.13	145.72	1384.15	149.57	1384.19
156.55	1384.25	159.51	1384.27	173.92	1384.39	182.48	1384.74	183.07	1384.76
199.75	1384.76	200.41	1384.96	200.56	1385	203.61	1385.99	207.52	1385.87
211.96	1385.72	215.25	1385.06	215.52	1385	215.84	1384.93	217.64	1384.53
219.9	1384.58	232.82	1384.89	237.48	1384.99	243.79	1385.11	251.36	1385.06
258.28	1385.03	270.76	1385.07	271.82	1385.07	272.17	1385.06	273.06	1385.04
274.45	1385	280.12	1384.85	281.48	1384.81	281.64	1384.81	281.84	1384.8
282.11	1384.78	291.14	1384.23	295.28	1384.22	298.6	1384.23	301.51	1385
302.23	1385.2	302.43	1385.25	312.36	1385.88	313.52	1385.85	324.97	1385.46
343.9	1384.85	344.26	1384.84	344.44	1384.84	344.86	1384.82	360.3	1384.27
374.49	1384	374.69	1384	376.52	1383.96	391.46	1383.96	409.16	1383.77
412.81	1383.99	412.91	1384	413.44	1384.03	419.94	1384.42	420.7	1384.72
421.43	1385	423.29	1385.72	424.01	1386	426.47	1386.95	426.59	1387
427.2	1387.24	429.17	1388	429.49	1388.12	432.57	1389.32	434.33	1390
435.79	1390.56	436.92	1391	438.48	1391.6	438.72	1391.69	438.88	1391.76
438.95	1391.78	439.52	1392	442.64	1392.05	444.58	1392.07	449.56	1392.14
449.81	1392.09	450.25	1392	453.75	1391.27	455.02	1391	459.64	1390.03
459.78	1390	464.55	1389	465.46	1388.8	469.54	1387.95	471.02	1387.63
473.27	1387.45	477.55	1387.1	477.71	1387.09	478.06	1387.1	478.6	1387.02
479.7	1387.04	480.35	1387	535.58	1387.17	541.04	1387.1	560.63	1387.24
591.69	1387.67	596.26	1387.68	612.67	1387.49	624.37	1387.69	673.78	1386.97
691.18	1387.04	700.02	1386.92	705.87	1386.92	714.68	1386.96	745.98	1387.06
758.69	1386.99	778.99	1387.19	780	1387.19				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
37.14	.04	203.61	.025	312.36	.04	423.29	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
312.36	423.29	100.18	100	100.13	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12300

INPUT
Description:

Station Elevation Data num= 120

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
24.19	1385.7	25.57	1385.69	33.44	1385.36	35.13	1385.31	36.49	1385.29
37.87	1385.29	41.54	1385.12	43.17	1385	45.37	1385	45.77	1384.97
50.03	1384.19	62.03	1384.09	73.92	1384.15	76.99	1384.16	81.01	1384.15
91.22	1384.1	108.88	1384.12	110.09	1384.12	112.84	1383.84	120.6	1383
125.74	1382.52	126.78	1382.42	127.91	1382.43	134.49	1382.54	142.38	1383
144.72	1383.13	147.18	1383.26	156.68	1383.52	160.81	1383.64	164.6	1383.72
178.48	1384.04	178.97	1384.05	179.02	1384.05	179.97	1384.08	205.54	1384.68
205.68	1384.73	206.48	1385	208.9	1385.93	217.94	1385.46	219.06	1385.19
219.84	1385	221.13	1384.69	223.27	1384.16	235.61	1384.6	238.27	1384.69
244.24	1384.8	249.22	1384.88	253.29	1384.86	263.53	1384.79	275.27	1384.88
277.16	1384.9	285.34	1384.57	287.97	1384.42	292.16	1384.19	300.11	1384.17
302.11	1384.18	303.26	1384.5	304.89	1384.99	305.35	1385.12	305.41	1385.13
305.63	1385.15	317.2	1385.6	318.14	1385.57	333.36	1385.16	350.9	1384.74
364.38	1384.18	366.01	1384.11	380.4	1383.96	382.03	1383.94	384.73	1383.89
397.11	1383.68	412.83	1383.66	414.7	1383.65	419.17	1383.94	420.14	1384
425.53	1384.35	425.72	1384.42	429.75	1385.96	429.86	1386	432.47	1386.99
432.97	1387.18	435.11	1388	435.2	1388.03	437.73	1389	437.92	1389.07
440.36	1390	440.63	1390.1	442.98	1391	443.57	1391.23	444.44	1391.56
445.13	1391.82	445.19	1391.84	451.31	1391.93	455.46	1392.01	458.54	1391.36
460.38	1391	461.31	1390.82	475.44	1388	477.66	1387.6	478.17	1387.5
483.99	1387.15	484.73	1387.1	486.23	1387.01	504.86	1387.07	505.67	1387.06
510.57	1386.99	531.09	1387.13	563.61	1387.58	568.4	1387.6	585.59	1387.4
597.84	1387.6	649.59	1386.85	667.81	1386.93	677.07	1386.8	683.19	1386.8
692.42	1386.84	725.21	1386.95	738.51	1386.88	759.78	1387.08	780	1387.06

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
24.19	.04	208.9	.025	317.2	.04	429.75	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
317.2	429.75	100.24	100	100.13	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12200

INPUT
Description:
Station Elevation Data num= 129

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
22.31	1385.33	37.28	1385.22	39.36	1385.21	40.25	1385.2	41.07	1385.2
46.88	1385.17	47.51	1385.17	49.74	1385	53.86	1385	57.11	1384.48
57.22	1384.46	57.33	1384.46	67.39	1384.18	87.05	1384.31	116.51	1384.58
117.35	1384.47	117.83	1384.39	120.22	1384	126.46	1383	131.76	1382.14
141.98	1382.09	147.11	1382.66	150.11	1383	151.75	1383.19	152.43	1383.27
164.29	1383.78	180.44	1384.07	182.31	1384.1	183.14	1384.11	188.17	1384.2
208.87	1384.53	211	1384.56	211.71	1384.81	212.24	1385	214.09	1385.67
214.41	1385.78	215.65	1385.65	219.6	1385.23	219.78	1385.2	220.93	1385
226.99	1384	227.88	1383.86	228.2	1383.8	229.48	1383.87	231.95	1384
242.62	1384.54	254.57	1384.7	255.09	1384.71	269.31	1384.63	282.74	1384.74
285.04	1384.66	289.06	1384.51	295.58	1384.19	296.7	1384.17	306.57	1384.01
309.25	1384.8	309.67	1384.94	309.87	1385	310.25	1385.13	311.35	1385.16
312.14	1385.18	318.82	1385.07	322.76	1385.18	323.4	1385.2	331.45	1385.04
333.15	1385	340.81	1384.87	348.04	1384.76	356.31	1384.61	370.16	1384.05
371.88	1384.02	372.64	1384	387.23	1383.7	399.84	1383.68	402.57	1383.68
419.83	1383.48	419.9	1383.48	427.07	1384	430.91	1384.27	431.12	1384.28
431.19	1384.31	432.97	1385	434.56	1385.62	435.31	1385.91	435.55	1386
435.77	1386.09	438.12	1387	439.02	1387.35	440.7	1388	442.49	1388.7
443.27	1389	444.98	1389.67	448.4	1391	449.15	1391.29	450.68	1391.89
452.69	1391.99	452.99	1392	453.75	1392.03	461.5	1392.36	461.82	1392.29
463.05	1392	465.88	1391.34	467.36	1391	475.07	1389.21	475.98	1389
482.4	1387.51	483.21	1387.33	484.86	1387.23	488.77	1387	490.38	1386.9
491.11	1386.86	491.48	1386.9	491.78	1386.93	492.17	1386.96	501.55	1387.03
535.54	1387.5	540.55	1387.51	558.51	1387.31	571.31	1387.52	625.4	1386.74
644.44	1386.82	654.12	1386.68	660.52	1386.68	670.17	1386.72	683.41	1386.75
704.43	1386.84	718.34	1386.76	740.56	1386.98	780	1386.93		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

22.31	.04	214.41	.025	312.14	.04	432.97	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
312.14	432.97	100.24	100	100.13	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12100

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
50.75	1385	54.4	1384.77	62.42	1384.28	71.35	1384.06	96.45	1384.24
115.68	1384.46	119.63	1384.51	121.23	1384.27	122.96	1384	125.51	1383.61
129.61	1383	136.48	1382	137.08	1381.91	138.04	1381.77	147.56	1381.82
148.14	1381.9	148.79	1382	159.78	1383.65	161.04	1383.7	165.33	1383.92
172.46	1384	172.78	1384	187.15	1384.18	202.56	1384.28	203.37	1384.29
204.76	1384.33	215.93	1384.6	216.13	1384.65	216.69	1384.77	217.7	1385
219.94	1385.55	231.57	1384	231.83	1383.97	233.84	1383.71	237.17	1383.86
247.37	1384.25	250.85	1384.31	261.71	1384.44	276.03	1384.55	289.7	1384.69
294.81	1384.32	300.16	1384.07	301.59	1384	311.03	1384	311.17	1383.99
312.55	1384.23	315.34	1384.7	321.71	1384.96	322.58	1385	324.45	1385.08
327.37	1385.2	328.37	1385.24	337.11	1385	345.22	1384.77	347.52	1384.71
368.02	1384.13	374.34	1383.8	374.94	1383.77	388.02	1383.58	391.54	1383.54
393.39	1383.56	401.53	1383.67	425.76	1383.31	435.51	1383.9	435.58	1383.91
435.67	1383.94	438.5	1385	438.95	1385.17	441.17	1386	443.45	1386.86
443.83	1387	444.16	1387.12	447.78	1388.48	449.17	1389	450.81	1389.62
453.17	1390.51	454.96	1391.19	456.47	1391.76	460.37	1391.91	462.91	1392
465.5	1392.1	467.53	1392.17	468.14	1392.04	468.31	1392	468.68	1391.92
475.81	1390.35	477.37	1390	480.95	1389.21	481.88	1389	482.7	1388.82
486.09	1388.07	486.38	1388	487.36	1387.78	487.65	1387.72	489.58	1387.59
496.94	1387.15	497.42	1387.24	497.76	1387.25	497.94	1387.29	507.47	1387.42
512.69	1387.43	531.42	1387.22	544.79	1387.44	601.21	1386.62	621.07	1386.7
631.17	1386.57	637.85	1386.57	647.91	1386.61	661.72	1386.64	683.65	1386.73
698.16	1386.65	721.35	1386.87	780	1386.8				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
50.75	.04	219.94	.025	328.37	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
328.37	438.95	100.24	100	100.13	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 12000

INPUT
Description:
Station Elevation Data num= 140

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
52.47	1385	60.96	1384.49	62.88	1384.52	66.94	1384.24	76.35	1384.01
76.62	1384	76.69	1384	77.04	1383.99	78.41	1383.99	102.33	1384.04
102.92	1384.04	103.02	1384.03	107.99	1384	113.69	1384	122.24	1383.96
126.61	1383.97	129.91	1383.45	132.68	1383	138.49	1382.12	139.35	1382
140.59	1381.83	140.7	1381.82	144.19	1381.49	147.65	1381.5	152.98	1381.53
156.23	1382	159.41	1382.56	161.77	1383	164.49	1383.54	164.9	1383.62
165.69	1383.69	167.85	1383.9	168.83	1384	169.04	1384.01	169.39	1384.04
173.21	1384	175.36	1384	183.91	1384.08	186.42	1384.1	190.52	1384.14
207.54	1384.13	208.22	1384.17	219.88	1384.79	221.22	1384.9	222.37	1385
224.43	1385.24	225.51	1385.36	226.4	1385.22	227.73	1385	233.57	1384.05
233.89	1384	234.24	1383.95	240.46	1382.99	240.6	1383	240.89	1383
245.39	1383.15	253.68	1383.49	266.34	1384.17	268.96	1384.3	282.83	1384.24
293.81	1384.45	296.15	1384.5	298.16	1384.42	307.08	1384.05	311.39	1384.08
313.54	1384.12	320.46	1384.45	320.97	1384.47	321.72	1384.51	330.01	1384.93
330.64	1384.94	331.43	1384.93	333.13	1384.91	333.48	1384.93	333.91	1384.94
334.74	1384.93	336.78	1384.93	339.88	1385	345.74	1385	349.92	1385.02
352.89	1385.06	353.55	1385.01	353.76	1385	355.9	1384.86	360.96	1384.5
366.26	1384.11	369.65	1384	373.16	1383.96	373.75	1383.95	376.56	1383.78

378.85	1383.63	379.17	1383.61	396.49	1383.6	402.76	1383.65	409.39	1383.72
433.3	1383.37	437.89	1383.49	440.53	1383.57	440.76	1383.65	441.13	1383.79
441.68	1384	444.06	1384.9	444.32	1385	444.49	1385.06	449.61	1387
451.07	1387.55	452.25	1388	454.72	1388.93	454.91	1389	454.99	1389.03
457.19	1389.86	457.57	1390	458.17	1390.22	460.26	1391	460.54	1391.1
461.31	1391.39	472.99	1391.7	473.62	1391.58	480.1	1390.36	481.99	1390
482.97	1389.81	491.42	1388.19	492.38	1388	492.47	1387.98	492.64	1387.95
501.22	1387.38	502.19	1387.32	502.8	1387.28	505.03	1387.14	518.26	1387.36
577.02	1386.5	597.7	1386.59	608.22	1386.45	615.17	1386.45	625.65	1386.49
640.04	1386.52	662.88	1386.62	677.99	1386.53	702.13	1386.77	780	1386.66

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
52.47	.04	224.43	.025	352.89	.04	444.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
352.89	444.49	100.24	100	100.13	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 11900

INPUT
Description:
Station Elevation Data num= 142

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
72.2	1384.9	73.64	1384.62	82.51	1384.18	101.51	1384.21	107.88	1384.25
116.33	1384.33	130.64	1384.4	130.79	1384.38	138.61	1383.06	138.95	1383
144.93	1382	145	1381.99	146.25	1381.78	149.99	1381.46	152.67	1381.22
162.76	1381.41	164.77	1381.62	165.68	1381.72	168.3	1382	170.54	1382.27
176.83	1383	180.6	1383.45	192.68	1383.8	192.92	1383.8	193.3	1383.81
194.01	1383.81	195.56	1383.82	215.1	1383.91	216.01	1384	216.21	1384.02
225.88	1385	226.08	1385.02	226.49	1385.06	229.51	1385.09	231.08	1385.11
232.12	1385.07	233.67	1385	234.12	1384.99	234.94	1384.96	238.02	1384.42
240.47	1384	246.1	1383	248.02	1382.65	248.09	1382.64	248.46	1382.66
260.28	1383.21	272	1383.98	272.23	1384	272.31	1384.01	275.89	1384.24
284.33	1384.21	289.75	1384.2	297.83	1384.26	303.94	1384.32	320.98	1384.06
321.32	1384.02	321.48	1384	323.22	1383.8	326.4	1383.42	328.42	1383.5
328.51	1383.5	328.73	1383.64	329.31	1384	330.5	1384.75	330.8	1384.93
330.86	1384.98	331.08	1384.98	331.56	1385	332.94	1385.06	334.27	1385.11
336.74	1385.21	337.92	1385.26	338.83	1385.57	340.06	1386	340.17	1386.05
340.24	1386.05	340.47	1386.03	340.88	1386.01	341.15	1386	358.36	1385.22
358.48	1385.17	358.7	1385.08	358.88	1385	359.21	1384.86	359.8	1384.62
360.24	1384.43	360.89	1384.41	364.1	1384.26	365.62	1384.11	366.7	1384
369	1383.77	369.09	1383.77	373.18	1383.84	378.49	1383.98	381.29	1383.9
385.66	1383.73	418.47	1383.64	419.28	1383.62	438.23	1383.28	440.06	1383.36
443.99	1383.51	445.38	1383.56	445.72	1383.69	449.28	1385	450.39	1385.41
453.25	1386.45	456.77	1387.71	457.59	1388	458.67	1388.39	460.38	1389
461.21	1389.3	462.29	1389.68	463.17	1390	464.29	1390.4	465.96	1391
466.33	1391.13	466.88	1391.32	473.56	1391.57	478.49	1391.74	480.39	1391.33
481.97	1391	482.38	1390.92	486.74	1390	490.33	1389.25	493.73	1388.55
496.04	1388.07	496.3	1388.05	496.99	1388	499.96	1387.81	509.19	1387.17
510.4	1387.04	510.93	1387	511.3	1387	511.37	1386.98	552.82	1386.39
574.33	1386.48	585.27	1386.33	592.5	1386.33	642.1	1386.51	657.81	1386.42
682.92	1386.66	780	1386.53						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
72.2	.04	232.12	.025	358.88	.04	449.28	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
358.88	449.28	129.95	100	100.13	.1	.3

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 11800

INPUT
Description:
Station Elevation Data num= 152

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
80.58	1385	80.78	1384.69	80.88	1384.46	84.59	1384.31	87.31	1384.19
112.18	1384.2	123.06	1384.02	123.83	1384	124.39	1384	124.73	1383.95
126.08	1383.77	130.87	1383.12	131.8	1383	133.17	1382.82	138.35	1382
138.49	1381.98	144.61	1381	144.74	1380.98	145.38	1380.96	155.96	1380.6
163.11	1380.43	167.26	1380.35	176.53	1380.75	176.59	1380.76	176.64	1380.76
176.89	1380.81	177.97	1381	181.01	1381.54	182.12	1381.74	182.56	1381.82
187.49	1382.67	189.38	1383	192.23	1383.35	194.46	1383.67	198.95	1383.73
201.54	1383.77	216.01	1383.94	218.65	1383.99	220.08	1383.99	220.13	1384
220.34	1384.02	221.65	1384.16	223.32	1384.33	231.82	1385.23	232.82	1385.33
234.11	1385.29	237.3	1385.18	237.69	1385.15	239.99	1385	243.51	1384.73
243.96	1384.7	244.16	1384.68	244.5	1384.64	248.63	1384.06	249.04	1384
249.09	1383.99	249.22	1383.98	257.95	1382.75	258.46	1382.68	258.61	1382.71
259.02	1382.77	260.94	1383.06	261.06	1383.08	261.28	1383.02	261.37	1383
262.8	1382.51	263.33	1382.33	263.66	1382.22	264.26	1382.26	270.71	1382.7
280.45	1383.46	283.02	1383.68	296.74	1383.75	311.2	1383.75	312.62	1383.73
317.98	1383.69	328.83	1383.58	329.7	1383.57	331.57	1383.57	332.47	1383.83
333.08	1384	334.7	1384.35	336.76	1384.82	337.1	1384.88	337.94	1385
341.28	1385.46	343.75	1385.81	344.22	1385.99	344.33	1386.02	345.68	1386.37
348.61	1386.02	348.86	1386	357.7	1385.16	358.5	1385.08	359.21	1385
360.25	1384.9	363.74	1384.57	365.42	1384.11	366.49	1383.83	366.85	1383.75
369.39	1383.74	375.39	1383.75	384.74	1383.86	386.7	1383.88	397.09	1383.73
398.56	1383.73	414.15	1383.69	444.75	1383.45	445.16	1383.45	445.95	1383.46
450.19	1383.49	451.54	1383.99	451.66	1384.04	454.95	1385.26	456.93	1386
462.3	1388	462.83	1388.2	464.99	1389	465.23	1389.09	467.59	1389.97
467.68	1390	467.73	1390.02	471.61	1391.46	472.97	1391.97	474.14	1391.99
474.98	1392	484	1392.16	484.48	1392.05	484.71	1392	489.05	1391
489.98	1390.78	493.36	1390	501.97	1388	502.63	1387.85	504.36	1387.43
506.52	1387.2	508.47	1387	510.71	1386.82	513.11	1386.62	516.63	1386.29
516.95	1386.33	517.61	1386.43	528.63	1386.27	550.97	1386.37	562.32	1386.21
569.82	1386.21	581.14	1386.26	596.67	1386.29	621.32	1386.39	637.64	1386.3
663.7	1386.56	780	1386.4						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
80.58	.04	232.82	.025	358.5	.04	454.95	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
358.5	454.95	275	400	250	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
80.58	500	1381.04

CROSS SECTION

RIVER: RIVER1
REACH: EXIST RS: 11400

INPUT
Description:
Station Elevation Data num= 108

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
355.51	1385	356.73	1384.74	359.63	1384.13	360.27	1384	364.13	1383.19
365.02	1383	365.33	1382.94	374.54	1381	374.65	1380.98	378.19	1380.23
381.57	1380.04	382.25	1380	384.02	1379.91	384.2	1379.9	384.34	1379.89
385.29	1379.84	404.72	1380.83	422.1	1380.94	422.35	1381	424.99	1381.58
426.13	1381.84	426.83	1382	428.61	1382.41	432.76	1383.38	437.13	1384.39
437.64	1384.51	438.13	1384.62	442.61	1384.72	450.68	1384.87	451.77	1384.86
457.36	1384.88	463.77	1384.89	464.84	1384.96	465.31	1385	469.36	1385.24
470.05	1385.28	470.33	1385.3	470.77	1385.3	481.38	1385.18	481.85	1385.1
482.4	1385	488.09	1384	489.68	1383.73	492.19	1383.29	492.49	1383.24
492.98	1383.25	506.73	1383.47	517.52	1383.8	520.66	1383.89	521.33	1383.91
521.98	1383.92	525.86	1384	527.03	1384.02	528.78	1384.06	534.08	1384.17
547.92	1384.34	556.59	1384.38	568.17	1384.21	568.36	1384.24	568.81	1384.29
574.75	1385	579.34	1385.52	580.97	1385.96	581.1	1386	585.63	1386
594.51	1385.42	602.38	1384.85	602.96	1384.8	603.83	1384.75	615.28	1384.11
619.14	1384.1	628.93	1384.05	653.81	1384.03	674.55	1384.19	682.64	1384.23
685.84	1384.35	690.07	1384.52	690.74	1384.79	693.8	1386	696.09	1386.91
696.32	1387	698.55	1387.89	698.83	1388	701.3	1389	701.44	1389.06
703.76	1390	707.75	1391.63	708.67	1392.01	708.89	1392.01	709	1392
714.95	1392.08	720.9	1392.18	721.33	1392.09	721.74	1392	726.47	1391.01
726.54	1390.99	736.07	1389	737.4	1388.72	744.18	1387.32	745.71	1387

```
  745.99 1386.94  746.07 1386.93   756.7 1386.05  756.81 1386.04     757    1386
  757.17    1386   757.3 1385.99     780 1386.06

Manning's n Values         num=       2
     Sta   n Val     Sta   n Val
*********************************
  355.51     .04  437.13    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        355.51  437.13            100.02     100  100.13              .1       .3
Ineffective Flow      num=       1
   Sta L   Sta R    Elev  Permanent
  470.33     780  1385.3       F
Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
************************
  355.51     500 1380.34

CROSS SECTION


RIVER: RIVER1
REACH: EXIST                RS: 11300

INPUT
Description:
Station Elevation Data     num=      115
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  350.04  1384.9  354.12    1384  355.87 1383.61  356.43 1383.49  363.24    1382
  367.54 1381.07  367.88    1381  369.03 1380.75  370.26 1380.49  370.46 1380.45
  372.82 1380.41  384.73 1380.16  398.15 1380.25  401.31 1380.24  408.19 1380.44
  418.08 1380.69  418.36 1380.77  418.67 1380.85  419.22    1381  422.72 1381.95
  422.89    1382  426.56    1383  429.27 1383.75   429.8  1383.9  430.13    1384
   431.8 1384.18  432.54 1384.25  432.61 1384.26  432.84 1384.29  433.17 1384.33
  433.56 1384.37  434.29 1384.46  435.11 1384.55   435.6 1384.61  437.63 1384.81
  447.41 1384.71  448.77  1384.7  462.99 1384.82   463.2 1384.85  464.61    1385
  465.66 1385.12  469.05 1385.49  476.69 1385.33  480.16 1385.25  481.01 1385.08
  481.42    1385  486.37    1384  486.57 1383.96  488.45 1383.58  504.49 1383.96
  504.65 1383.96  505.53    1384  510.31 1384.19  518.76 1384.51  531.91 1384.72
  537.07 1384.82  539.57 1384.88  545.27    1385  546.38 1385.02  554.11 1385.05
  554.59 1385.05   557.2    1385  562.33 1384.88  565.82 1384.81  567.05  1384.9
  568.32    1385  578.17  1385.8  601.08 1385.19  601.69 1385.13  608.54 1384.49
  613.93    1384  615.05    1384  630.37 1384.12  650.83 1384.18  681.74 1384.32
  689.08 1384.66  689.64 1384.69  690.36    1385  691.51 1385.49  692.68    1386
  694.82 1386.92  694.99    1387  695.11 1387.05   699.4 1388.91   699.6    1389
  699.78 1389.07  701.89    1390  702.49 1390.26  704.15    1391  704.94 1391.36
  706.13 1391.89  711.73 1391.98  719.36 1392.08  719.64 1392.03  719.77    1392
  724.72    1391  727.25 1390.48  733.69 1389.12  734.23    1389  734.83 1388.87
  738.99    1388  739.96  1387.8  743.75    1387  744.49 1386.83  745.77 1386.55
  750.38 1386.27  754.41    1386  755.21 1385.94  755.54 1385.92   755.7 1385.91
  756.04 1385.99  756.21 1385.95  756.35 1385.97  766.72 1386.01     780 1385.94

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  350.04    .025  350.04     .04  437.63    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        350.04  437.63                  0       0       0              .1       .3
Ineffective Flow      num=       1
   Sta L   Sta R    Elev  Permanent
  469.05     780 1385.49       F

*****************************************************************************

SUMMARY OF MANNING'S N VALUES

River:RIVER1
*********************************************************************
*     Reach       *   River Sta.   *   n1    *   n2    *   n3    *   n4    *
*********************************************************************
*EXIST           *    14200       *     .04*     .04*     .04*          *
*EXIST           *    14199       *Lat Struct*       *       *        *
*EXIST           *    14100       *     .025*     .04*       *          *
*EXIST           *    14000       *     .025*     .04*    .025*         *
*EXIST           *    13900       *     .025*     .04*    .025*         *
```

*EXIST	* 13800	* .025*	.04*	.025* *
*EXIST	* 13700	* .025*	.04*	.025* *
*EXIST	* 13600	* .025*	.04*	.025* *
*EXIST	* 13500	* .025*	.04*	.025* *
*EXIST	* 13400	* .025*	.04*	.025* *
*EXIST	* 13300	* .04*	.025*	.04* .025*
*EXIST	* 13200	* .04*	.025*	.04* .025*
*EXIST	* 13100	* .04*	.025*	.04* .025*
*EXIST	* 13000	* .04*	.025*	.04* .025*
*EXIST	* 12900	* .04*	.025*	.04* .025*
*EXIST	* 12800	* .04*	.025*	.04* .025*
*EXIST	* 12700	* .04*	.025*	.04* .025*
*EXIST	* 12600	* .04*	.025*	.04* .025*
*EXIST	* 12500	* .04*	.025*	.04* .025*
*EXIST	* 12400	* .04*	.025*	.04* .025*
*EXIST	* 12300	* .04*	.025*	.04* .025*
*EXIST	* 12200	* .04*	.025*	.04* .025*
*EXIST	* 12100	* .04*	.025*	.04* *
*EXIST	* 12000	* .04*	.025*	.04* .025*
*EXIST	* 11900	* .04*	.025*	.04* .025*
*EXIST	* 11800	* .04*	.025*	.04* .025*
*EXIST	* 11400	* .04*	.025*	* *
*EXIST	* 11300	* .025*	.04*	.025* *

SUMMARY OF REACH LENGTHS

River: RIVER1

Reach	River Sta.	Left	Channel	Right
*EXIST	* 14200	* 129.01*	100*	79.86*
*EXIST	* 14199	*Lat Struct*	*	*
*EXIST	* 14100	* 100.32*	100*	100.59*
*EXIST	* 14000	* 137.93*	100*	76.1*
*EXIST	* 13900	* 100.33*	100*	100.1*
*EXIST	* 13800	* 113.04*	100*	92.22*
*EXIST	* 13700	* 100.02*	100*	100.1*
*EXIST	* 13600	* 100.02*	100*	100.1*
*EXIST	* 13500	* 100.02*	100*	100.1*
*EXIST	* 13400	* 100.02*	100*	100*
*EXIST	* 13300	* 100.02*	100*	100*
*EXIST	* 13200	* 100.02*	100*	100*
*EXIST	* 13100	* 100.02*	100*	100*
*EXIST	* 13000	* 100.02*	100*	100*
*EXIST	* 12900	* 100.02*	100*	100*
*EXIST	* 12800	* 100.02*	100*	100*
*EXIST	* 12700	* 89.17*	100*	104.1*
*EXIST	* 12600	* 100.14*	100*	100.13*
*EXIST	* 12500	* 100.14*	100*	100.13*
*EXIST	* 12400	* 100.18*	100*	100.13*
*EXIST	* 12300	* 100.24*	100*	100.13*
*EXIST	* 12200	* 100.24*	100*	100.13*
*EXIST	* 12100	* 100.24*	100*	100.13*
*EXIST	* 12000	* 100.24*	100*	100.13*
*EXIST	* 11900	* 129.95*	100*	100.13*
*EXIST	* 11800	* 275*	400*	250*
*EXIST	* 11400	* 100.02*	100*	100.13*
*EXIST	* 11300	* 0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RIVER1

Reach	River Sta.	Contr.	Expan.
*EXIST	* 14200	* .1*	.3*
*EXIST	* 14199	*Lat Struct*	*
*EXIST	* 14100	* .1*	.3*
*EXIST	* 14000	* .1*	.3*
*EXIST	* 13900	* .1*	.3*
*EXIST	* 13800	* .1*	.3*

```
*EXIST          *    13700   *       .1*       .3*
*EXIST          *    13600   *       .1*       .3*
*EXIST          *    13500   *       .1*       .3*
*EXIST          *    13400   *       .1*       .3*
*EXIST          *    13300   *       .1*       .3*
*EXIST          *    13200   *       .1*       .3*
*EXIST          *    13100   *       .1*       .3*
*EXIST          *    13000   *       .1*       .3*
*EXIST          *    12900   *       .1*       .3*
*EXIST          *    12800   *       .1*       .3*
*EXIST          *    12700   *       .1*       .3*
*EXIST          *    12600   *       .1*       .3*
*EXIST          *    12500   *       .1*       .3*
*EXIST          *    12400   *       .1*       .3*
*EXIST          *    12300   *       .1*       .3*
*EXIST          *    12200   *       .1*       .3*
*EXIST          *    12100   *       .1*       .3*
*EXIST          *    12000   *       .1*       .3*
*EXIST          *    11900   *       .1*       .3*
*EXIST          *    11800   *       .1*       .3*
*EXIST          *    11400   *       .1*       .3*
*EXIST          *    11300   *       .1*       .3*
*****************************************************
```

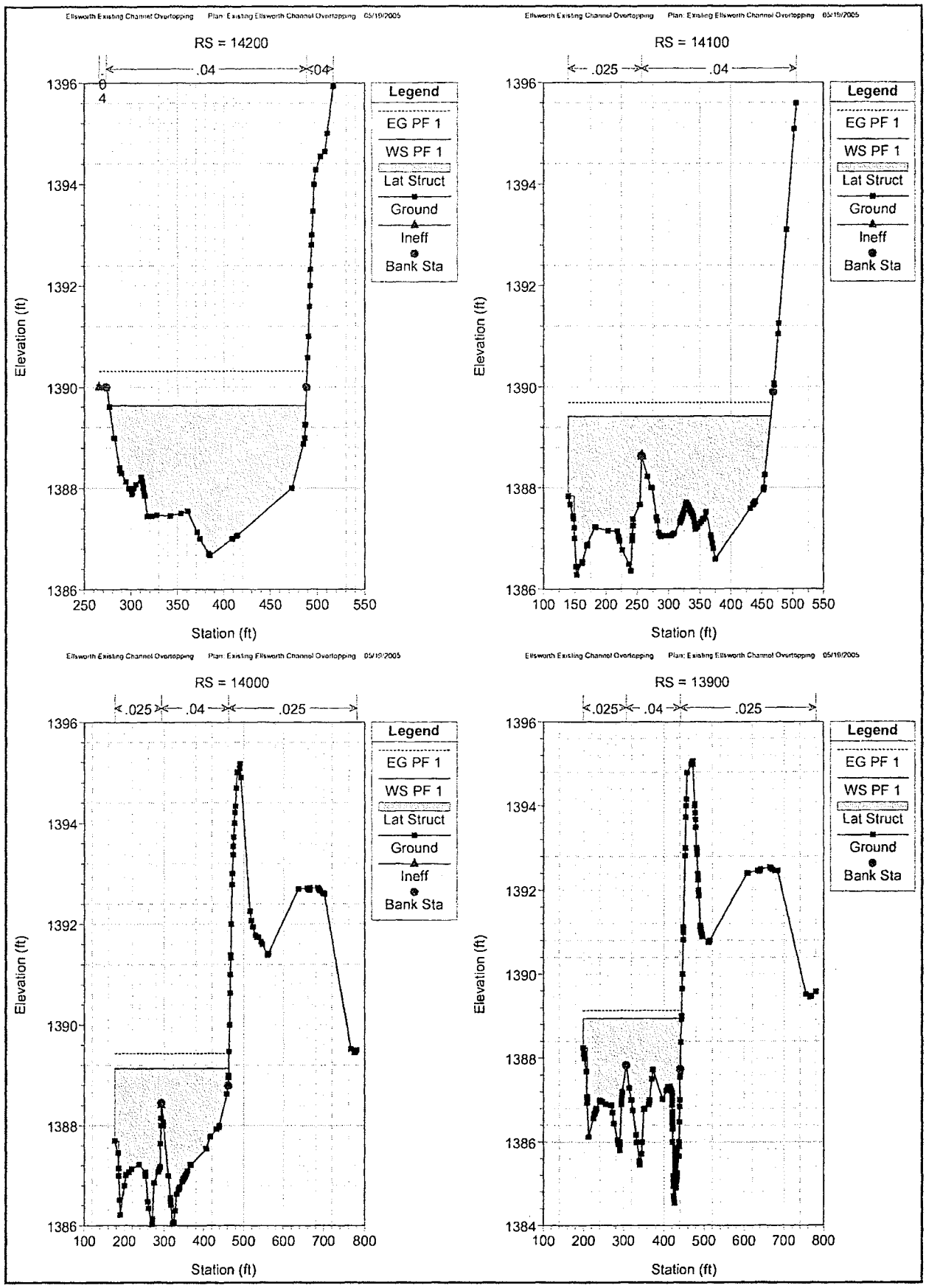
Profile Output Table - Standard Table 1

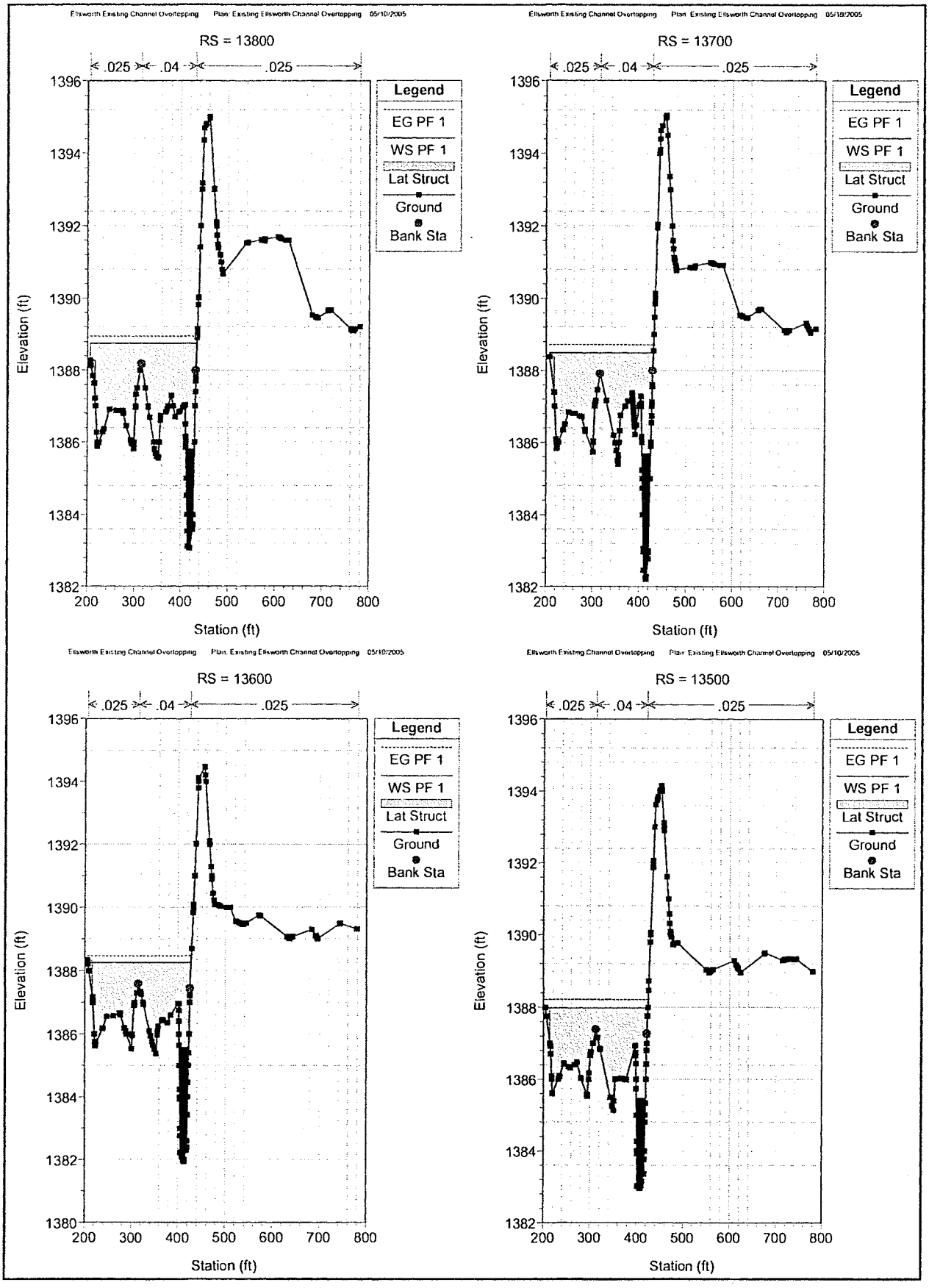
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
EXIST	14200	2856.00	1386.67	1389.63	1389.38	1390.32	0.012497	6.65	429.27	211.33	0.82
EXIST	14199	Lat Struct									
EXIST	14100	2555.97	1386.59	1389.41	1388.66	1389.68	0.002339	2.82	687.09	325.32	0.35
EXIST	14000	2087.76	1386.04	1389.14	1388.52	1389.43	0.002634	2.74	546.02	287.08	0.37
EXIST	13900	1675.36	1385.46	1388.94		1389.13	0.001770	2.57	516.35	244.78	0.31
EXIST	13800	1536.69	1385.56	1388.76		1388.95	0.001888	2.65	466.37	228.42	0.32
EXIST	13700	1452.35	1385.40	1388.49		1388.72	0.002452	2.77	410.03	222.98	0.36
EXIST	13600	1426.65	1385.38	1388.26		1388.47	0.002375	2.81	410.35	221.28	0.35
EXIST	13500	1410.10	1385.13	1387.98		1388.21	0.002851	3.04	387.02	220.49	0.39
EXIST	13400	1376.17	1384.90	1387.42		1387.78	0.006747	4.04	294.36	216.54	0.58
EXIST	13300	1320.64	1385.24	1387.25		1387.34	0.002202	2.18	540.61	397.79	0.33
EXIST	13200	1253.85	1385.08	1387.07		1387.14	0.001630	1.96	580.09	401.13	0.28
EXIST	13100	1225.34	1384.85	1386.92		1386.99	0.001438	1.87	590.39	394.56	0.27
EXIST	13000	1225.33	1384.52	1386.76		1386.83	0.001702	2.06	556.40	385.42	0.29
EXIST	12900	1190.01	1384.43	1386.57		1386.65	0.001985	2.12	528.01	394.31	0.31
EXIST	12800	1101.70	1384.28	1386.43		1386.48	0.001286	1.74	573.66	388.61	0.25
EXIST	12700	1078.86	1383.98	1386.30		1386.35	0.001296	1.72	555.92	374.09	0.25
EXIST	12600	1078.86	1383.84	1386.19		1386.24	0.001180	1.68	594.59	407.55	0.24
EXIST	12500	1078.86	1383.86	1386.05		1386.11	0.001350	1.78	564.63	399.62	0.26
EXIST	12400	1078.86	1383.77	1385.92		1385.98	0.001358	1.72	554.16	383.72	0.26
EXIST	12300	1078.86	1383.65	1385.80		1385.85	0.001148	1.59	595.71	402.23	0.24
EXIST	12200	1078.86	1383.48	1385.67		1385.73	0.001328	1.69	575.36	411.00	0.25
EXIST	12100	1078.86	1383.31	1385.54		1385.59	0.001288	1.75	564.69	389.02	0.25
EXIST	12000	1078.86	1383.37	1385.42		1385.47	0.001153	1.73	578.94	392.96	0.24
EXIST	11900	1078.86	1383.28	1385.29		1385.35	0.001215	1.73	549.46	359.08	0.24
EXIST	11800	1078.86	1383.45	1385.18		1385.23	0.000801	1.31	611.04	349.80	0.20
EXIST	11400	1078.86	1380.34	1384.32	1383.01	1384.67	0.003966	4.74	227.59	219.70	0.49
EXIST	11300	1078.86	1380.16	1383.81	1382.72	1384.22	0.004901	5.15	209.63	85.37	0.54

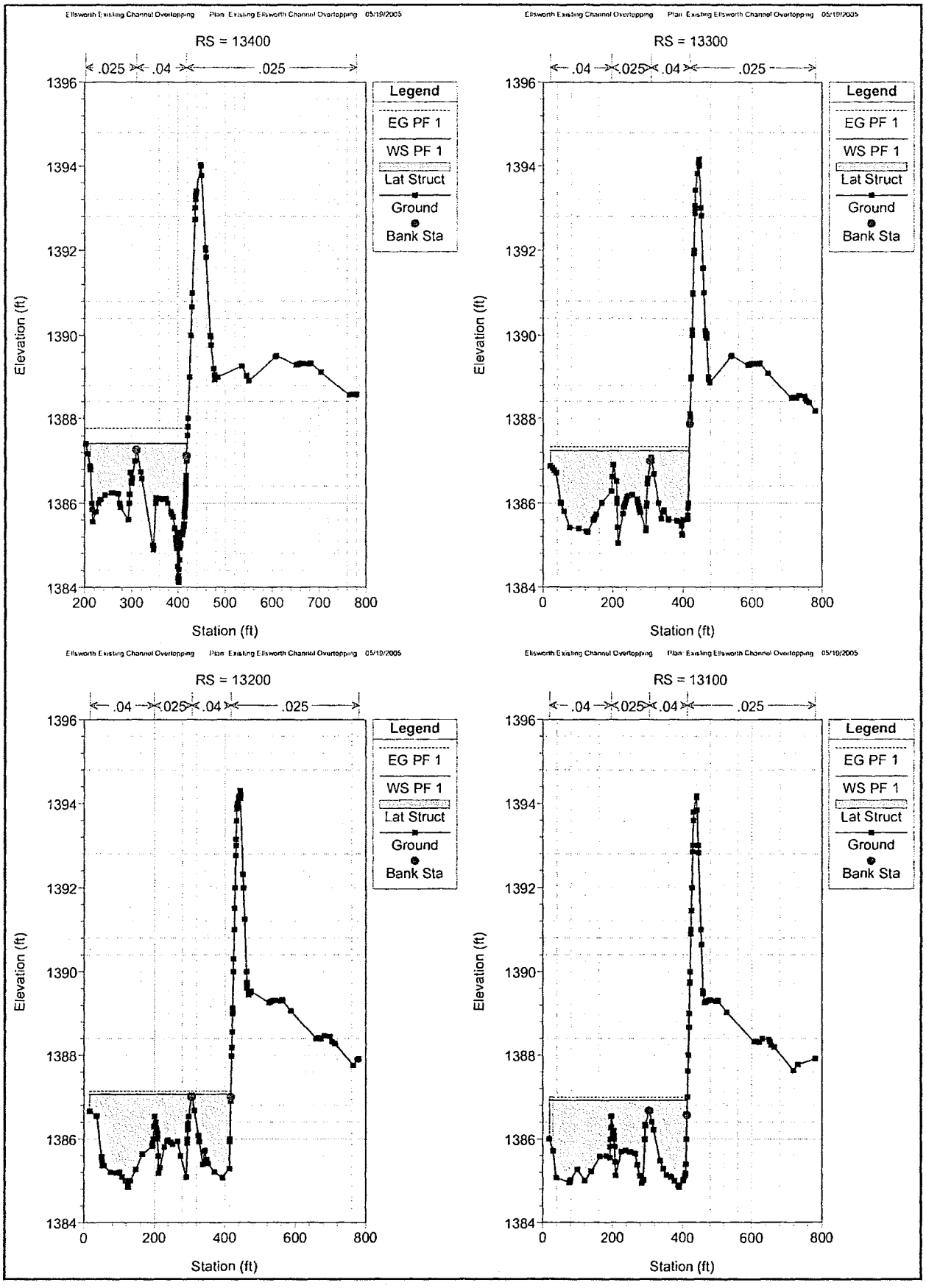
Profile Output Table - Standard Table 2

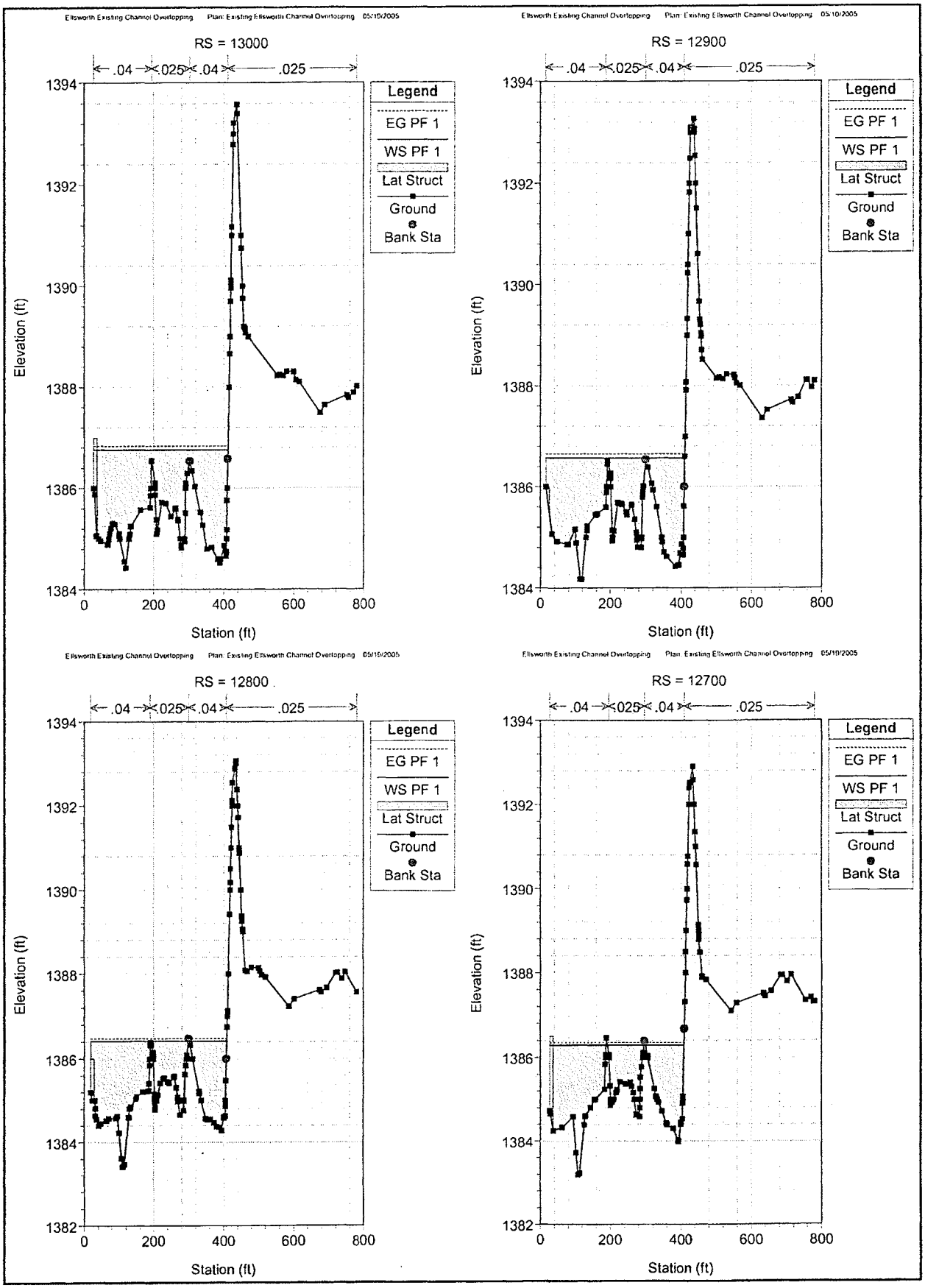
Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
EXIST	14200	1390.32	1389.63	0.69	0.51	0.12		2856.00		211.33
EXIST	14199	Lat Struct								
EXIST	14100	1389.68	1389.41	0.27	0.25	0.00	1402.51	1153.46		325.32
EXIST	14000	1389.43	1389.14	0.29	0.27	0.03	1291.97	795.66	0.13	287.08
EXIST	13900	1389.13	1388.94	0.19	0.18	0.00	935.36	737.18	2.82	244.78
EXIST	13800	1388.95	1388.76	0.19	0.23	0.00	876.22	659.56	0.91	228.42
EXIST	13700	1388.72	1388.49	0.22	0.24	0.00	866.06	585.96	0.32	222.98
EXIST	13600	1388.47	1388.26	0.21	0.26	0.00	816.32	609.01	1.32	221.28
EXIST	13500	1388.21	1387.98	0.23	0.42	0.01	773.42	635.56	1.12	220.49
EXIST	13400	1387.78	1387.42	0.36	0.36	0.08	708.19	667.80	0.18	216.54
EXIST	13300	1387.34	1387.25	0.09	0.19	0.01	983.29	337.34		397.79
EXIST	13200	1387.14	1387.07	0.07	0.15	0.00	931.40	322.44	0.00	401.13
EXIST	13100	1386.99	1386.92	0.07	0.16	0.00	917.34	307.89	0.10	394.56
EXIST	13000	1386.83	1386.76	0.08	0.18	0.00	873.55	351.76	0.02	385.42
EXIST	12900	1386.65	1386.57	0.08	0.16	0.01	857.62	331.95	0.44	394.31
EXIST	12800	1386.48	1386.43	0.06	0.13	0.00	822.54	278.98	0.17	388.61
EXIST	12700	1386.35	1386.30	0.06	0.11	0.00	804.51	274.36		374.09
EXIST	12600	1386.24	1386.19	0.05	0.13	0.00	801.57	277.28	0.02	407.55
EXIST	12500	1386.11	1386.05	0.06	0.14	0.00	786.40	292.32	0.15	399.62
EXIST	12400	1385.98	1385.92	0.06	0.12	0.00	808.89	269.95	0.02	383.72
EXIST	12300	1385.85	1385.80	0.05	0.12	0.00	823.14	255.73		402.23
EXIST	12200	1385.73	1385.67	0.06	0.13	0.00	791.65	286.64	0.57	411.00
EXIST	12100	1385.59	1385.54	0.06	0.12	0.00	785.77	293.02	0.07	389.02
EXIST	12000	1385.47	1385.42	0.05	0.12	0.00	823.25	255.51	0.10	392.96

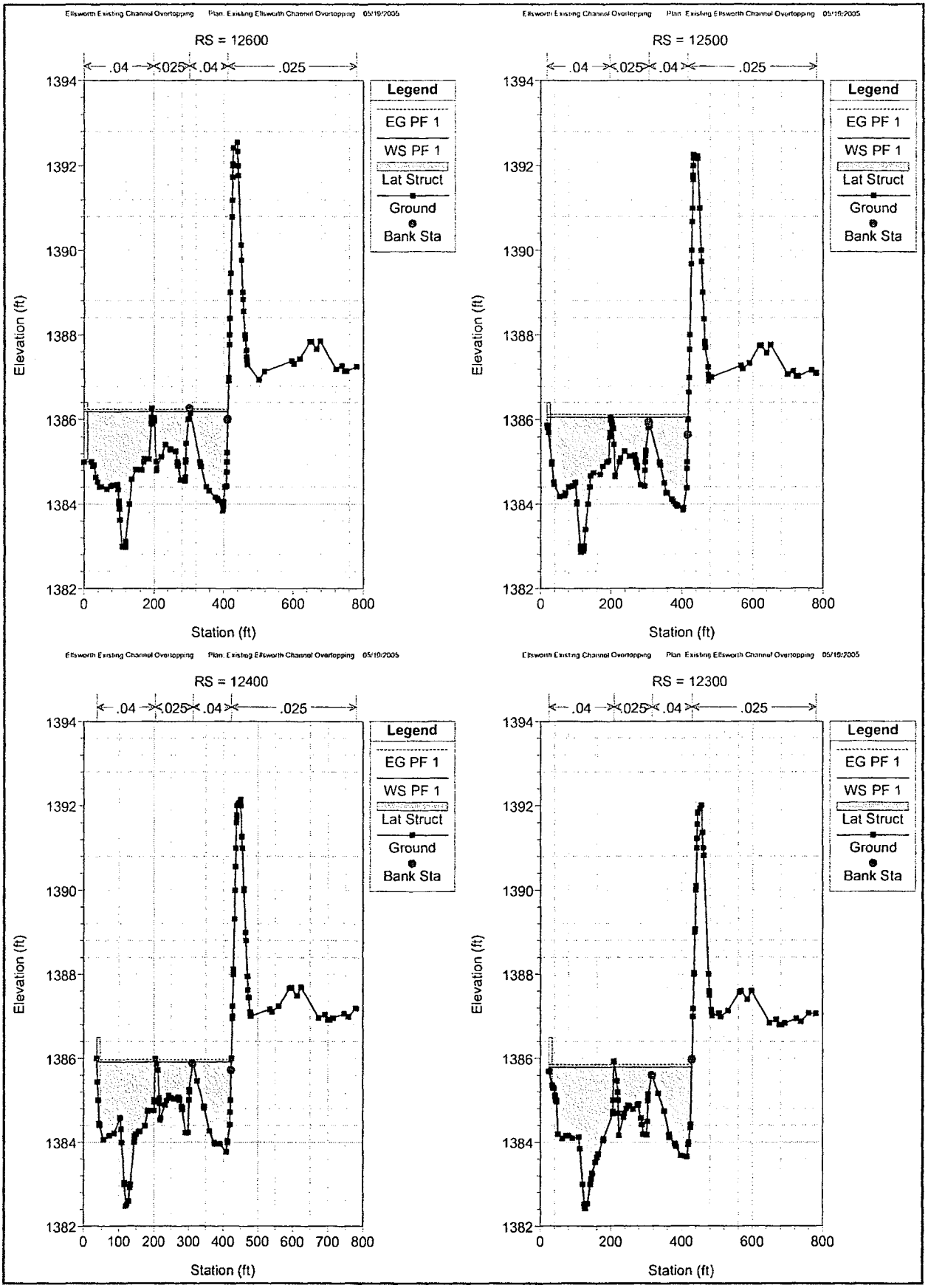
EXIST	11900		1385.35	1385.29	0.06	0.12	0.00	835.12	243.68	0.06	359.08
EXIST	11800		1385.23	1385.18	0.05	0.53	0.03	903.35	175.52		349.80
EXIST	11400		1384.67	1384.32	0.35	0.44	0.01		1078.86		219.70
EXIST	11300		1384.22	1383.81	0.41				1078.86		85.37

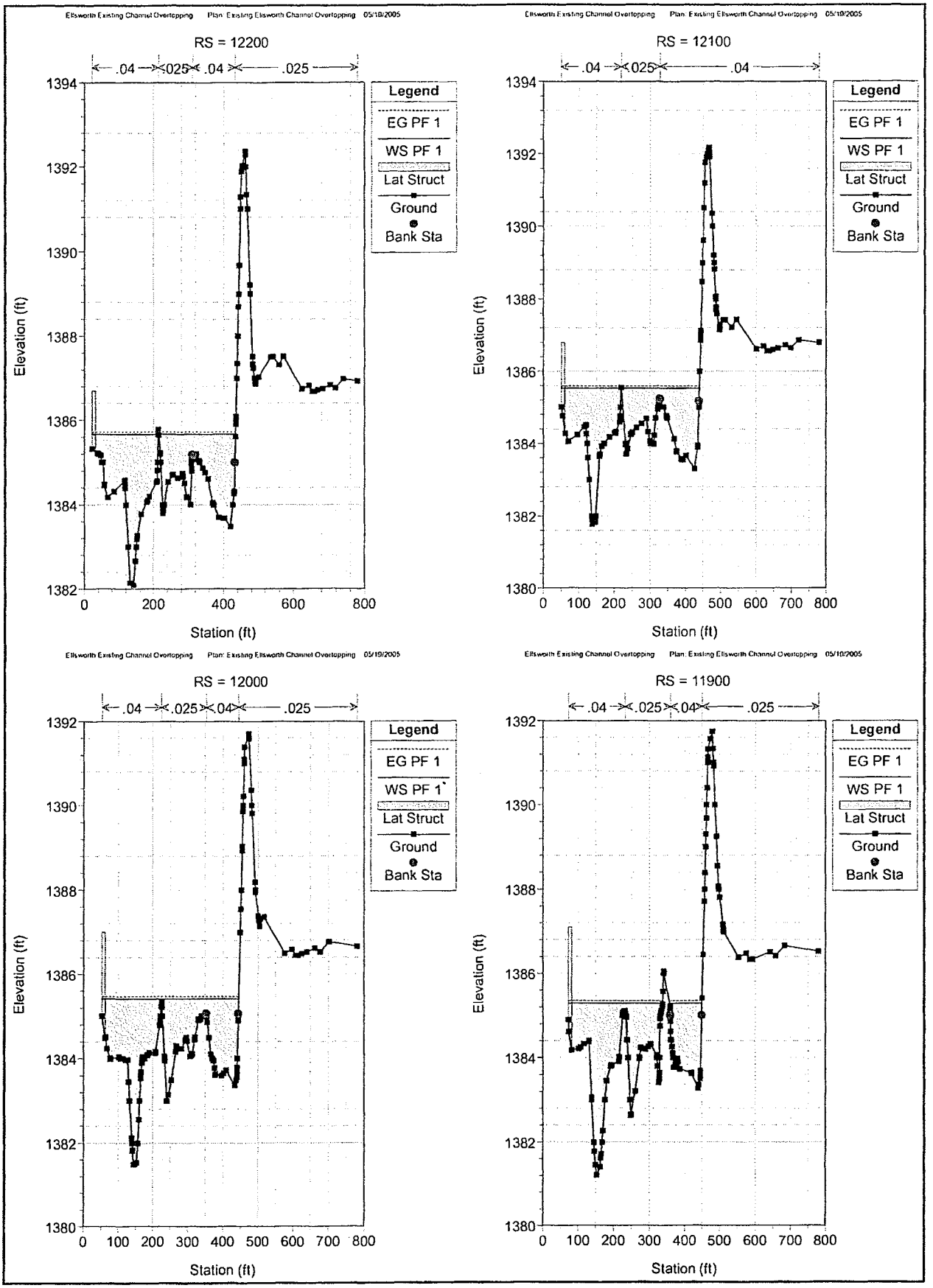

Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 14200
.04
.04
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
RS = 14100
.025
.04
RS = 14000
.025
.04
.025
RS = 13900
.025
.04
.025


Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/10/2005
RS = 13800
RS = 13700
RS = 13600
RS = 13500
.025
.04
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
1396
1394
1392
1390
1388
1386
1384
1382
1380
200
300
400
500
600
700
800

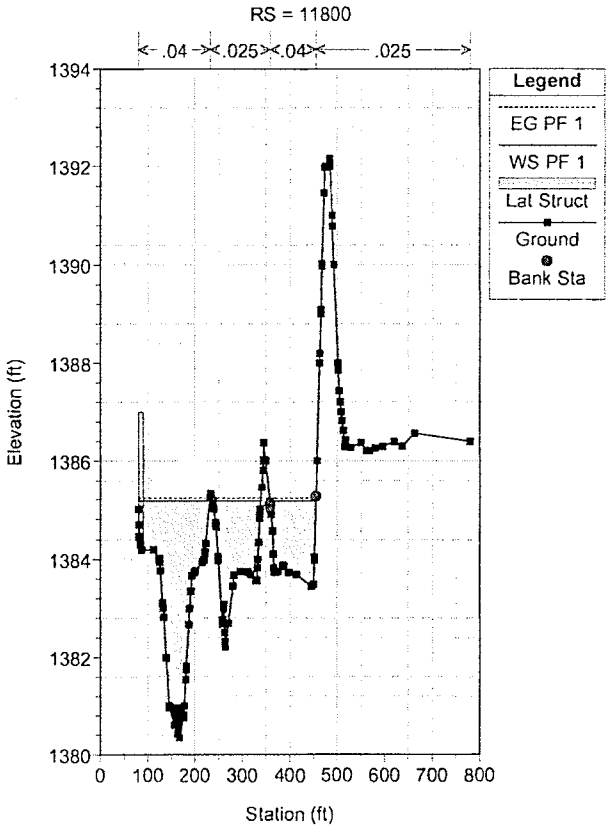

Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 13400
.025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 13300
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 13200
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 13100
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/10/2005
RS = 13000
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/10/2005
RS = 12900
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/10/2005
RS = 12800
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/10/2005
RS = 12700
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)

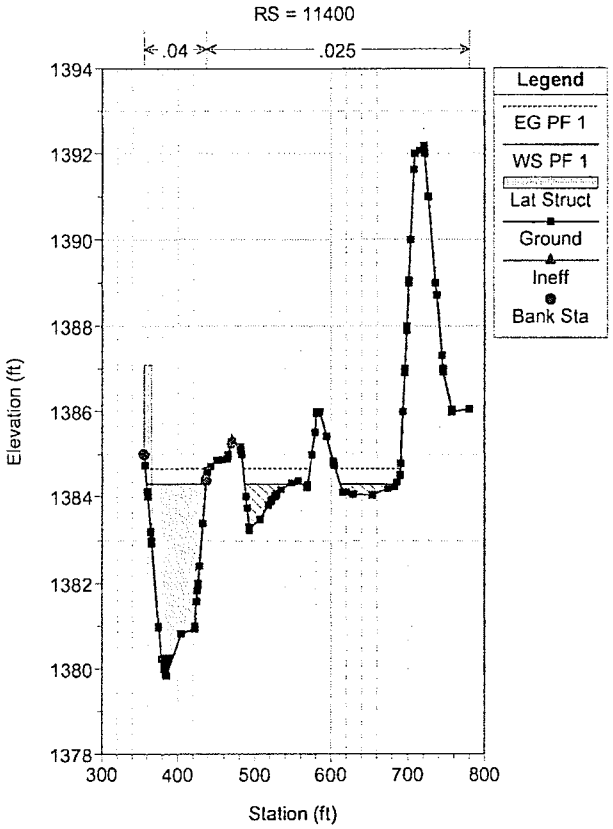

Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 12600
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 12500
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 12400
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 12300
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 12200
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 12100
.04 .025 .04
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 12000
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005
RS = 11900
.04 .025 .04 .025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Bank Sta
Elevation (ft)
Station (ft)

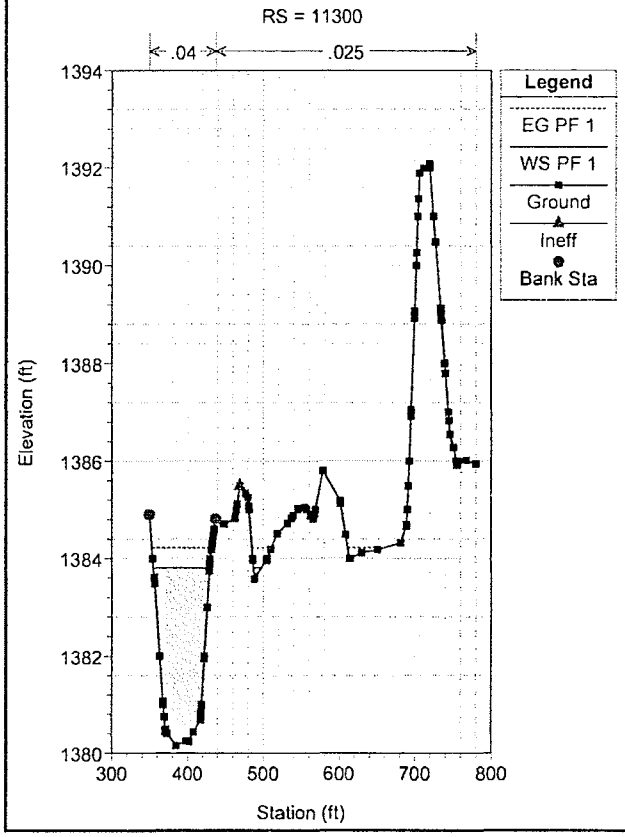
Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005



Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005



Ellsworth Existing Channel Overtopping Plan: Existing Ellsworth Channel Overtopping 05/19/2005



```
                    HEC-RAS Version 3.1.2 April 2004
                      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: Ellsworth Channel
Project File : EllsworthChannel.prj
Run Date and Time: 05/20/2005 8:17:33 AM

Project in English units

Project Description:
Ellsworth Road Channel


*******************************************************************************

PLAN DATA

Plan Title: Final Unplugged Int CIP Q Weir & No Berm
Plan File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.p03

          Geometry Title: Final Un-Plugged With Weir No Berm
          Geometry File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.g03

          Flow Title    : Interim Condition Flows (Interim CIP)
          Flow File     : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.f02

Plan Description:
Final UnPlugged With Weir No Berm:
Proposed Geometry no debris modeled along
culvert bottoms.
Interim CIP Flow Condition
No Berm Considered at Stations
11900 and 11800
Lateral Weir Used to compute flow that breaks out to the west
adjacent to the WGA Property (See Exhibit in Drainage Report for weir
location).


Plan Summary Information:
Number of:  Cross Sections =  227    Multiple Openings  =    0
            Culverts       =    6    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    1

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:     Mixed Flow

*******************************************************************************
```

FLOW DATA

Flow Title: Interim Condition Flows (Interim CIP)
Flow File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.f02

Flow Data (cfs)

River	Reach	RS	PF 1
River	Ellsworth	17100	349
River	Ellsworth	13900	2856
River	Ellsworth	9600	3203
River	Ellsworth	8600	3550

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River	Ellsworth	PF 1	Normal S = 0.000656	Known WS = 1358.73

GEOMETRY DATA

Geometry Title: Final Un-Plugged With Weir No Berm
Geometry File : p:\Phoenix\2004\000\042004045\AMEC Drainage\HEC-RAS\Final 5-17-05\EllsworthChannel.g03

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 17100

INPUT
Description: Channel Station 44799.16
Station Elevation Data num= 140

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1391.14	10.76	1391.3	11.78	1391.32	11.93	1391.32	12.08	1391.32
12.11	1391.33	12.24	1391.37	14.18	1391.98	14.19	1391.98	14.2	1391.98
16.42	1391.57	16.6	1391.54	16.75	1391.42	17.25	1391	17.73	1390.6
18.46	1390	18.53	1389.94	18.59	1389.89	19.75	1389.89	20.07	1389.89
20.08	1389.96	20.08	1390	20.15	1390.5	20.22	1391	20.32	1391.59
20.38	1392	20.48	1392.53	20.56	1393	20.6	1393.22	20.61	1393.28
20.72	1393.09	20.77	1393	20.93	1392.77	21.5	1392	21.65	1391.82
21.79	1391.67	22.56	1391.74	23.86	1391.83	24.69	1391.97	24.87	1392
25.71	1392.14	26.43	1392.26	27.36	1392.42	28.4	1392.3	29.16	1392.16
30.01	1392	31.24	1391.74	34.32	1391.16	37.59	1391.09	39.22	1391.13
39.77	1391.13	40.07	1391.13	42.01	1391.21	44.18	1391.22	45.92	1391.27
46.22	1391.28	46.75	1391.28	47.49	1391.29	48.4	1391.3	52.97	1391.3
53.05	1391.3	53.1	1391.3	53.18	1391.3	53.26	1391.3	53.31	1391.3
57.02	1391.33	60.17	1391.33	60.19	1391.33	60.26	1391.32	60.28	1391.32
60.31	1391.32	60.34	1391.32	60.36	1391.32	60.96	1391.32	66.42	1391.11
66.96	1391.08	67.75	1391.04	68.5	1391	68.6	1391	69.08	1390.97
70.34	1390.96	71.58	1391	71.59	1391.25	71.63	1391.96	72.1	1391.84
75.47	1391	82.76	1390.97	88.92	1390.97	89.1	1390.97	89.51	1390.98
90.43	1391	90.57	1391	93.16	1391.05	102.94	1391.24	137.92	1391.94
170.1	1391.29	177.92	1391.15	179.28	1391.08	179.79	1391.05	180.86	1391
185.39	1391	190.74	1391	191.55	1391.2	191.71	1391.24	194.74	1392
202.47	1392.15	209.04	1392.27	211.25	1392.31	211.43	1392.27	212.5	1392
215.61	1392	216.7	1392	217.09	1392	218.5	1392.05	250	1384.17
260.17	1384.37	290.85	1392.04	291.41	1392	292.16	1392	292.86	1392
302.74	1392	322.71	1392	322.72	1391.91	322.73	1391.88	322.73	1392.1
322.76	1393	325.2	1393	331.62	1393	340.29	1392.56	347.9	1392.18
349.39	1392.11	351.56	1392	352.36	1391.96	355.65	1391.96	365.28	1392
368.66	1392.03	371.03	1392.03	372.94	1392.08	411.88	1392.12	437.8	1392.18

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.5	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.5	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent

```
       0   218.5 1392.05        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 17000

INPUT
Description: Channel Station 44899.16
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1390.62   24.72  1390.7   25.57  1390.7   26.05  1390.7   26.32  1390.7
   27.69 1390.68   53.69 1390.41   54.34 1390.39   55.53 1390.38   56.86 1390.49
    57.4 1390.55   65.33 1390.52   67.35 1390.54   70.05 1390.75   70.53  1390.8
   71.39 1390.88   72.71    1391   72.73 1391.27   72.73 1391.31    72.9 1391.28
    74.3    1391   76.33 1390.49   79.12  1389.8    82.1 1390.29   82.14  1390.3
    89.1 1390.64   89.31 1390.65  137.99 1391.62   138.1 1391.62  138.19 1391.62
   178.1 1390.82  178.15 1390.82   185.1 1390.47  188.07 1389.98   188.1 1389.97
  197.65 1392.36  197.75 1392.39  216.74 1392.42     250 1384.11  260.17 1384.31
  290.85 1391.98  306.85  1392.3  311.45 1391.15  314.33 1391.87  320.04    1393
  332.97 1392.54   347.8    1392  348.65 1391.97  350.81 1391.89  352.66 1391.83
  358.33 1391.89  363.09 1391.89  366.92 1391.98   445.1 1392.07  469.86 1392.13

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  216.74    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.74  290.85              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   218.5 1391.99        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16900

INPUT
Description: Channel Station 44999.16
Station Elevation Data    num=      48
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0  1390.5   17.81 1390.57   27.22 1390.61   32.62 1390.57   36.57 1390.53
   54.87 1390.33   56.78 1390.17   56.82 1390.16   57.17 1390.23    58.6 1390.49
    59.6 1390.49   67.23 1390.47   73.43 1390.53   74.95 1390.57   75.01 1390.55
   79.24 1389.49   79.28 1389.49   82.27 1389.99    82.3 1389.99   89.27 1390.34
   89.48 1390.34  138.16 1391.32  138.27 1391.32  138.36 1391.32  178.27 1390.52
  178.32 1390.51  185.27 1390.17  185.29 1390.16  188.27 1389.67  188.36 1389.69
  198.98 1392.35  217.02 1392.29     250 1384.05  260.17 1384.25  290.85 1391.92
  306.85 1392.24  311.45 1391.09  314.39 1391.82  315.02    1393  320.69 1392.81
  330.91 1392.47   344.8    1392   347.8  1391.9  352.52 1391.74  355.14 1391.74
  360.89 1391.88  478.31 1392.01     500 1392.07

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  217.02    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.02  290.85              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   218.5 1391.93        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16800

INPUT
Description: Channel Station 45099.16
```

Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.48	28.78	1390.33	50.23	1390.28	55.06	1390.28	56.83	1390.06
57.06	1390.03	58.87	1390.42	59.01	1390.45	59.35	1390.45	67.85	1390.4
72.88	1390.41	76.32	1390.43	79.04	1390.45	79.06	1390.44	83.78	1389.27
86.77	1389.77	86.8	1389.77	93.77	1390.12	93.94	1390.12	138.34	1391.01
138.44	1391.01	138.52	1391.01	177.1	1390.24	177.15	1390.24	184.1	1389.89
184.13	1389.88	187.1	1389.39	187.2	1389.41	198.25	1392.18	217.47	1392.12
250	1383.99	260.17	1384.19	290.85	1391.86	306.85	1392.18	311.45	1391.03
313.9	1391.64	344.24	1392	346.24	1391.94	353.1	1391.73	354.87	1391.78
500	1391.95								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.47	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.47	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.87	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16700

INPUT
Description: Channel Station 45199.16
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.3	30.3	1390.27	30.63	1390.27	30.92	1390.27	31.06	1390.27
31.54	1390.27	56.41	1390.11	56.94	1390.05	57.49	1390	57.94	1389.96
58.02	1389.95	58.05	1389.96	58.23	1390	58.45	1390.04	59.56	1390.25
66.97	1390.34	68.52	1390.36	69.83	1390.37	71.72	1390.38	77.6	1390.42
77.62	1390.37	77.67	1390.3	81.81	1390.12	82.67	1390.47	82.7	1390.46
88.28	1389.08	91.27	1389.57	91.3	1389.57	98.27	1389.92	98.4	1389.93
121.63	1390.39	138.51	1390.73	138.6	1390.73	138.69	1390.73	175.94	1389.98
182.94	1389.63	182.96	1389.63	185.94	1389.13	186.04	1389.16	198.06	1392.16
217.43	1392.07	250	1383.93	260.17	1384.13	290.85	1391.8	306.85	1392.12
311.45	1390.97	314.24	1391.67	322.61	1392	339.02	1392	340.79	1391.95
346.11	1391.81	348.83	1391.74	352.82	1391.63	355.88	1391.63	383.6	1391.72
500	1391.85								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.43	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.43	290.85	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.81	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16600

INPUT
Description: Channel Station 45299.16
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390.2	10.68	1390.23	31.49	1390.31	54.52	1390.13	56.4	1390.12
56.91	1390.06	57.4	1390	57.52	1389.98	58.53	1389.86	58.87	1389.94
59.09	1390	59.32	1390.06	59.89	1390.21	66.96	1390.24	68.39	1390.24
69.45	1390.25	70.53	1390.25	77.74	1390.25	78.27	1390.22	79.02	1390.17
85.81	1390.05	87.37	1390.4	87.39	1390.39	92.78	1389.05	95.77	1389.55
95.79	1389.55	102.77	1389.9	102.86	1389.9	138.69	1390.61	138.77	1390.62
174.52	1389.9	174.77	1389.9	181.72	1389.55	181.77	1389.55	184.75	1389.05

```
  184.77 1389.05   197.2 1392.15  197.33 1392.19     217 1392.12     250 1383.87
  260.17 1384.07  290.85 1391.74  306.85 1392.06  311.45 1390.91  314.03 1391.55
  323.94    1392  329.33    1392  331.05    1392  332.15    1392  335.48    1392
  341.62 1391.85  353.44 1391.57  371.54  1391.6  399.29 1391.59  425.52 1391.67
     500 1391.76

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025     217    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          217  290.85               100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   218.5 1391.75       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16500

INPUT
Description: Channel Station 45399.16
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1389.97    5.84 1389.98   11.56    1390   18.04 1390.02   27.47 1390.04
   31.18 1390.05   38.98 1390.02   41.81    1390   54.06 1389.93   56.98 1389.91
   57.27 1389.86   58.48 1389.66   59.26  1389.8   59.99 1389.94   65.59 1389.99
   66.14    1390   66.45    1390   69.73 1390.03    75.5 1390.06   77.51 1390.06
   79.48 1390.04   80.37 1390.04   81.66 1390.01   81.97    1390   85.45    1390
   86.38    1390   95.86 1389.62   95.89 1389.61   95.94 1389.63   95.96 1389.63
  102.94 1389.98  103.03 1389.98   121.8 1390.35  138.94  1390.7  139.02 1390.69
  174.94 1389.98  174.99 1389.97  181.94 1389.63  184.91 1389.13  184.94 1389.13
  197.09 1392.16   217.1 1392.03     250 1383.81  260.17 1384.01  290.85 1391.68
  306.85    1392  311.45 1390.85  313.82 1391.44  327.61    1392  336.18  1391.8
  343.01 1391.63  347.08 1391.54  349.41 1391.48   350.8 1391.45  353.64 1391.38
  389.07 1391.52  416.54 1391.56  442.71 1391.55  467.44 1391.63     500 1391.67

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025   217.1    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.1  290.85               100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  210.45 1392.15       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16400

INPUT
Description: Channel Station 45499.16
Station Elevation Data    num=      59
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1389.83   26.97 1389.91   32.12 1389.92   34.55 1389.91   37.65 1389.89
   47.58 1389.82   56.72 1389.76   57.34 1389.68   58.84 1389.49   59.98 1389.79
   60.36 1389.89   66.76 1389.89   69.48 1389.89   71.59 1389.89   75.54 1389.88
   79.47  1389.9   81.72 1389.91   86.55 1389.94    88.2 1389.95   90.05 1389.96
   91.44 1389.96   93.06 1389.97   95.22 1389.65   96.11 1389.87  103.09 1390.22
  103.11 1390.22   103.2 1390.22  139.03 1390.94  139.11 1390.94  139.19 1390.94
  175.11 1390.22  175.16 1390.22  182.11 1389.87  185.08 1389.38  185.11 1389.37
   185.2  1389.4  196.25 1392.16  216.81 1392.04     250 1383.75  260.17 1383.95
  290.85 1391.62  306.85 1391.94  311.45 1390.79  314.34 1391.51  325.16    1392
  331.96 1391.89  338.64 1391.79  342.22 1391.73  344.45  1391.7  345.96 1391.67
  347.11 1391.66  348.03 1391.64     354 1391.57  359.13 1391.56  399.99 1391.34
  435.73 1391.48  461.54 1391.52  486.13 1391.51     500 1391.56

Manning's n Values         num=       5
```

```
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************************
       0    .025  216.81    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.81  290.85              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  210.11 1392.18       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16300

INPUT
Description: Channel Station 45599.16
Station Elevation Data     num=      53
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
       0 1389.69   32.22 1389.64   33.59 1389.64   37.66 1389.65   56.26  1389.7
   58.18 1389.46   59.35 1389.32   60.57  1389.8   60.64 1389.83   61.03 1389.83
    70.3 1389.73   71.45 1389.74   75.08 1389.76   81.69 1389.78   83.07 1389.78
   83.91  1389.8   84.49 1389.81   86.81 1389.85   94.97 1389.82   96.28 1390.14
  103.26 1390.49  103.28 1390.49  103.37  1390.5  139.19 1391.21  139.28 1391.21
  175.02  1390.5  175.28 1390.49  182.22 1390.15  182.28 1390.14  185.25 1389.65
  185.28 1389.64  185.36 1389.67  195.23 1392.13  216.38 1392.09     250 1383.69
  260.17 1383.89  290.85 1391.56  306.85 1391.88  311.45 1390.73  315.12 1391.64
  315.13    1392  315.18    1392  315.29    1392  350.57 1391.62  352.33  1391.6
  353.49 1391.58     354 1391.58  354.56 1391.58  354.89 1391.58  410.73 1391.52
  448.96 1391.31   482.4 1391.45     500 1391.47

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************************
       0    .025  216.38    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.38  290.85              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  209.82 1392.19       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 16200

INPUT
Description: Channel Station 45699.16
Station Elevation Data     num=      46
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
       0 1389.29   20.73 1389.33   35.37 1389.38   43.67 1389.35   55.39 1389.38
   56.43 1389.38   56.74 1389.36   59.77 1389.08   61.05  1389.5    61.4 1389.62
    64.9 1389.62   68.88 1389.62   75.67 1389.65   82.62 1389.67   84.42 1389.66
   88.97  1389.8   92.23 1389.91   94.77    1390   96.45 1390.42  103.43 1390.76
  103.45 1390.77  122.05 1391.14  139.36 1391.48  139.45 1391.49  175.19 1390.77
  175.45 1390.77  182.39 1390.42  182.45 1390.42  185.42 1389.92  185.45 1389.92
  185.51 1389.93  193.61 1391.96  217.01 1391.87     250 1383.63  260.17 1383.83
  290.85  1391.5  306.85 1391.82  311.45 1390.67  314.38  1391.4  324.38 1391.44
  357.97 1391.58  370.81 1391.57  410.34 1391.53  462.34 1391.47  497.93 1391.28
     500 1391.29

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************************
       0    .025  217.01    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.01  290.85              100     100     100              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   218.5 1391.51       F
```

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16100

INPUT
Description: Channel Station 45799.16
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1389.29	20.64	1389.29	36.84	1389.27	48.77	1389.33	57.01	1389.37
58.43	1389.22	59.57	1389.1	59.91	1389.07	60.15	1389.14	61.24	1389.5
62.14	1389.46	63.87	1389.39	72.43	1389.44	74.94	1389.45	76.08	1389.45
84.46	1389.52	85.77	1389.53	87.18	1389.63	92.28	1390	94.74	1390.22
96.61	1390.69	103.61	1391.04	139.53	1391.76	139.61	1391.76	175.36	1391.04
175.61	1391.04	182.56	1390.69	182.61	1390.69	185.59	1390.19	185.61	1390.19
185.67	1390.2	192.56	1391.92	217.41	1391.71	250	1383.57	260.17	1383.77
290.85	1391.44	306.85	1391.76	311.45	1390.61	314.05	1391.26	341.08	1391.39
347.47	1391.41	358.65	1391.46	364.74	1391.11	396.03	1391.53	429.19	1391.52
465.8	1391.48	500	1391.45						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.41	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.41	290.85	100	100	100	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.45	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 16000

INPUT
Description: Channel Station 45899.16
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1389.11	31.81	1389.17	36.97	1389.18	38.32	1389.18	40.58	1389.2
57.11	1389.31	58.89	1389.04	59.13	1389	59.17	1388.99	59.22	1388.99
59.23	1388.99	59.26	1389	59.76	1389.15	60.77	1389.45	62.38	1389.31
62.91	1389.26	74.67	1389.39	75.83	1389.4	79.25	1389.4	87.12	1389.4
88.25	1389.57	88.89	1389.65	91.04	1389.96	91.35	1390	92.65	1390.19
94.32	1390.32	96.78	1390.94	96.81	1390.94	103.78	1391.29	103.87	1391.29
139.7	1392.01	139.78	1392.01	175.52	1391.29	175.78	1391.29	182.72	1390.94
182.78	1390.94	185.76	1390.44	185.78	1390.44	187.79	1390.94	187.81	1390.94
217.52	1391.63	250	1383.51	260.17	1383.71	290.85	1391.38	306.85	1391.7
311.45	1390.55	314.37	1391.28	336.22	1391.34	359.93	1391.43	364.74	1391.01
370.79	1390.59	374.6	1390.37	457.06	1391.48	487.57	1391.47	500	1391.46

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	217.52	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
217.52	290.85	33.5	33.5	33.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	218.5	1391.49	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15966.5

INPUT
Description: Begin Channel Bottom Transition (Begin Flow Constriction)
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
*****************************************************************************
   94.13 1390.31   96.84 1390.99  103.84 1391.34  139.84 1392.06  175.84 1391.34
  182.84 1390.99  185.84 1390.49  188.19 1391.08  189.51 1390.97   194.5 1391.74
  217.68 1391.56     250 1383.49  260.17 1383.69  290.85 1391.36  306.85 1391.68
  311.45 1390.53  314.75 1391.35

Manning's n Values          num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
*****************************************************************************
   94.13    .025  217.68     .04      250    .028  260.17     .04  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        217.68  290.85             19.34   19.34   19.34              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15947.5

INPUT
Description: Full Riprap Section
Station Elevation Data     num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
   94.06  1390.3   96.76 1390.98   96.92 1391.01  103.75 1391.35  104.05 1391.36
  139.68 1392.08  139.91 1392.08  175.61 1391.37     176 1391.35   182.6 1391.02
  183.01 1390.99  185.59 1390.56  186.01 1390.55  187.94 1391.03  189.15 1391.19
  189.26 1391.18  189.93 1391.18  194.24 1391.74  196.44  1391.9  217.37 1391.63
  235.61 1384.86     250 1383.48  260.17 1383.68  274.46 1385.06  290.85 1391.35
  306.74 1391.66  307.08 1391.61   311.3 1390.55  311.75 1390.59   315.1 1391.43

Manning's n Values          num=       4
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
*****************************************************************
   94.06    .025  217.37     .04  290.85    .025   315.1    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        217.37  290.85              10      10      10              .1       .3
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
   94.06     226    1391       F
     274   315.1    1391       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15937.5

INPUT
Description: Upstream End of Wingwall
Station Elevation Data     num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
   94.02  1390.3   96.88 1391.01     104 1391.37  139.83 1392.09  175.89 1391.37
  182.89 1391.02  185.89 1390.52  189.02  1391.3   189.8 1391.23  196.31 1391.99
  217.22 1391.66  235.54 1383.76     250 1383.47  274.46 1383.96  290.85 1391.34
  306.85 1391.66  311.45 1390.51  315.27 1391.47

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*****************************************
   94.02    .025  217.22    .015  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        217.22  290.85             16.83   16.83   16.83              .1       .3
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
   94.02     231    1391       F
     269  315.27    1391       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15920.67
```

```
INPUT
Description: Upstream Face of C3
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  239.09    1392  239.09 1383.46  260.92 1383.46  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        239.09  260.92                 50      50      50              .1       .3

CULVERT


RIVER: River
REACH: Ellsworth          RS: 15895

INPUT
Description:
Distance from Upstream XS =      15
Deck/Roadway Width        =      20
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************
       0  1391.3              500  1391.3

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  239.09    1392  239.09 1383.46  260.92 1383.46  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Coeff Contr.   Expan.
        239.09  260.92              .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************
       0  1391.3              500  1391.3

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  239.09    1392  239.09 1383.42  260.92 1383.42  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Coeff Contr.   Expan.
        239.09  260.92              .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         =
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 #3          Box        6       10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      50     .015     .015         0                .4                 1
Number of Barrels =  2
Upstream   Elevation =  1383.46
Centerline Stations
    Sta.    Sta.
  244.45  255.45
Downstream Elevation =  1383.43
Centerline Stations
    Sta.    Sta.
  244.45  255.45

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15870.67

INPUT
Description: Downstream Face of C3
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  239.09    1392  239.09 1383.42  260.92 1383.42  260.92    1392

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  239.09          239.09    .015  260.92

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        239.09  260.92             15.17   15.17   15.17              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15855.5

INPUT
Description: Downstream End of Wingwall (Full Riprap Section)
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   94.83 1390.47   97.02 1391.02  104.02 1391.37  140.03 1392.09  176.03 1391.37
  183.03 1391.02   185.2 1390.48  190.54 1391.03  198.34 1390.66  212.67 1390.33
  216.51 1391.29  218.51 1391.29  235.54 1383.71     250 1383.42  274.46 1383.91
  290.85 1391.29  306.85 1391.61  313.25 1390.01

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
   94.83    .025  218.51     .04  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        218.51  290.85               10      10      10              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   94.83     232    1391       F
     269  313.25    1391       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15845.5

INPUT
Description: End Full Riprap Section
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
```

```
   93.55 1390.14   95.77 1390.69    99.5 1391.13  102.84  1391.3  106.36 1391.41
  139.22 1392.06  141.64 1392.05  175.59 1391.37  176.92 1391.32  182.66 1391.03
  183.78 1390.83  184.86 1390.56  185.85 1390.54  190.25 1390.96  192.49 1390.96
  198.13 1390.64  199.03  1390.6  212.61 1390.35  213.11 1390.44  216.49 1391.28
  216.55 1391.28  218.51 1391.28  235.54 1384.81     250 1383.41  260.17 1383.62
  274.46    1385  290.85 1391.28  307.65 1391.62  308.21 1391.53  314.36    1390

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
   93.55    .025  218.51     .04  235.54    .028  274.46     .04  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        218.51  290.85             19.28   19.28   19.28              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   93.55     227    1391       F
     274  314.36    1391       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15826.6

INPUT
Description: End Channel Bottom Transition (Fully Expanded Flow)
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
      91 1389.47   97.07 1390.99  104.07 1391.34  140.07 1392.06  176.07 1391.34
  183.07 1390.99  185.18 1390.47  191.96 1391.02  198.63 1390.52     213  1390.4
  216.51 1391.27  218.51 1391.27     250  1383.4  260.17  1383.6  290.85 1391.27
  309.85 1391.65  316.59 1389.97

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
      91    .025  218.51    .032     250    .028  260.17    .032  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        218.51  290.85              17.6    17.6    17.6              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15809

INPUT
Description: Channel Station 46090.16, culvert section 1
Station Elevation Data    num=      81
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1389.03   18.13 1389.12   21.64 1389.13   36.19 1389.13   43.36 1389.21
   59.56 1389.26   62.06 1389.27   74.57 1389.39   86.67 1389.22   89.82 1389.15
   91.09 1389.46   91.67 1389.61   93.27 1390.01   93.78 1390.12   97.92 1391.01
   99.97 1391.11     102 1391.21  104.11 1391.32  114.31 1391.52   123.5 1391.71
  138.62 1392.01  139.15 1392.02  140.11 1392.04  140.87 1392.02   141.6 1392.01
  155.72 1391.73  166.08 1391.52  176.11 1391.32  178.12 1391.22  180.04 1391.12
  182.31 1391.01  185.32 1391.01  192.82 1391.01  206.18 1391.89  207.27 1391.96
  207.27 1391.89   207.3 1391.01  207.68 1391.01  210.23 1391.01  210.31 1391.01
  210.55 1391.01  210.61 1391.01  210.88 1391.01  210.98 1391.01  211.04 1391.01
  211.64 1390.81  212.98 1390.35  215.34 1390.94  215.62 1391.01  215.83 1391.01
   218.5 1391.31     250 1383.43  260.17  1383.6  290.85 1391.27  294.21 1391.01
  303.87 1391.01  312.96 1390.35  314.32 1390.24   317.1 1390.01  317.12 1390.01
  317.13 1390.01  317.14 1390.01  317.15    1390  317.29 1389.97  317.29    1390
  317.29 1390.01  317.31 1390.56  317.31 1390.77  317.32 1391.01  318.69 1391.01
  322.99 1391.01  350.95 1390.12  353.11 1390.05  353.66 1390.04  356.75 1389.97
  366.29 1389.76  372.53  1389.7  376.33 1389.63  448.65 1389.63  449.09 1389.63
     500 1390.32

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025   218.5    .032     250    .028  260.17    .032  290.85    .025
```

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.5	290.85	9	9	9	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15800

INPUT
Description: Channel Station 46099.16
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1389.02	18.13	1389.11	21.64	1389.12	36.19	1389.12	43.36	1389.2
59.56	1389.25	62.06	1389.26	74.57	1389.38	86.67	1389.21	89.82	1389.14
89.85	1389.14	97.1	1390.95	97.12	1390.96	104.1	1391.3	104.12	1391.31
104.21	1391.31	140.12	1392.03	175.86	1391.31	176.12	1391.31	183.06	1390.96
183.13	1390.95	185.12	1390.46	212.84	1390.34	216.51	1391.26	218.51	1391.26
250	1383.39	260.17	1383.59	290.85	1391.26	313.71	1391.72	320.72	1389.97
322.99	1391	350.95	1390.11	353.11	1390.04	353.66	1390.03	356.75	1389.96
366.29	1389.75	372.53	1389.69	376.33	1389.62	448.65	1389.62	449.09	1389.62
500	1390.31								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15700

INPUT
Description: Channel Station 46199.16
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.86	1.24	1388.86	12.03	1388.86	32.9	1388.82	40.86	1388.82
52.15	1388.97	54.77	1389	60.06	1389.06	62.35	1389.09	65.2	1389.12
72.62	1389.15	87.68	1389.19	89.03	1389.11	89.3	1389.1	90.8	1389.36
91.52	1389.28	91.55	1389.29	97.29	1390.72	104.27	1391.07	104.29	1391.07
104.38	1391.08	140.29	1391.79	140.37	1391.79	176.29	1391.07	176.34	1391.07
183.29	1390.72	183.53	1390.66	195.63	1390.97	212.43	1390.18	216.51	1391.2
218.51	1391.2	250	1383.33	260.17	1383.53	290.85	1391.2	313.87	1391.66
321.39	1389.78	321.82	1391	322.37	1391	323.64	1391	325.88	1390.93
354.31	1390	356.07	1389.95	358.03	1389.89	364.79	1389.74	500	1389.75

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15600

INPUT
Description: Channel Station 46299.16
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.6	17.79	1388.64	25.45	1388.65	25.95	1388.66	26.61	1388.65
50.32	1388.7	50.59	1388.7	51.14	1388.7	53.3	1388.72	55.43	1388.72
56.49	1388.73	57.52	1388.73	58.64	1388.73	69.61	1388.8	81.5	1388.9
81.57	1388.91	81.66	1388.93	81.97	1389	85.49	1389.72	85.75	1389.77
85.91	1389.74	88.14	1389.2	88.73	1389.05	91.2	1389.39	93.11	1389.39

97.44	1390.47	97.46	1390.47	97.48	1390.47	104.46	1390.82	104.54	1390.82
140.37	1391.54	140.46	1391.54	176.2	1390.83	176.46	1390.82	183.4	1390.47
183.46	1390.47	183.67	1390.42	185.8	1390.89	196.85	1391.21	212.17	1390.05
216.51	1391.14	218.51	1391.14	250	1383.27	260.17	1383.47	290.85	1391.14
306.85	1391.46	314.12	1389.64	339.64	1390	344.56	1390	349.96	1390
351.18	1389.97	355.9	1389.87	357.61	1389.83	358.33	1389.81	359.16	1389.8
362.72	1389.8	416.39	1389.88	420.5	1389.88	500	1389.88		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.032	250	.028	260.17	.032	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	50	50	50	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15550

INPUT
Description: Channel Station 46349.16, upstream end of riprap
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.61	15.93	1388.62	23.24	1388.63	31.64	1388.64	31.69	1388.64
52.97	1388.74	69.21	1388.78	82.22	1388.79	82.3	1388.81	82.52	1388.84
82.6	1388.85	83.83	1389.04	85.48	1389.29	86.7	1389.48	87.43	1389.35
89	1389.07	92.54	1389.5	93.45	1389.6	94.9	1389.78	97.1	1390.04
97.29	1390.05	105.74	1390.71	110.85	1390.81	113.48	1390.86	117.45	1390.93
122.1	1391.02	123.27	1391.04	123.71	1391.05	126.43	1391.1	128.28	1391.13
132.17	1391.21	135.1	1391.26	136.72	1391.29	137.73	1391.31	143.1	1391.41
157.85	1391.11	161.4	1391.04	161.61	1391.04	167.86	1390.92	171.29	1390.85
173.36	1390.81	180.46	1390.66	196.48	1390.97	199.99	1391.04	202.29	1391.22
203.13	1391.28	205.44	1391.46	208.45	1391.7	209.13	1391.75	210.83	1391.89
211.46	1391.06	211.5	1391.04	211.54	1391.04	212.12	1391.04	212.56	1391.04
212.57	1391.04	212.65	1391.04	212.9	1391.02	213.09	1390.98	213.3	1390.29
213.87	1390.43	216.29	1391.04	218.49	1391.04	218.51	1391.11	250	1383.24
260.17	1383.44	290.85	1391.11	293.63	1391.04	294.62	1391.04	303.93	1390.42
309.62	1390.04	309.85	1389.99	309.9	1389.98	309.93	1389.97	310.03	1389.95
310.32	1389.89	310.5	1389.85	311.04	1389.85	311.05	1389.74	311.59	1389.76
311.88	1390.04	312.81	1390.04	313.16	1390.04	313.47	1390.04	313.81	1390.04
314.09	1390.04	314.42	1390.04	314.69	1390.04	322.48	1390.04	326.79	1390.01
334.15	1390.02	355.92	1389.99	364.67	1389.98	371.47	1389.93	414.56	1390
420.45	1390.01	426.94	1390.01	496.17	1390.06	500	1390.07		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.51	.04	290.85	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
218.51	290.85	64	90	120	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15460

INPUT
Description: Channel Station 46439.16, culvert section 4
Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.56	15.93	1388.57	23.24	1388.58	31.64	1388.59	31.69	1388.59
52.97	1388.69	69.21	1388.73	82.22	1388.74	82.3	1388.76	82.52	1388.79
82.6	1388.8	83.83	1388.99	85.48	1389.24	86.7	1389.43	87.43	1389.3
89	1389.02	92.54	1389.45	93.45	1389.55	94.9	1389.73	97.1	1389.99
97.29	1390	105.74	1390.66	110.85	1390.76	113.48	1390.81	117.45	1390.88
122.1	1390.97	123.27	1390.99	123.71	1391	126.43	1391.05	128.28	1391.08
132.17	1391.16	135.1	1391.21	136.72	1391.24	137.73	1391.26	143.1	1391.36
157.85	1391.06	161.4	1390.99	161.61	1390.99	167.86	1390.87	171.29	1390.8
173.36	1390.76	180.46	1390.61	196.48	1390.92	199.99	1390.99	202.29	1391.17
203.13	1391.23	205.44	1391.41	208.45	1391.65	209.13	1391.7	210.83	1391.84

```
  211.46 1391.01   211.5 1390.99  211.54 1390.99  212.12 1390.99  212.56 1390.99
  212.57 1390.99  212.65 1390.99   212.9 1390.97  213.09 1390.93   213.3 1390.24
  213.87 1390.38  216.29 1390.99   218.5 1390.09  238.26 1388.61  245.52 1383.18
     250 1383.18  265.63 1383.18  265.63 1387.25  271.63 1388.83  290.85 1390.09
  293.63 1390.99  294.62 1390.99  303.93 1390.37  309.62 1389.99  309.85 1389.94
   309.9 1389.93  309.93 1389.92  310.03  1389.9  310.32 1389.84   310.5  1389.8
  311.04  1389.8  311.05 1389.69  311.59 1389.71  311.88 1389.99  312.81 1389.99
  313.16 1389.99  313.47 1389.99  313.81 1389.99  314.09 1389.99  314.42 1389.99
  314.69 1389.99  322.48 1389.99  326.79 1389.96  334.15 1389.97  355.92 1389.94
  364.67 1389.93  371.47 1389.88  414.56 1389.95  420.45 1389.96  426.94 1389.96
  496.17 1390.01     500 1390.02

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .025  216.29    .015  293.63    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.29  293.63                 10      10      10              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15450

INPUT
Description: Channel Station 46449.16, culvert section 3
Station Elevation Data    num=     101
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1387.24   15.93 1387.25   23.24 1387.26   31.64 1387.27   31.69 1387.27
   52.97 1387.37   69.21 1387.41   82.22 1387.42    82.3 1387.44   82.52 1387.47
    82.6 1387.48   83.83 1387.67   85.48 1387.92    86.7 1388.11   87.43 1387.98
      89  1387.7   92.54 1388.13   93.45 1388.23    94.9 1388.41    97.1 1388.67
   97.29 1388.68  105.74 1389.34  110.85 1389.44  113.48 1389.49  117.45 1389.56
   122.1 1389.65  123.27 1389.67  123.71 1389.68  126.43 1389.73  128.28 1389.76
  132.17 1389.84   135.1 1389.89  136.72 1389.92  137.73 1389.94   143.1 1390.04
  157.85 1389.74   161.4 1389.67  161.61 1389.67  167.86 1389.55  171.29 1389.48
  173.36 1389.44  180.46 1389.29  196.48  1389.6  199.99 1389.67  202.29 1389.85
  203.13 1389.91  205.44 1390.09  208.45 1390.33  209.13 1390.38  210.83 1390.52
  211.46 1389.69   211.5 1389.67  211.54 1389.67  212.12 1389.67  212.56 1389.67
  212.57 1389.67  212.65 1389.67   212.9 1389.65  213.09 1389.61   213.3 1388.92
  213.87 1389.06  216.29 1389.67   218.5 1390.09  238.26 1388.61  245.52  1386.9
  245.52 1381.86     250 1381.86  265.63 1381.86  265.63 1387.25  271.63 1388.83
  290.85 1390.09  306.84 1389.77  309.62 1388.67  309.85 1388.62   309.9 1388.61
  309.93  1388.6  310.03 1388.58  310.32 1388.52   310.5 1388.48  311.04 1388.48
  311.05 1388.37  311.59 1388.39  311.88 1388.67  312.81 1388.67  313.16 1388.67
  313.47 1388.67  313.81 1388.67  314.09 1388.67  314.42 1388.67  314.69 1388.67
  322.48 1388.67  326.79 1388.64  334.15 1388.65  355.92 1388.62  364.67 1388.61
  371.47 1388.56  414.56 1388.63  420.45 1388.64  426.94 1388.64  496.17 1388.69
     500  1388.7

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .025   218.5    .015  290.85    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         218.5  290.85                258     258     258              .3       .5
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
       0  245.81 1389.92        F
  266.81     500 1389.92        F

CULVERT


RIVER: River
REACH: Ellsworth          RS: 15350

INPUT
Description:
Distance from Upstream XS =       .1
Deck/Roadway Width        =      240
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
```

num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1389.9		500	1389.9	

Upstream Bridge Cross Section Data
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.24	15.93	1387.25	23.24	1387.26	31.64	1387.27	31.69	1387.27
52.97	1387.37	69.21	1387.41	82.22	1387.42	82.3	1387.44	82.52	1387.47
82.6	1387.48	83.83	1387.67	85.48	1387.92	86.7	1388.11	87.43	1387.98
89	1387.7	92.54	1388.13	93.45	1388.23	94.9	1388.41	97.1	1388.67
97.29	1388.68	105.74	1389.34	110.85	1389.44	113.48	1389.49	117.45	1389.56
122.1	1389.65	123.27	1389.67	123.71	1389.68	126.43	1389.73	128.28	1389.76
132.17	1389.84	135.1	1389.89	136.72	1389.92	137.73	1389.94	143.1	1390.04
157.85	1389.74	161.4	1389.67	161.61	1389.67	167.86	1389.55	171.29	1389.48
173.36	1389.44	180.46	1389.29	196.48	1389.6	199.99	1389.67	202.29	1389.85
203.13	1389.91	205.44	1390.09	208.45	1390.33	209.13	1390.38	210.83	1390.52
211.46	1389.69	211.5	1389.67	211.54	1389.67	212.12	1389.67	212.56	1389.67
212.57	1389.67	212.65	1389.67	212.9	1389.65	213.09	1389.61	213.3	1388.92
213.87	1389.06	216.29	1389.67	218.5	1390.09	238.26	1388.61	245.52	1386.9
245.52	1381.86	250	1381.86	265.63	1381.86	265.63	1387.25	271.63	1388.83
290.85	1390.09	306.84	1389.77	309.62	1388.67	309.85	1388.62	309.9	1388.61
309.93	1388.6	310.03	1388.58	310.32	1388.52	310.5	1388.48	311.04	1388.48
311.05	1388.37	311.59	1388.39	311.88	1388.67	312.81	1388.67	313.16	1388.67
313.47	1388.67	313.81	1388.67	314.09	1388.67	314.42	1388.67	314.69	1388.67
322.48	1388.67	326.79	1388.64	334.15	1388.65	355.92	1388.62	364.67	1388.61
371.47	1388.56	414.56	1388.63	420.45	1388.64	426.94	1388.64	496.17	1388.69
500	1388.7								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	218.5	.015	290.85	.025

Bank Sta: Left	Right	Coeff Contr.	Expan.
218.5	290.85	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	245.81	1389.92	F
266.81	500	1389.92	F

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1389.2		500	1389.2	

Downstream Bridge Cross Section Data
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.25	60.13	1388.44	69.15	1388.28	93.13	1388.37	96.58	1388.39
124.12	1388.45	139.64	1388.47	161.29	1388.49	172.36	1388.51	176.48	1388.65
177.07	1388.67	186.9	1388.81	187.55	1388.82	188.75	1388.8	191.19	1388.65
193.04	1388.18	193.76	1388	195	1388	197.43	1388	202.57	1388
209.15	1388.28	239.83	1380.61	250	1380.41	281.51	1388.28	287.04	1388
289.89	1388	295.91	1388	297.53	1388	301.89	1388	303.66	1388.44
305.84	1388.99	305.91	1389.01	307.1	1389.23	313.97	1389.91	314.88	1389.92
315.26	1389.93	315.74	1389.94	316.21	1389.94	317.03	1389.95	317.25	1389.96
318.14	1389.97	320.07	1390	320.63	1390.01	323.36	1390.05	325.2	1390.08
326.35	1390.09	329.41	1390.14	330.19	1390.15	330.76	1390.16	331.15	1390.16
332.02	1390.18	333.07	1390.19	334.42	1390.21	335.29	1390.23	335.77	1390.23
335.9	1390.24	336.12	1390.24	336.2	1390.24	336.97	1390.25	338.61	1390.28
339.95	1390.3	341.21	1390.31	342.88	1390.34	343.92	1390.35	351.94	1390.47
352.29	1390.48	352.42	1390.48	352.51	1390.48	352.55	1390.48	352.58	1390.48
352.63	1390.48	352.7	1390.48	352.82	1390.49	353	1390.49	353.11	1390.49
353.32	1390.49	353.48	1390.5	358.08	1390.56	358.83	1390.51	359.23	1390.48
359.86	1390.44	360.44	1390.4	361.94	1390.29	366.14	1390	366.31	1390
366.84	1390	369.11	1390	370.45	1390	374	1390	389.86	1390
390.42	1389.99	394.12	1389.92	399.2	1389.83	399.41	1389.83	400.4	1389.81
402.2	1389.78	402.52	1389.78	402.58	1389.79	402.65	1389.79	402.75	1389.79
402.87	1389.79	402.97	1389.79	403.05	1389.79	415.23	1389.94	415.25	1389.94
415.78	1389.95	416.94	1389.97	419.06	1390	419.24	1390	421.48	1390.23
422.47	1390.34	423.97	1390.5	424.75	1390.58	427.98	1390.93	428.15	1390.95
428.58	1391	432.46	1391.42	435.28	1391.73	435.39	1391.71	435.44	1391.7

435.5	1391.68	435.56	1391.67	435.73	1391.64	437.03	1391.35	438.42	1391.05
438.6	1391	442.33	1390.28	444.08	1390	444.69	1389.94	444.78	1389.93
444.83	1389.92	455.45	1389.89	498.85	1389.46	500	1389.46		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.04	281.51	.025

Bank Sta: Left Right Coeff Contr. Expan.
209.15 281.51 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	226.98	1389.13	F
261.98	500	1389.13	F

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 =
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 #4	Box	6	10

FHWA Chart # 11- Skewed headwall; Chamfered or beveled Inlet
FHWA Scale # 1 - Headwall skewed 45 deg.; inlet edges chamfered 3/4 inch
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	0	240	.015	.015	0	.4	1

Number of Barrels = 2
Upstream Elevation = 1381.86
Centerline Stations

Sta.	Sta.
250.81	261.81

Downstream Elevation = 1380.41
Centerline Stations

Sta.	Sta.
238.98	249.98

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 15192

INPUT
Description: Channel Station 46707.16, culvert section 2
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388.25	60.13	1388.44	69.15	1388.28	93.13	1388.37	96.58	1388.39
124.12	1388.45	139.64	1388.47	161.29	1388.49	172.36	1388.51	176.48	1388.65
177.07	1388.67	186.9	1388.81	187.55	1388.82	188.75	1388.8	191.19	1388.65
193.04	1388.18	193.76	1388	195	1388	197.43	1388	202.57	1388
209.15	1388.28	239.83	1380.61	250	1380.41	281.51	1388.28	287.04	1388
289.89	1388	295.91	1388	297.53	1388	301.89	1388	303.66	1388.44
305.84	1388.99	305.91	1389.01	307.1	1389.23	313.97	1389.91	314.88	1389.92
315.26	1389.93	315.74	1389.94	316.21	1389.94	317.03	1389.95	317.25	1389.96
318.14	1389.97	320.07	1390	320.63	1390.01	323.36	1390.05	325.2	1390.08
326.35	1390.09	329.41	1390.14	330.19	1390.15	330.76	1390.16	331.15	1390.16
332.02	1390.18	333.07	1390.19	334.42	1390.21	335.29	1390.23	335.77	1390.23
335.9	1390.24	336.12	1390.24	336.2	1390.24	336.97	1390.25	338.61	1390.28
339.95	1390.3	341.21	1390.31	342.88	1390.34	343.92	1390.35	351.94	1390.47
352.29	1390.48	352.42	1390.48	352.51	1390.48	352.55	1390.48	352.58	1390.48
352.63	1390.48	352.7	1390.48	352.82	1390.49	353	1390.49	353.11	1390.49
353.32	1390.49	353.48	1390.5	358.08	1390.56	358.83	1390.51	359.23	1390.48
359.86	1390.44	360.44	1390.4	361.94	1390.29	366.14	1390	366.31	1390
366.84	1390	369.11	1390	370.45	1390	374	1390	389.86	1390
390.42	1389.99	394.12	1389.92	399.2	1389.83	399.41	1389.83	400.4	1389.81
402.2	1389.78	402.52	1389.78	402.58	1389.79	402.65	1389.79	402.75	1389.79
402.87	1389.79	402.97	1389.79	403.05	1389.79	415.23	1389.94	415.25	1389.94
415.78	1389.95	416.94	1389.97	419.06	1390	419.24	1390	421.48	1390.23
422.47	1390.34	423.97	1390.5	424.75	1390.58	427.98	1390.93	428.15	1390.95

```
  428.58    1391  432.46 1391.42  435.28 1391.73  435.39 1391.71  435.44  1391.7
   435.5 1391.68  435.56 1391.67  435.73 1391.64  437.03 1391.35  438.42 1391.05
   438.6    1391  442.33 1390.28  444.08    1390  444.69 1389.94  444.78 1389.93
  444.83 1389.92  455.45 1389.89  498.85 1389.46     500 1389.46

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val     Sta   n Val
**********************************************
       0    .025  209.15     .04  281.51    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        209.15  281.51                 92       92      92              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  226.98 1389.13        F
  261.98     500 1389.13        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15100

INPUT
Description: Channel Station 46799.16, culvert section 1
Station Elevation Data    num=      53
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
**********************************************************************************
       0 1387.83  118.85 1388.33  132.41 1388.04  135.57 1388.06  136.77 1388.07
  142.09 1388.11  151.12 1388.18  160.08 1388.21   183.5 1388.25  187.82 1388.25
  188.25 1388.15  188.83    1388   189.2    1388  192.07 1388.25  193.15 1388.52
  209.15  1388.2  239.83 1380.53     250 1380.33   281.5  1388.2  297.49 1388.52
  298.38 1388.74  312.28  1389.1  317.09 1389.77  323.92  1389.4  326.28 1389.04
   327.5 1389.35  327.72  1389.4  328.81 1389.46  334.73 1389.75  370.75 1390.47
  371.74 1390.45  406.78 1389.75  407.33 1389.72  413.78  1389.4  414.54  1389.2
  414.63 1389.18  420.78    1390  424.08 1390.44  428.33    1391  429.11  1391.1
  433.83 1391.73  436.79 1391.03  436.94    1391  437.42 1390.89  441.23    1390
  441.43 1389.95  441.63 1389.91  473.12 1389.72  484.36 1389.65  488.35 1389.63
  492.62 1389.59  495.16  1389.6     500  1389.6

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val     Sta   n Val
**********************************************
       0    .025  209.15     .04   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        209.15   281.5            102.51     100   97.56              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  187.82 1388.25        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 15000

INPUT
Description: Channel Station 46899.16 (End Riprap)
Station Elevation Data    num=      49
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
**********************************************************************************
       0 1387.78  115.83 1388.27   128.5    1388   133.9    1388  134.11    1388
  137.66 1388.04  164.28  1388.3  180.36 1388.31  186.96 1388.34  187.99 1388.33
  198.62 1388.12  212.48 1387.29  239.83 1380.45     250 1380.25   281.5 1388.12
  304.47 1388.58  305.76  1388.9  313.92 1389.11  318.35  1389.5   324.8 1389.21
  327.58 1388.83  327.99 1388.93  328.89 1389.16  333.69  1389.4   335.9 1389.51
   371.9 1390.22   407.9  1389.5  413.21 1389.24   414.9 1389.15  415.16 1389.09
  415.29 1389.06  419.22  1389.9  421.96    1390  423.63 1390.24  428.91    1391
  433.12 1391.54  434.29  1391.7  434.48 1391.35  434.66    1391  438.16 1390.52
  441.17 1390.11  441.84 1390.08  443.27    1390  445.48 1389.88   445.6 1389.87
  445.72 1389.86  445.99 1389.86   486.4 1389.44     500 1389.49

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
       0    .025  212.48    .032  239.83    .028     250    .032   281.5    .025
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        212.48   281.5              100     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  186.96 1388.34       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 14900

INPUT
Description: Channel Station 46999.16
Station Elevation Data    num=      66
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1387.73  112.73 1388.21  122.63    1388  127.52   ·1388  128.72    1388
  129.57    1388  130.03    1388  130.04    1388  130.18    1388  130.46    1388
  130.89    1388  144.62    1388  144.69    1388  144.86    1388  145.23    1388
  145.47    1388  145.84    1388  146.14    1388  149.34 1388.03  167.88 1388.25
  188.78 1388.26  190.38 1388.27   192.1 1388.27  193.73 1388.28  201.93 1388.31
  202.56 1388.15  203.15    1388  204.18    1388  207.17    1388  207.96    1388
  208.03 1388.32  239.83 1380.37     250 1380.17   281.5 1388.04  299.21 1388.39
  300.02  1388.6   311.2 1388.78  319.66 1389.34  328.44 1388.98  329.47 1388.76
  329.69 1388.81  330.06  1388.9  334.86 1389.14  337.06 1389.25  373.06 1389.97
  409.07 1389.25  410.78 1389.17  416.07  1388.9  416.78 1388.78  419.07  1388.4
  421.64 1389.04  430.16 1391.17  432.19 1391.34   434.8 1391.66  435.61 1391.41
  437.23    1391  439.06 1390.69   441.6 1390.16  443.59 1390.07  444.95    1390
  446.38 1389.93  448.05 1389.82  470.37 1389.61   475.3 1389.57  487.57 1389.45
     500 1389.48

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
       0    .025  208.03    .032  239.83    .028     250    .032   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.03   281.5              100     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  193.73 1388.28       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 14800

INPUT
Description: Channel Station 47099.16
Station Elevation Data    num=      63
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1387.69  109.62 1388.15  116.75    1388  120.28    1388  121.14    1388
  121.75    1388  122.08    1388  122.09    1388  122.19    1388  122.39    1388
   122.7    1388  135.95    1388  137.82    1388  140.44    1388  161.77    1388
  161.86    1388  162.72    1388  163.39 1388.01  167.68 1388.04  180.29 1388.14
  193.43  1388.2  201.47  1388.2  202.03  1388.2  202.23 1388.15  202.83    1388
  208.18  1388.2  239.83 1380.29     250 1380.09   281.5 1387.96  299.84 1388.33
  300.07 1388.38  306.86 1388.46   316.1 1388.69  321.04 1389.21  324.52 1389.08
  325.73 1388.77  328.23 1388.15  329.19 1388.31  331.23 1388.65  336.02 1388.89
  338.23    1389  374.23 1389.72  410.23    1389  411.94 1388.91  417.23 1388.65
  417.95 1388.53  420.23 1388.15  423.07 1388.86  432.71 1391.27     434  1391.4
  435.31 1391.62  435.57 1391.15  435.69    1391  437.91 1390.74  440.94 1390.35
  445.85 1390.09  447.58    1390  450.42 1389.85  451.38 1389.79  462.29 1389.31
  475.66 1389.14   488.7 1389.45     500  1389.5

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
       0    .025  208.18    .032  239.83    .028     250    .032   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.18   281.5              100     100     100             .1       .3
Ineffective Flow     num=       1
```

Sta L	Sta R	Elev	Permanent
0	202.03	1388.2	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14700

INPUT
Description: Channel Station 47199.16
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.64	106.52	1388.09	110.87	1388	113.03	1388	113.56	1388
113.93	1388	114.13	1388	114.14	1388	114.2	1388	114.33	1388
114.51	1388	122.61	1388	123.76	1388	125.36	1388	139.36	1388
140.05	1388	141.38	1388	143.46	1388	153.39	1387.98	167.49	1387.94
172.04	1387.94	193.91	1387.96	193.93	1387.96	193.95	1387.96	202.53	1388
208.58	1388.02	239.83	1380.21	250	1380.01	281.5	1387.88	302.13	1388.29
306.73	1387.14	311.19	1388.26	317.57	1388.36	322.41	1388.89	331.32	1388.57
332.35	1388.39	332.39	1388.4	339.39	1388.75	375.39	1389.47	411.4	1388.75
416.42	1388.49	418.4	1388.4	419.23	1388.26	421.4	1387.9	431.12	1390.33
434.72	1391.23	435.66	1391.53	437.44	1391.26	439.64	1391	442.53	1390.85
448.08	1390.57	450.09	1390.48	452.33	1390.33	453.95	1390.15	455.21	1390
455.53	1389.96	456.07	1389.9	457.19	1389.76	463.08	1389	466.82	1389
468.66	1389	471.39	1389.18	475.29	1389.44	476.69	1389.54	477.76	1389.62
487.48	1389.81	488.17	1389.84	488.63	1389.86	488.92	1389.88	489.11	1389.89
500	1389.93								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.58	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.58	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	106.52	1388.09	F
375.36	500	1389.47	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14600

INPUT
Description: Channel Station 47299.16
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.6	103.41	1388.03	105	1388	105.78	1388	105.98	1388
106.11	1388	106.19	1388	106.21	1388	106.26	1388	106.32	1388
109.28	1388	109.69	1388	110.28	1388	115.38	1388	115.63	1388
116.12	1388	116.87	1388	120.49	1387.99	126.2	1387.98	133.79	1388
134.13	1388	134.34	1388	148.92	1387.89	167.4	1387.9	188.7	1387.83
193.81	1387.84	197.95	1387.84	202.83	1387.84	208.82	1387.31	208.96	1387.85
239.83	1380.13	250	1379.93	281.5	1387.8	303.4	1388.24	308	1387.09
311.47	1387.96	318.6	1388.03	323.11	1388.66	332.46	1388.34	333.51	1388.13
333.56	1388.15	340.56	1388.5	376.56	1389.21	412.56	1388.49	414.26	1388.41
419.56	1388.14	419.78	1388.09	420.49	1387.97	425.87	1389.32	427.07	1389.31
430.91	1390	433.11	1390.52	435.18	1391	435.23	1391.08	435.32	1391.21
435.33	1391.17	435.35	1391	435.84	1390.95	436.3	1390.91	436.7	1390.87
437.88	1390.71	444.57	1390.17	446.65	1390	450.24	1389.62	453.65	1389.25
456.36	1389	458.42	1389	459.83	1389	463.9	1389.95	464.11	1390
469.25	1390.43	472.49	1390.6	483.56	1390.08	484.78	1390.02	485.22	1390
485.88	1389.97	486.07	1389.96	486.14	1389.96	486.17	1389.96	487.25	1389.96
500	1389.85								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	208.96	.032	239.83	.028	250	.032	281.5	.025

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

```
        208.96   281.5                 21       21       21              .1        .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0  103.41 1388.03        F
  376.53     500 1389.22        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 14579

INPUT
Description: Channel Station 47320.16
Station Elevation Data    num=      107
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1387.57  103.41    1388     105 1387.97  105.78 1387.97  105.98 1387.97
  106.11 1387.97  106.19 1387.97  106.21 1387.97  106.26 1387.97  106.32 1387.97
  109.28 1387.97  109.69 1387.97  110.28 1387.97  115.38 1387.97  115.63 1387.97
  116.12 1387.97  116.87 1387.97  120.49 1387.96   126.2 1387.95  133.79 1387.97
  134.13 1387.97  134.34 1387.97  148.92 1387.86   167.4 1387.87   188.7  1387.8
  193.81 1387.81  197.95 1387.81  202.83 1387.81  208.82 1387.28  209.15 1387.77
  212.35 1386.97  239.83  1380.1     250  1379.9   281.5 1387.78  290.47 1386.97
  290.63 1386.97  290.65 1386.96  290.77 1386.87  290.82 1386.83     292 1385.97
  294.88 1385.97  295.46 1385.97  299.68 1386.65  301.83 1386.97  302.95 1386.97
   304.9 1386.97  305.01 1386.97  305.04 1386.97  306.16 1386.97   308.3 1387.51
  309.93 1387.91  310.03 1387.92  310.68 1387.97  313.14  1388.2  318.05 1388.62
  322.54 1388.42  338.36 1388.34  340.53 1388.47  364.15 1388.94  365.49 1388.97
  365.88 1388.98  376.53 1389.19  385.26 1389.02  387.54 1388.97  404.91 1388.62
     409 1388.54  409.96 1388.52  412.53 1388.47  413.67  1388.4  420.09 1387.99
  420.36 1387.97  421.44 1387.97  421.53 1387.99  421.73 1388.04   425.5 1388.97
  427.07 1389.28  430.91 1389.97  433.11 1390.49  435.18 1390.97  435.23 1391.05
  435.32 1391.18  435.33 1391.14  435.35 1390.97  435.84 1390.92   436.3 1390.88
   436.7 1390.84  437.88 1390.68  444.57 1390.14  446.65 1389.97  450.24 1389.59
  453.65 1389.22  456.36 1388.97  458.42 1388.97  459.83 1388.97   463.9 1389.92
  464.11 1389.97  469.25  1390.4  472.49 1390.57  483.56 1390.05  484.78 1389.99
  485.22 1389.97  485.88 1389.94  486.07 1389.93  486.14 1389.93  486.17 1389.93
  487.25 1389.93     500 1389.82

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  212.35    .032  239.83    .028     250    .032   281.5    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        209.15   281.5                 10       10       10              .3        .5
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0  103.41    1388        F
  376.53     500 1389.19        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 14569

INPUT
Description: Channel Station 47330.16
Station Elevation Data    num=      106
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1387.57  103.41    1388     105 1387.97  105.78 1387.97  105.98 1387.97
  106.11 1387.97  106.19 1387.97  106.21 1387.97  106.26 1387.97  106.32 1387.97
  109.28 1387.97  109.69 1387.97  110.28 1387.97  115.38 1387.97  115.63 1387.97
  116.12 1387.97  116.87 1387.97  120.49 1387.96   126.2 1387.95  133.79 1387.97
  134.13 1387.97  134.34 1387.97  148.92 1387.86   167.4 1387.87   188.7  1387.8
  193.81 1387.81  197.95 1387.81  202.83 1387.81  208.82 1387.28  209.15 1387.77
  239.83  1380.1     250  1379.9   281.5 1387.78  290.47 1386.97  290.63 1386.97
  290.65 1386.96  290.77 1386.87  290.82 1386.83     292 1385.97  294.88 1385.97
  295.46 1385.97  299.68 1386.65  301.83 1386.97  302.95 1386.97   304.9 1386.97
  305.01 1386.97  305.04 1386.97  306.16 1386.97   308.3 1387.51  309.93 1387.91
  310.03 1387.92  310.68 1387.97  313.14  1388.2  318.05 1388.62  322.54 1388.42
  338.36 1388.34  340.53 1388.47  364.15 1388.94  365.49 1388.97  365.88 1388.98
  376.53 1389.19  385.26 1389.02  387.54 1388.97  404.91 1388.62     409 1388.54
  409.96 1388.52  412.53 1388.47  413.67  1388.4  420.09 1387.99  420.36 1387.97
```

421.44	1387.97	421.53	1387.99	421.73	1388.04	425.5	1388.97	427.07	1389.28
430.91	1389.97	433.11	1390.49	435.18	1390.97	435.23	1391.05	435.32	1391.18
435.33	1391.14	435.35	1390.97	435.84	1390.92	436.3	1390.88	436.7	1390.84
437.88	1390.68	444.57	1390.14	446.65	1389.97	450.24	1389.59	453.65	1389.22
456.36	1388.97	458.42	1388.97	459.83	1388.97	463.9	1389.92	464.11	1389.97
469.25	1390.4	472.49	1390.57	483.56	1390.05	484.78	1389.99	485.22	1389.97
485.88	1389.94	486.07	1389.93	486.14	1389.93	486.17	1389.93	487.25	1389.93
500	1389.82								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	68	68	68	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14501

INPUT
Description: Channel Station 47398.16
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.55	78.21	1387.88	99.22	1387.79	112.35	1388	114.79	1388
117.33	1388	121.49	1388	128.26	1388	132.77	1388	135.36	1388
137.35	1388	140.83	1388	141.54	1388	144.9	1388	145.99	1388
148.96	1388	151.95	1388	153.52	1388	156.49	1388	163.45	1388.1
165.15	1388.08	167.19	1388.07	167.68	1388.06	172.06	1388.01	172.52	1388
182.49	1387.93	186.47	1387.9	193.63	1387.8	200.08	1387.95	200.55	1387.96
200.98	1387.97	201.48	1387.97	201.7	1387.95	201.79	1387.93	201.85	1387.93
202.28	1387.9	204.61	1387.68	208.63	1387.31	209.15	1387.72	239.83	1380.05
250	1379.85	281.5	1387.73	284.61	1387	289.14	1387	290.82	1387
300.96	1387	301.66	1387	302.07	1387	303.57	1387.38	306.06	1388
306.7	1388.16	307.56	1388.37	311.08	1388.41	317.19	1388.42	317.84	1388.54
318.48	1388.6	328.23	1388.11	330.93	1388	331.34	1388	336.25	1388
336.63	1388.02	341.2	1388.25	358.39	1388.59	377.2	1388.97	396.34	1388.59
413.2	1388.25	417.8	1388.02	418.16	1388	421.63	1388	423.51	1388
425.83	1388.41	429.07	1389	431.23	1389.64	432.44	1390	434	1390.55
434.57	1390.75	434.99	1390.89	435	1390.66	435.02	1390	435.7	1389.88
439.77	1389.46	444.45	1389.49	447.28	1389.48	447.52	1389.48	448.9	1389.4
452.02	1389	457.08	1389	458.15	1389	460.26	1389.27	463.08	1389.27
469.17	1389.39	474.6	1389.17	475.07	1389.17	475.85	1389.17	488.84	1389.17
490.34	1389.18	491.2	1389.18	500	1389.18				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	10	10	10	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14491

INPUT
Description: Channel Station 47408.16
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
163.45	1388.09	165.15	1388.07	167.19	1388.06	167.68	1388.05	172.06	1388
172.52	1387.99	182.49	1387.92	186.47	1387.89	193.63	1387.79	200.08	1387.94
200.55	1387.95	200.98	1387.96	201.48	1387.96	201.7	1387.94	201.79	1387.92
201.85	1387.92	202.28	1387.89	204.61	1387.67	208.63	1387.3	209.15	1387.71
239.83	1380.04	250	1379.84	281.5	1387.72	284.61	1386.99	289.14	1386.99
290.82	1386.99	300.96	1386.99	301.66	1386.99	302.07	1386.99	303.57	1387.37
306.06	1387.99	306.7	1388.15	307.56	1388.36	311.08	1388.4	317.19	1388.41
317.84	1388.53	318.48	1388.59	328.23	1388.1	330.93	1387.99	331.34	1387.99
336.25	1387.99	336.63	1388.01	341.2	1388.24	358.39	1388.58	377.2	1388.96

396.34	1388.58	413.2	1388.24	417.8	1388.01	418.16	1387.99	421.63	1387.99
423.51	1387.99	425.83	1388.4	429.07	1388.99	431.23	1389.63	432.44	1389.99
434	1390.54	434.57	1390.74	434.99	1390.88	435	1390.65	435.02	1389.99
435.7	1389.87	439.77	1389.45	444.45	1389.48	447.28	1389.47	447.52	1389.47
448.9	1389.39	452.02	1388.99	457.08	1388.99	458.15	1388.99	460.26	1389.26
463.08	1389.26	469.17	1389.38	474.6	1389.16	475.07	1389.16	475.85	1389.16
488.84	1389.16	490.34	1389.17	491.2	1389.17	500	1389.17		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
163.45	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	40	40	40	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
163.45	208.9	1387.73	F

LATERAL STRUCTURE

RIVER: River
REACH: Ellsworth RS: 14490

INPUT
Description: Overflow from Proposed Ellsworth Channel Under Interim Flow Conditions
Lateral structure position = Left overbank
Distance from Upstream XS = 0
Deck/Roadway Width = 10
Weir Coefficient = 2
Weir Flow Reference = Energy Grade
Weir Embankment Coordinates num = 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388	40	1386.9	91	1386.9	191	1386.9	291	1387
391	1387	491	1386	591	1386	691	1386	789.87	1386
888.52	1386.5	988.3	1386.7	1088.31	1386.8	1190.67	1386.88	1293.69	1386.66
1396.78	1387	1492.26	1387	1588.81	1386	1690.45	1386	1793.99	1386.5
1894.4	1386.4	1988.49	1386.4	2088.57	1386.5	2190.66	1386.5	2294.48	1386.7
2387.16	1386.8	2486.62	1387	2586.67	1387.1	2692.39	1387	2791.7	1387
2887.36	1387	2987.37	1387	3091.09	1387	3196.28	1387		

Weir crest shape = Broad Crested

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14451

INPUT
Description: Channel Station 47488.16
Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
174.74	1386.67	174.87	1386.67	174.97	1386.67	175.08	1386.67	175.4	1386.68
175.58	1386.69	175.91	1386.7	176.73	1386.74	182.39	1387.04	182.7	1387.04
182.98	1387.04	183.15	1387.04	183.2	1387.04	183.26	1387.04	183.79	1387.06
184.4	1387.08	184.97	1387.1	185.5	1387.12	202.93	1387.7	206.62	1387.41
208.44	1387.28	209.15	1387.68	239.83	1380.01	250	1379.81	281.5	1387.69
285.39	1387.04	290.82	1387.04	302.57	1387.04	304.05	1387.04	304.66	1387.04
306.44	1387.48	306.82	1387.58	306.97	1387.62	307.08	1387.64	307.42	1387.67
312.12	1387.93	314.95	1387.7	316.09	1387.93	316.71	1388.04	317.68	1388.3
318.43	1388.48	318.91	1388.6	320.43	1388.49	320.81	1388.46	321.02	1388.45
321.19	1388.44	321.32	1388.43	321.48	1388.41	321.83	1388.39	322.53	1388.34
325.5	1388.13	326.84	1388.04	338.18	1388.04	341.05	1388.04	341.07	1388.04
341.3	1388.04	344.49	1388.1	353.15	1388.28	377.05	1388.76	401.71	1388.26
409.91	1388.1	412.83	1388.04	413.03	1388.04	413.05	1388.04	414.05	1388.04
426.47	1388.04	430.39	1389.02	430.47	1389.04	430.85	1389.17	433.46	1390.04
433.91	1390.26	434.08	1390.34	434.31	1390.45	434.66	1390.61	434.67	1390.45
434.68	1390.04	434.69	1389.76	434.71	1389.04	434.89	1388.97	435.08	1388.9
435.94	1388.56	453.78	1388.72	455.53	1388.73	456.83	1388.75	457.77	1388.77
458.03	1388.78	458.29	1388.78	458.47	1388.79	458.53	1388.79	458.66	1388.79
459.1	1388.79	465.88	1388.93	472.34	1388.93	482.61	1388.6	500	1388.66

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
174.74	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	51	51	51	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
174.74	202.93	1387.7	F
318.91	500	1388.6	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14400

INPUT
Description: Channel Station 47499.16
Station Elevation Data num= 196

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
138.59	1386.56	140.72	1386.1	140.95	1386.11	141.12	1386.12	141.34	1386.12
142.32	1386.12	154.04	1386.3	155.1	1386.32	167.19	1386.51	167.71	1386.52
168.24	1386.53	174.74	1386.63	174.87	1386.63	174.97	1386.63	175.08	1386.63
175.4	1386.64	175.58	1386.65	175.91	1386.66	176.73	1386.7	182.39	1387
182.7	1387	182.98	1387	183.15	1387	183.2	1387	183.26	1387
183.79	1387.02	184.4	1387.04	184.97	1387.06	185.5	1387.08	202.93	1387.66
206.62	1387.37	208.44	1387.24	208.67	1387.76	239.83	1379.97	250	1379.77
281.5	1387.64	300.63	1388.02	305.23	1386.87	308.09	1387.59	314.92	1387.66
322.28	1388.64	331.54	1388.02	333.57	1387.52	334.05	1387.64	341.05	1387.99
377.05	1388.71	413.05	1387.99	420.05	1387.64	420.09	1387.63	422.24	1387.27
424.25	1387.77	426.47	1388	430.24	1388.94	430.47	1389	430.7	1389.08
433.46	1390	434.11	1390.31	434.36	1390.43	434.67	1390.57	434.67	1390.54
434.68	1390.07	434.68	1390	434.71	1389	434.78	1388.97	434.99	1388.89
435.13	1388.84	435.97	1388.52	445.94	1388.6	457.62	1388.69	461.9	1388.77
477.03	1388.7	484.02	1388.46	512.45	1388.5	526.15	1388.59	537.08	1388.63
573.04	1388.65	579.14	1388.62	602.3	1388.67	624.24	1388.71	629.38	1388.75
633.51	1388.75	651.75	1388.82	666.27	1388.83	675.63	1388.68	684.93	1388.55
689.17	1388.48	691.56	1388.83	692.1	1388.91	692.41	1388.94	693.12	1389
696.29	1389.26	696.52	1389.28	696.76	1389.3	697.01	1389.32	697.26	1389.34
698.92	1389.45	701.14	1389.62	704.52	1389.85	705.09	1389.9	706.48	1390
709.22	1390.19	713.86	1390.54	715.22	1390.8	716.2	1391	718.32	1391
719.16	1391	719.75	1390.98	719.84	1390.94	721.47	1390.9	727.53	1390.83
735.91	1390.52	736.16	1390.48	737.33	1390.31	739.07	1390.05	739.4	1390
742.25	1389.42	744.06	1389.09	746	1389.2	747.48	1389.3	751.43	1389.31
761.47	1389.29	761.74	1389.29	761.8	1389.29	761.9	1389.29	770.37	1389.67
770.63	1389.68	774.96	1389.3	776.98	1389.13	778.49	1389	780.45	1388.86
780.89	1388.83	781.16	1388.81	798.18	1388.62	798.88	1388.61	799.47	1388.6
800.44	1388.59	801.89	1388.57	812.83	1388.44	815.3	1388.42	817.37	1388.39
822.17	1388.33	838.66	1388.15	841.46	1388.15	845.15	1388.17	874.92	1388
879.45	1388	897.52	1388	907.28	1387.86	931.93	1387.85	945.04	1388
945.54	1388	959.02	1388.18	961.12	1388.23	972.19	1388.23	975.88	1388.39
982.59	1388.45	987.34	1388.73	989.28	1388.8	993.09	1389	994.88	1389
995.84	1388.98	996.45	1389	999.94	1389.11	1004.03	1389.32	1012.44	1389.86
1013.54	1389.93	1014.5	1390	1025.78	1390.84	1027.46	1391	1033.51	1391.44
1034.56	1391.49	1035.99	1391.57	1045.95	1392	1046.26	1392.01	1047.23	1392.03
1048.2	1392.06	1049.21	1392.32	1051.79	1393	1052.38	1393.16	1053.22	1393.38
1054.62	1393.75	1055.56	1394	1057.52	1394.52	1059.31	1395	1059.64	1395.09
1063.06	1396	1063.34	1396.08	1063.45	1396.1	1063.68	1396.17	1065.57	1396.67
1066.8	1397	1067.1	1397.08	1067.4	1397.16	1068.32	1397.17	1070.71	1397.21
1082.68	1397.52								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
138.59	.025	208.67	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.67	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
138.59	208.69	1387.76	F
318.91	1082.68	1388.6	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14300

INPUT
Description: Channel Station 47599.16
Station Elevation Data num= 164

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
157.82	1386.88	158.92	1386.88	160.48	1386.89	162.17	1386.89	168.65	1386.9
171.13	1386.91	185.37	1386.87	185.96	1386.87	186.41	1386.87	204.63	1386.93
207.15	1387.56	209.15	1387.56	239.83	1379.89	250	1379.69	281.5	1387.56
300.09	1387.93	304.69	1386.78	305.22	1386.92	316.13	1386.71	321.93	1387.8
331	1387.66	333.44	1387.35	333.9	1387.46	340.9	1387.81	376.9	1388.46
412.9	1387.81	414.87	1387.71	419.9	1387.46	419.93	1387.46	420.78	1387.31
421.61	1387.52	423.92	1387.29	426.95	1388	430.21	1388.89	430.62	1389
431.53	1389.28	432.3	1389.52	432.33	1389.53	433.85	1390	434.23	1390
434.33	1390	434.34	1390	434.35	1390.11	434.36	1390.25	434.38	1389.47
434.4	1389	434.67	1388.83	434.85	1388.71	435.03	1388.6	435.11	1388.55
435.16	1388.52	435.22	1388.48	435.37	1388.39	449.93	1388.24	456.19	1388.18
456.96	1388.17	460.55	1388.16	482.98	1388.13	483.91	1388.13	486.14	1388.13
508.95	1388.16	529.72	1388.13	553.67	1388.2	564.06	1388.2	573.4	1388.18
582.81	1388.17	583.45	1388.15	594.01	1388	596.5	1387.96	598.07	1387.94
601.54	1387.88	604.43	1387.84	604.77	1387.96	604.9	1388	605.02	1388.05
605.79	1388.38	606.26	1388.42	607.97	1388.55	611.35	1388.8	612.94	1388.92
614.14	1389	620.12	1389.44	624.65	1389.87	626.17	1390	629.76	1390.14
631.73	1390.21	637.2	1390.44	647.79	1390.15	649.48	1390.08	651.32	1390
651.35	1390	651.38	1390	651.4	1390	651.64	1390	651.79	1389.99
651.97	1389.98	652.41	1389.91	653.21	1389.78	654.32	1389.62	654.81	1389.55
658.3	1389	658.5	1388.91	659.67	1388.54	668.79	1388.5	671.77	1388.5
695.96	1388.6	701.58	1388.58	706.52	1388.57	711.12	1388.56	719.47	1388.51
723.01	1388.51	728.97	1388.46	768.84	1388.27	788.74	1388	789.77	1388
812.25	1388	812.6	1388	812.75	1388	824.25	1388	835.21	1388
841.36	1388	863.14	1388	867.49	1388	888.63	1388.63	894.2	1388.77
903.1	1389	904.89	1389.18	906.48	1389.33	913.26	1390	917.07	1390.39
922.59	1391	927.23	1391.14	927.76	1391.16	928.64	1391.19	929.53	1391.22
930.68	1391.26	939.77	1391.55	942.98	1391.65	947.6	1391.79	950.08	1391.87
953.99	1392	954.16	1392.01	955.07	1392.03	955.59	1392.05	957.69	1392.72
958.57	1393	959.51	1393.28	961.8	1393.94	961.96	1393.98	962.03	1394
964.51	1394.68	965.65	1395	967.3	1395.45	969.39	1396	969.7	1396.14
970.43	1396.47	971.56	1396.9	975.59	1396.94	980.11	1397	982.36	1397
983.51	1397	984.13	1397	984.21	1397.01	989.02	1397.09		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
157.82	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
157.82	209.17	1387.57	F
319.35	989.02	1388.51	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14200

INPUT
Description: Channel Station 47699.16 (Modified to Include GM Access Road Berm, per Sheet CHC5)
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
186.44	1386.81	196.49	1386.96	200.01	1387	203.41	1387.05	204.67	1387.06
204.78	1387.03	204.91	1387	205.39	1387.04	207.15	1387.48	209.15	1387.48
239.83	1379.81	250	1379.61	281.5	1387.48	303.67	1387.92	308.27	1386.77
310.89	1387.43	318.32	1387.45	322.43	1387.89	330.47	1387.47	332.87	1387.09
333.75	1387.31	340.75	1387.66	376.75	1388.2	412.75	1387.66	414.72	1387.56
419.75	1387.31	419.92	1387.27	420.35	1387.16	441.75	1388.25	502.75	1390
666.75	1391	804.75	1391	809.75	1390	817.75	1390	831.75	1391
839.75	1392	845.75	1395						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
186.44	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
186.44	209.06	1387.51	F
303.49	845.75	1387.96	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14100

INPUT
Description: Channel Station 47799.16
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
186.69	1386.75	202.34	1386.86	204.96	1386.87	204.98	1386.86	207.15	1387.4
209.15	1387.4	239.83	1379.73	250	1379.53	281.5	1387.4	297.5	1387.72
302.1	1386.57	304.62	1387.2	318.16	1387.3	322.52	1387.81	330.35	1387.29
332.57	1386.8	333.6	1387.06	340.6	1387.41	366.65	1387.8	376.6	1387.95
402.5	1387.56	412.6	1387.41	417.62	1387.16	419.6	1387.06	419.63	1387.05
421.78	1386.69	426.95	1387.99	428.8	1388	431.4	1388.82	433.68	1389.62
436.08	1388.5	437.11	1388.05	437.24	1388	437.43	1387.98	437.51	1387.97
437.56	1387.97	438.59	1387.95	453.65	1387.75	456.36	1387.84	458.74	1387.93
460.39	1388	461.8	1388.06	466.39	1388.25	469.47	1388.55	473.77	1389
473.96	1389.02	474.3	1389.05	476.2	1389.53	478.08	1389.8	479.55	1390
486.25	1390	490.42	1390	495.05	1390	498.04	1389.17	498.57	1389
499.3	1388.77	500.6	1388.35	501.07	1388.2	503.16	1388.14	508.24	1388
510.63	1387.93	513.77	1387.83	517.36	1387.96	518.75	1387.99	519.11	1387.99
519.57	1387.99	519.63	1388	521.49	1387.91	522.78	1387.84	527.41	1387.55
541.52	1387.49	549.4	1387.44	555.66	1387.45	572.53	1387.57	575.36	1387.56
578.05	1387.45	579.87	1387.37	588.59	1387.01	588.81	1387	588.92	1387
598.86	1386.61	615.08	1386.85	624.92	1387	631.86	1387.11	688.45	1388
695	1388.47	702.13	1388.93	703.18	1389	703.75	1389.32	704.95	1390
705.68	1390.37	706.94	1391	707.96	1391.51	708.93	1392	709.74	1392.41
710.91	1393	711.87	1393.5	712.86	1394	715.35	1394.76	715.8	1395
716.52	1395	717.47	1395	721.31	1395.32	726.78	1395.49	729.01	1395.56
731.76	1395.98	732.24	1396.05	732.95	1395.97	748.35	1395.15	762.37	1394.66
776.67	1394.27								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
186.69	.025	209.15	.032	239.83	.028	250	.032	281.5	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
209.15	281.5	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
186.69	209.33	1387.47	F
320.21	776.67	1388.42	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 14000

INPUT
Description: Channel Station 47899.16 (Riprap for Culvert C6)
Station Elevation Data num= 144

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
156.86	1386.04	166.01	1386.36	167.88	1386.43	172.06	1386.56	183.85	1386.71
191.98	1386.84	199.45	1386.94	199.91	1386.92	200.26	1386.91	203.34	1386.36
205.38	1386	206.46	1386.86	234.91	1379.75	250	1379.45	265.09	1379.75
291.49	1386.35	307.49	1386.67	309.68	1387.22	317.92	1387.29	322.01	1387.89
330.74	1387.36	333.35	1386.71	333.45	1386.74	340.45	1387.09	376.45	1387.7
412.45	1387.09	419.45	1386.74	422.45	1386.24	427.88	1387.6	428.48	1387.86

429.19	1388	429.6	1388.13	430.24	1388.33	432.4	1389	432.95	1389.17
433.25	1389.27	433.35	1389.3	433.37	1389.17	433.39	1389	439.91	1388.61
444.48	1388.34	445.99	1388.25	451.94	1388	459.15	1387.38	460.55	1387.25
460.91	1387.21	461.24	1387.13	462.93	1387.14	470.45	1387.14	472.51	1387.14
474.4	1387.14	474.58	1387.14	476.12	1387.14	483.96	1387.13	484.59	1387.13
485.32	1387.13	485.87	1387.14	487.13	1387.15	488.33	1387.16	489.45	1387.16
493.82	1387.27	494.16	1387.28	495.68	1387.3	496.09	1387.32	497.5	1387.34
497.97	1387.36	498.52	1387.39	499.78	1387.41	500.41	1387.44	500.94	1387.47
501.57	1387.49	502.32	1387.53	503.24	1387.55	504.04	1387.59	504.44	1387.59
505.34	1387.64	506.42	1387.69	506.62	1387.69	507.79	1387.74	507.87	1387.75
507.94	1387.75	508.8	1387.79	509.25	1387.79	509.3	1387.78	510.62	1387.77
511.76	1387.76	512.04	1387.74	513.1	1387.73	514.05	1387.72	514.48	1387.7
515.33	1387.69	515.89	1387.65	516.63	1387.63	517.3	1387.58	517.92	1387.55
518.76	1387.48	519.23	1387.45	520.26	1387.36	520.55	1387.34	521.83	1387.22
521.91	1387.21	522.35	1387.17	524.58	1387.21	527.02	1387.25	528.84	1387.28
529.88	1387.3	537.68	1387.53	539.45	1387.42	540.12	1387.38	541.68	1387.28
546.11	1387	548.25	1386.87	552.65	1386.59	558.04	1386.69	564.11	1386.8
575.46	1387	594.43	1387.33	604.28	1387.51	608.23	1387.58	609.81	1387.6
611.15	1387.63	612.31	1387.65	613.31	1387.67	614.2	1387.68	614.98	1387.7
629.97	1387.96	630.54	1387.98	631.33	1388	632.69	1388.28	646.09	1389.88
646.77	1390.03	646.88	1390.05	654.68	1391.24	661.28	1392.25	666.94	1393.11
671.84	1393.85	676.12	1394.5	679.9	1395.08	683.26	1395.59	683.51	1395.63
695.61	1394.22	705.49	1393.7	714.51	1393.39	727.26	1393.05		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
156.86	.025	206.46	.04	234.91	.04	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.46	291.49	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
156.86	206.44	1386.86	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13900

INPUT
Description: Channel Station 47999.16
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
148.1	1386	150.3	1385.85	156.8	1385.4	163.75	1385.64	166.11	1385.71
172.45	1385.89	176.39	1386	195.74	1386.76	198.61	1386.87	198.64	1386.87
200.06	1386.88	201.04	1386.69	204.57	1386	205.97	1386.9	234.91	1379.67
250	1379.37	265.09	1379.67	291.49	1386.27	307.49	1386.59	309.72	1387.15
318	1387.18	321.23	1387.83	323.48	1387.75	328.45	1386.5	330.29	1386.04
333.29	1386.54	340.29	1386.89	376.29	1387.61	412.29	1386.89	417.32	1386.64
419.29	1386.54	420.14	1386.4	422.29	1386.04	423.31	1386.3	426.2	1387.02
428.22	1387.59	429.65	1388	430.31	1388.19	431.59	1388.56	432.89	1388.94
433.02	1388.97	434.88	1388.52	436.09	1388.18	436.9	1388	437.15	1388
442.77	1387.56	445.91	1387.34	447.52	1387.23	449.63	1387	452.66	1386.77
460.7	1386.12	461.82	1386.1	463.81	1386.11	467.47	1386.39	470.94	1386.67
477.69	1386.79	478.58	1386.81	479.93	1386.83	481.77	1386.87	484.42	1386.92
487.1	1386.97	488.88	1387	489.08	1387	491	1387.04	492.68	1387.07
498.86	1387.18	500.36	1387.2	501.29	1387.22	501.92	1387.23	502.38	1387.24
502.71	1387.25	504.82	1387.28	508.33	1387.23	551.17	1387.28	551.51	1387.28
555	1387.3	568.13	1387.73	576.39	1388	576.99	1388	577.04	1388
577.09	1388	577.13	1388	591.84	1388.51	592.75	1388.54	605.76	1389
605.8	1389	606.17	1389.02	606.87	1389.05	608.81	1389.48	610.28	1389.81
611.97	1390.2	612.96	1390.43	613.61	1390.58	620.77	1392.39	623.65	1393.09
626.43	1393.42	629.79	1394.17	630.34	1394.29	631.67	1394.49	632.8	1394.66
633.78	1394.81	634.64	1394.94	635.39	1395.05	636.06	1395.15	636.66	1395.24
636.7	1395.25	659	1392.7	664.11	1392.44	668.81	1392.28	676.19	1392.1

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
148.1	.025	205.97	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.97	291.49	100	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
321.07	676.19	1388.34	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13800

INPUT
Description: Channel Station 48099.16
Station Elevation Data num= 204

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
133.73	1386	136.64	1385.94	155.32	1385.63	158.37	1385.59	159.03	1385.58
159.45	1385.57	159.73	1385.57	161.33	1385.52	164.3	1385.65	172.25	1386
182.95	1386.45	196.03	1387	198.56	1387.11	198.81	1387.12	199.14	1387.03
199.27	1387	201.57	1386.37	202.91	1386	204.26	1387.25	234.91	1379.59
250	1379.29	265.09	1379.59	291.49	1386.19	307.49	1386.51	312.43	1387.74
315.21	1387.76	321.73	1388.28	329.2	1387.63	333.01	1386.64	333.14	1386.67
340.14	1387.02	376.14	1387.74	412.14	1387.02	417.17	1386.77	419.14	1386.67
419.99	1386.53	422.14	1386.17	428.67	1387.8	429.63	1388	431.18	1388.34
432.75	1388.7	434	1388.55	434.7	1388.46	438.78	1388	442.95	1387.54
447.88	1387	450.14	1386.75	451.06	1386.65	457.12	1386	457.56	1385.95
460.01	1385.7	464.69	1385.66	465.92	1385.66	468.06	1385.95	468.16	1385.97
468.28	1385.99	468.37	1386	468.52	1386.02	468.88	1386.07	469.21	1386.11
469.5	1386.15	470.99	1386.35	473.03	1386.62	474.39	1386.81	476.03	1386.83
476.26	1386.83	478.58	1386.86	479.67	1386.88	481.42	1386.9	484.36	1386.94
485.43	1386.95	486.13	1386.96	488.77	1386.99	490	1387	490.01	1387
490.02	1387	490.03	1387	490.06	1387	490.07	1387	490.08	1387
490.1	1387	491.48	1387.02	491.83	1387.02	492.17	1387.03	502.36	1387.76
505.69	1387.93	506.46	1387.92	521.14	1387.3	523.72	1387.11	528.33	1387.19
542.07	1387.5	547.32	1387.1	547.67	1387.07	548.05	1387.04	548.47	1387.01
548.58	1387	548.71	1386.99	548.89	1386.98	549.12	1386.96	550.11	1386.65
552.18	1386	554	1385.33	554.89	1385	555.06	1384.94	556.02	1384.58
556.17	1384.6	556.32	1384.63	556.79	1384.7	557.76	1384.91	558.17	1385
558.18	1385	558.45	1385.06	558.65	1385.1	558.79	1385.13	558.91	1385.15
559	1385.17	559.08	1385.19	559.15	1385.2	559.39	1385.25	559.5	1385.26
559.61	1385.28	559.67	1385.29	560.01	1385.34	562.2	1385.66	564	1385.89
564.63	1385.97	566.01	1385.47	566.19	1385.4	566.43	1385.53	566.6	1385.62
567.29	1386	567.48	1386.1	567.57	1386.15	567.86	1386.31	569.11	1387
569.22	1387.06	569.45	1387.18	569.59	1387.26	569.68	1387.31	569.75	1387.35
569.8	1387.38	569.83	1387.4	569.87	1387.41	569.91	1387.44	569.95	1387.46
569.96	1387.46	569.97	1387.47	570.16	1387.57	570.35	1387.66	570.44	1387.7
570.67	1387.8	571.14	1388	572.94	1388.78	573.27	1388.92	573.45	1389
575.36	1389.83	575.75	1390	577.62	1390.81	578.06	1391	579.9	1391.8
580.37	1392	582.2	1392.79	582.67	1393	584.49	1393.79	584.98	1394
586.46	1394.64	586.65	1394.73	586.85	1394.81	587.8	1394.83	588.04	1394.84
588.68	1394.85	592.62	1394.93	596.53	1395	600.31	1395.07	600.83	1395.08
600.87	1395.07	601.21	1395	603.04	1394.6	605.8	1394	608.33	1393.45
610.39	1393	614.86	1392.03	614.99	1392	616.97	1391.57	617.62	1391.43
618.86	1391.16	619.79	1391.11	620.68	1391.07	622.14	1391	622.32	1390.99
623.72	1390.91	623.79	1390.91	623.85	1390.92	623.99	1390.92	624.02	1390.93
624.05	1390.93	624.06	1390.93	624.08	1390.93	637.24	1390.75	638.41	1390.74
639.17	1390.75	639.93	1390.76	640.67	1390.78	658.79	1391.09		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
133.73	.025	204.26	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
204.26	291.49	98.87	100	101.06	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
320.88	658.79	1388.21	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13700

INPUT
Description: Channel Station 48199.16
Station Elevation Data num= 161

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

148.71	1386	156.42	1385.97	158.44	1385.98	160.9	1385.97	161.18	1385.98
161.34	1385.98	161.79	1385.97	162.79	1385.99	163.18	1386	171.92	1386.21
187.99	1386.59	199.64	1386.88	200.19	1386.65	201.45	1386.12	201.73	1386
202.68	1385.92	205.2	1386.94	234.91	1379.51	250	1379.21	265.09	1379.51
291.49	1386.11	307.49	1386.43	313.68	1387.97	315.83	1387.96	320.33	1388.38
328.66	1387.74	332.35	1386.7	333.05	1386.87	340.05	1387.22	376.05	1387.94
412.05	1387.22	413.49	1387.15	419.05	1386.87	419.66	1386.77	422.05	1386.37
427.64	1387.77	429.04	1388.12	429.12	1388	430.06	1388.11	433.32	1388.49
433.33	1388.49	433.33	1388.5	433.34	1388.5	433.59	1388	442.23	1387.19
444.26	1387	455.88	1386.01	455.98	1386	458.42	1385.8	459.72	1385.69
461.86	1385.68	463.2	1385.67	468.21	1385.61	468.3	1385.64	469.48	1386
470.05	1386.2	471.76	1386.78	471.81	1386.79	471.84	1386.81	471.86	1386.81
471.87	1386.82	471.89	1386.82	471.9	1386.83	471.99	1386.86	473.03	1386.86
483.72	1386.92	483.95	1386.94	485.23	1387	494.7	1387.42	498.99	1387.65
505.14	1387.07	505.88	1387	506.38	1386.95	508.23	1386.77	516.06	1386.96
517.7	1387	519.42	1387.04	520.5	1387.07	525.55	1387.19	526.94	1387.22
527.3	1387.23	527.33	1387.23	527.73	1387.24	527.8	1387.18	527.95	1387.06
528.01	1387	528.08	1386.95	528.45	1386.64	529.28	1386	530.42	1385.16
530.64	1385	530.75	1384.91	532	1384	532.38	1383.72	532.94	1383.31
535.11	1383.31	538.64	1383.28	541.03	1383.46	544.83	1383.76	545.12	1383.78
545.3	1383.8	545.31	1383.81	545.33	1383.82	545.57	1384	546.07	1384.36
546.97	1385	547.91	1385.67	548.37	1386	549.01	1386.45	549.78	1387
550.29	1387.36	551.04	1387.89	551.14	1387.93	551.31	1388	552.46	1388.46
553.79	1389	555.67	1389.76	556.26	1390	558.21	1390.78	558.74	1391
559.15	1391.16	561.22	1392	561.63	1392.16	563.7	1393	564.09	1393.16
565.69	1393.81	566.18	1394	567.6	1394.58	567.73	1394.63	567.86	1394.68
568.27	1394.69	570.4	1394.74	580.44	1394.99	581.96	1394.66	583.58	1394.32
585.06	1394	588.17	1393.34	589.75	1393	592.28	1392.46	594.36	1392.02
594.46	1392	595.47	1391.79	597.09	1391.44	602.32	1391.18	602.58	1391.17
602.84	1391.15	603.01	1391.13	603.15	1391.12	603.94	1391	603.99	1391
604.19	1391	604.22	1391	604.24	1391	606.61	1390.77	606.68	1390.77
606.75	1390.76	606.81	1390.77	606.86	1390.76	608.05	1390.67	608.15	1390.65
636.33	1391.14								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
148.71	.025	205.2	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.2	291.49	98.65	100	101.34	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
321.76	636.33	1388.3	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13600

INPUT
Description: Channel Station 48299.16
Station Elevation Data num= 203

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
133.74	1386	143.91	1385.96	154.31	1385.88	156.13	1385.88	162.29	1385.8
166.5	1385.93	169.13	1386	180.61	1386.31	191.5	1386.59	192.58	1386.62
199.46	1386.79	200.24	1386.59	201.02	1386.39	202.56	1386	205.16	1386.86
234.91	1379.43	250	1379.13	265.09	1379.43	291.49	1386.03	307.49	1386.35
312.94	1387.71	318.31	1387.74	322	1388.33	331.72	1387.4	334.11	1386.84
335.06	1387.08	342.01	1387.43	342.06	1387.43	344.8	1387.48	378.08	1388.15
414.1	1387.43	419.65	1387.16	421.11	1387.09	423.45	1386.69	424.11	1386.59
425.22	1386.86	429.5	1387.93	430.43	1387.97	430.55	1388	430.66	1388.01
430.81	1388.02	434.68	1388.3	434.69	1388.15	434.71	1388	437.8	1387.7
445.06	1387	445.65	1386.96	446.3	1386.91	447.09	1386.85	454.5	1386.32
455.11	1386.28	456.27	1386.2	458.98	1386	459	1386	459.03	1386
461.14	1385.84	464.51	1385.59	467.23	1385.54	469.72	1385.49	471.74	1385.89
472.01	1385.94	472.32	1386	472.42	1386.02	473.09	1386.14	474.96	1386.49
482.86	1386.62	488.07	1386.7	493.67	1386.78	495.02	1386.97	495.21	1387
495.26	1387	495.27	1387	495.28	1387	497.44	1387.28	497.52	1387.29
497.59	1387.3	497.66	1387.3	498.41	1387.38	498.47	1387.39	498.54	1387.4
498.6	1387.4	498.66	1387.41	499.8	1387.53	499.83	1387.53	499.86	1387.53
500.7	1387.62	501.31	1387.55	501.76	1387.5	502.97	1387.34	505.73	1387
505.81	1387	505.83	1387	505.85	1387	505.87	1387	505.89	1387
505.91	1387	505.95	1387	505.96	1387	505.97	1387	506	1387

506.16	1386.98	506.28	1386.96	506.37	1386.95	506.44	1386.94	506.5	1386.93
506.81	1386.89	506.94	1386.88	507	1386.87	507.14	1386.86	508.8	1386.9
513.55	1387	513.67	1387	513.86	1387	517.87	1387.08	518.95	1387.1
521.04	1387.16	521.18	1387.03	521.22	1387	521.94	1386.35	522.33	1386
522.61	1385.76	523.45	1385	523.87	1384.63	524.58	1384	525.14	1383.5
525.7	1383	525.96	1382.77	525.99	1382.74	530.51	1382.67	531.38	1382.66
532.08	1382.71	535.85	1383	536.16	1383.02	536.98	1383.08	537.59	1383.53
538.24	1384	539.04	1384.58	539.62	1385	540.54	1385.66	541	1386
541.53	1386.38	542.38	1387	542.57	1387.13	543.72	1387.95	543.76	1387.97
543.84	1388	545.42	1388.64	546.31	1389	547.19	1389.35	548.81	1390
550.04	1390.49	550.89	1390.83	551.32	1391	552.2	1391.35	553.84	1392
554.09	1392.1	556.35	1393	556.87	1393.21	558.86	1394	560.03	1394.46
560.32	1394.58	560.64	1394.71	562.79	1394.76	566.85	1394.87	571.97	1395
572.53	1395.01	573.03	1395.03	573.1	1395.01	573.16	1395	574.07	1394.8
577.65	1394	581.08	1393.24	582.14	1393	586.01	1392.13	586.6	1392
586.64	1391.99	589.23	1391.41	593.26	1391.1	594.56	1391	594.61	1391
594.96	1390.97	594.99	1390.96	595.04	1390.96	595.05	1390.96	595.08	1390.95
595.14	1390.94	595.18	1390.94	595.22	1390.94	595.22	1390.93	595.25	1390.93
595.26	1390.93	596.33	1390.84	596.54	1390.82	604.91	1390.96	606.39	1390.96
608.07	1390.97	638.53	1391.03	640.55	1391.03	642.55	1391.02	644.51	1391.01
646.43	1391.01	647.85	1391.06	651.8	1391.07				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
133.74	.025	205.16	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.16	291.49	99.78	100	100.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
321.65	651.8	1388.25	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13500

INPUT
Description: Channel Station 48399.16
Station Elevation Data num= 175

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
152.49	1386	154.38	1386	162.09	1386	163.82	1386.01	164.84	1386
165.19	1386	166.8	1386	167.76	1385.99	181.4	1386.38	184.3	1386.46
198.71	1386.9	200.11	1386.55	200.93	1386.35	202.31	1386	204.18	1387.03
234.91	1379.35	250	1379.05	265.09	1379.35	291.49	1385.95	307.49	1386.27
313.23	1387.7	321.76	1387.75	326.3	1388.43	336.46	1387.31	337.75	1386.93
339.16	1387.28	339.34	1387.29	346.16	1387.63	348.15	1387.67	382.19	1388.35
389.07	1388.22	418.23	1387.64	420.29	1387.53	425.23	1387.29	426.31	1387.02
426.85	1386.88	427.89	1387	436.14	1387.84	437.73	1388	437.84	1388.01
437.87	1388.01	437.91	1388.02	437.96	1388.02	437.98	1388.02	438.15	1388.04
438.78	1388.11	438.78	1388.08	438.79	1388	439.46	1387.92	440.93	1387.75
441.94	1387.63	442.38	1387.58	442.75	1387.54	443.41	1387.46	447.24	1387
454.42	1386.54	463.02	1386	466.06	1385.79	466.79	1385.74	467.83	1385.7
472.22	1385.49	475.01	1385.88	475.9	1386	477.55	1386.22	477.62	1386.23
477.69	1386.24	478.22	1386.26	496.39	1386.71	498.47	1386.73	498.58	1386.73
505.86	1386.79	514.44	1386.86	521.91	1386.93	522.66	1386.23	522.9	1386
523.45	1385.49	523.99	1385	524.23	1384.78	525.09	1384	525.94	1383.24
526.2	1383	526.41	1382.81	527.05	1382.23	530.26	1382.09	532	1382
533.41	1381.92	533.71	1381.9	533.83	1381.91	534.05	1381.92	535.11	1382
536.55	1382.1	539.27	1382.29	539.58	1382.57	539.94	1382.88	540.07	1383
540.29	1383.19	540.74	1383.6	541.19	1384	541.65	1384.36	542.2	1384.78
542.47	1385	542.73	1385.19	543.84	1386	544.65	1386.6	545.21	1387
545.32	1387.08	545.42	1387.16	546.12	1387.43	547.53	1388	548.69	1388.46
550.02	1389	550.03	1389	551.19	1389.46	552.54	1390	554.4	1390.73
555.07	1391	556.07	1391.39	557.65	1392	559.4	1392.68	560.22	1393
560.73	1393.2	562.8	1394	563.28	1394.19	563.38	1394.22	564.56	1394.26
569.71	1394.44	575.96	1394.63	577.49	1394.29	578.77	1394	579.02	1393.94
583.25	1393	583.43	1392.96	586.62	1392.24	587.72	1392	587.88	1391.96
592.19	1391	593.21	1390.77	593.35	1390.74	593.44	1390.72	593.69	1390.71
594.59	1390.7	597.4	1390.64	597.41	1390.61	597.42	1390.61	597.45	1390.59
597.48	1390.58	597.51	1390.57	597.54	1390.56	597.59	1390.55	597.62	1390.53
597.66	1390.52	597.7	1390.51	597.74	1390.5	597.77	1390.49	597.82	1390.44
597.86	1390.43	597.91	1390.39	597.96	1390.39	598.01	1390.36	598.07	1390.36
598.12	1390.33	598.17	1390.33	598.22	1390.33	598.27	1390.29	598.31	1390.29

598.35	1390.26	598.39	1390.25	617.73	1390.3	619.64	1390.29	620.79	1390.28
621.44	1390.28	623.23	1390.26	625	1390.25	626.76	1390.23	633.51	1390.21

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
152.49	.025	204.18	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
204.18	291.49	100.01	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
320	633.51	1387.86	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13400

INPUT
Description: Channel Station 48499.16
Station Elevation Data num= 151

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
140.36	1386	145.5	1386.37	161.81	1386.23	166.65	1386.24	169.5	1386.17
171.27	1386.12	171.29	1386.12	171.34	1386.12	171.39	1386.12	171.4	1386.12
171.43	1386.12	199.16	1386.47	200.04	1386.49	200.18	1386.45	200.34	1386.41
201.99	1386	203.74	1385.86	205.56	1386.61	234.91	1379.27	250	1378.97
265.09	1379.27	291.49	1385.87	307.49	1386.19	313.22	1387.62	319.26	1387.52
330.6	1388.16	341.52	1387.03	341.57	1387.04	343.31	1387.47	350.32	1387.82
380.72	1388.43	386.35	1388.54	412.9	1388.02	422.38	1387.83	427.21	1387.59
429.38	1387.48	430.96	1387.08	431.77	1386.88	432.85	1387	436.04	1387.29
442.94	1387.92	447.21	1387.27	449.55	1387	457.8	1386.5	465.28	1386
466.04	1385.95	473.05	1385.54	477.36	1385.23	478.02	1385.19	478.97	1385.43
479.65	1385.61	481.2	1386	481.46	1386.07	481.8	1386.15	482.25	1386.27
489.18	1386.05	490.74	1386	491.07	1386	491.55	1385.99	491.82	1385.99
492.83	1385.96	494.13	1385.98	494.36	1385.98	494.7	1385.99	495.2	1385.99
496.03	1385.99	496.87	1386	497.83	1386.02	499.46	1386.05	500.45	1386.07
503.02	1386.11	508.67	1386.34	508.99	1386.35	509.34	1386.36	509.74	1386.38
510.2	1386.4	524.28	1387	524.29	1387	524.31	1387	525.09	1387.03
525.66	1387.06	525.69	1387.03	525.72	1387	526.26	1386.44	526.68	1386
527.43	1385.22	528.25	1384.38	528.62	1384	528.69	1383.92	528.93	1383.67
529.06	1383.53	529.54	1383	529.81	1382.7	529.84	1382.67	530.16	1382.66
535.05	1382.56	540.38	1382.97	540.75	1383	540.99	1383.02	542.43	1383.13
543.99	1383.25	544.45	1383.57	545.05	1384	546.13	1384.75	546.48	1385
547.01	1385.37	547.92	1386	548.98	1386.74	549.35	1387	549.42	1387.05
549.69	1387.24	550.01	1387.36	551.21	1387.83	551.66	1388	551.87	1388.08
554.24	1389	556.07	1389.71	556.82	1390	559.06	1390.87	559.4	1391
560.75	1391.52	561.99	1392	562.93	1392.37	564.56	1393	565.14	1393.23
566.83	1393.9	568.72	1393.95	570.23	1394	571.19	1394.03	573.66	1394.1
579.28	1394.28	580.5	1394.03	580.65	1394	581.65	1393.79	585.46	1393
586.61	1392.76	590.27	1392	591.72	1391.7	595.08	1391	598.16	1390.36
598.6	1390.27	598.95	1390.19	599.11	1390.18	599.23	1390.16	599.57	1390.12
600.6	1390	601.44	1389.9	602.4	1389.79	604.63	1389.52	604.67	1389.53
625.24	1389.72								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
140.36	.025	205.56	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
205.56	291.49	102.36	100	97.83	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
319.44	625.24	1387.54	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13300

INPUT
Description: Channel Station 48599.16
Station Elevation Data num= 142

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
142.67	1386	150.77	1386.58	171.81	1386.4	173.04	1386.38	174.29	1386.41
193.34	1386.82	197.15	1386.91	199.03	1386.44	200.79	1386	201.34	1385.86
203.36	1387.07	234.91	1379.19	250	1378.89	265.09	1379.19	291.49	1385.79
307.49	1386.11	310.92	1386.96	320.18	1386.73	329.2	1386.87	334.88	1387.68
344.68	1386.95	345.05	1387.05	346.79	1387.48	347.98	1387.54	353.79	1387.83
359.42	1387.94	389.79	1388.55	422.8	1387.89	425.8	1387.83	432.29	1387.51
432.8	1387.48	433.03	1387.42	436.1	1386.65	438.42	1387	442.63	1387.44
444.26	1387.61	445.48	1387.73	446.63	1387.63	453.83	1387	459.43	1386.51
465.18	1386	473.54	1385.26	476.45	1385	476.95	1384.96	478.07	1384.86
478.84	1384.79	479.48	1384.95	479.65	1385	482.01	1385.58	483.74	1386
483.98	1386.06	484.21	1386.11	491.2	1386.1	498.56	1386.09	502.37	1386.06
506.51	1386.05	509.17	1386.02	524.31	1386.18	524.42	1386.18	525.01	1386.2
525.24	1386.05	525.32	1386	526	1385.57	526.89	1385	528.09	1384.26
528.51	1384	528.55	1383.97	529.13	1383.62	531.9	1383.5	533.35	1383.43
536.97	1383.54	545.53	1383.8	545.7	1383.91	545.83	1384	546.13	1384.2
547.32	1385	547.64	1385.22	548.59	1385.85	548.81	1386	549.06	1386.17
549.23	1386.29	550.17	1386.92	550.29	1387	550.44	1387.09	550.48	1387.11
551.41	1387.42	551.91	1387.58	553.22	1388	553.45	1388.08	556.31	1389
558.27	1389.64	559.4	1390	560.46	1390.35	562.48	1391	563.82	1391.43
565.57	1392	568.1	1392.82	568.66	1393	569.22	1393.18	569.9	1393.4
577.13	1393.83	579.99	1394	580.49	1394.03	580.8	1394.05	580.87	1394.05
580.89	1394.05	581.13	1394	583.24	1393.58	586.2	1393	588.37	1392.57
591.27	1392	593.94	1391.47	596.34	1391	601.3	1390.02	601.41	1390
602.28	1389.83	602.4	1389.8	602.49	1389.79	602.88	1389.75	607.4	1389.35
607.46	1389.36	607.58	1389.37	607.69	1389.39	607.74	1389.39	607.85	1389.4
607.96	1389.41	608.05	1389.41	608.12	1389.39	608.19	1389.37	608.25	1389.35
608.32	1389.34	608.44	1389.34	608.51	1389.32	608.57	1389.31	608.63	1389.3
608.68	1389.29	608.73	1389.28	608.78	1389.27	608.82	1389.26	608.86	1389.26
608.87	1389.26	627.02	1389.04						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
142.67	.025	203.36	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
203.36	291.49	103.02	100	97.3	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
316.1	627.02	1386.84	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 13200

INPUT
Description: Channel Station 48699.16
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
185.4	1386.1	189.45	1386	189.64	1386	190.04	1385.99	202.54	1385.71
204.05	1385.33	205.12	1385.07	205.39	1385	205.61	1385	206.03	1385.59
206.51	1385.71	208.51	1385.71	234.91	1379.11	250	1378.81	265.09	1379.11
291.49	1385.71	307.49	1386.03	308.85	1386.37	328.89	1386.55	334.56	1387.16
342.97	1386.68	345.28	1387.26	352.28	1387.61	388.32	1388.34	421.61	1387.68
424.36	1387.62	431.08	1387.29	431.37	1387.27	431.45	1387.25	433.81	1386.67
434.97	1387	438.01	1387	439.15	1387.1	445.1	1387.56	448.95	1387.25
452.18	1387.04	452.74	1387	457.15	1386.66	465.89	1386	471.27	1385.59
477.77	1385.1	482.31	1385.54	485.7	1385.88	488.6	1385.91	495.08	1386
497.58	1386.02	504.72	1386.09	511.1	1386.01	512.19	1386	526.41	1385.62
528.66	1385.55	529.59	1385.53	529.73	1385.52	530.45	1385.34	531.38	1385.11
531.81	1385	532	1384.95	532.42	1384.86	533.4	1384.64	533.79	1384.73
533.83	1384.74	533.9	1384.76	534.66	1385	534.7	1385	534.71	1385
536.81	1385.7	536.86	1385.71	536.91	1385.73	537.2	1385.84	543.85	1385.91
546.8	1385.94	547.13	1385.94	547.3	1386	547.45	1386.05	549.93	1386.89
550.25	1387	552.58	1387.79	553.2	1388	554.08	1388.3	556.15	1389
558.18	1389.69	559.1	1390	560.14	1390.35	562.05	1391	563.92	1391.63
565	1392	565.31	1392.1	567.95	1393	568.33	1393.13	568.8	1393.29
576.23	1393.83	578.57	1394	579.38	1394.06	579.42	1394.06	579.43	1394.06
579.75	1394	580.54	1393.85	585.09	1393	590.14	1392.05	590.41	1392
590.5	1391.98	595.72	1391	597.23	1390.71	598.72	1390.43	600.57	1390.4
601.3	1390.38	602.52	1390.22	603.19	1390.14	604.23	1390	605.48	1389.84
606.55	1389.7	606.9	1389.66	607.06	1389.63	607.53	1389.57	607.62	1389.55

```
  607.65 1389.54  607.77 1389.51  607.87 1389.48  607.95 1389.43  608.02 1389.37
  608.09 1389.33  608.16 1389.29  608.22 1389.25  608.28 1389.22  608.34 1389.18
   608.4 1389.14  628.44 1389.25

Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
   185.4    .025  208.51    .032  234.91    .028  265.09    .032  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.51  291.49            103.09     100   97.23              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  388.37  628.44 1388.34        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 13100

INPUT
Description: Channel Station 48799.16
Station Elevation Data     num=      130
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
   173.6    1386  174.16 1385.96  178.64 1385.59   199.3 1385.39  201.83 1385.36
  202.22 1385.36   203.6 1385.35  204.12 1385.22     205    1385  205.39 1385.35
  208.51 1385.63  234.91 1379.03     250 1378.73  265.09 1379.03  291.49 1385.63
  307.49 1385.95  312.09  1384.8  316.46 1385.89  322.26 1385.95  328.24 1386.72
  336.18 1386.38  336.36 1386.32  338.23 1386.79  345.25 1387.14  349.71 1387.24
  381.35 1387.88  417.44 1387.17  424.46 1386.83  425.44 1386.58  432.31   1387
  436.65 1387.27  438.46 1387.38   438.8 1387.22  438.87    1387  438.93    1387
     439    1387  439.06    1387  439.11    1387  439.13    1387  439.14    1387
   439.7    1387  439.79    1387  440.78    1387  441.19    1387  443.03    1387
     452 1386.51  458.05 1386.22  459.34 1386.16  462.56    1386  463.72 1385.95
  466.76 1385.82  472.24 1385.91  475.84 1385.93  478.43 1385.81  485.45 1385.53
  497.52 1385.52  502.88 1385.51  509.99 1385.46  515.62 1385.42  524.92 1385.36
  534.05 1385.48  537.85 1385.53  541.06 1385.57  541.28 1385.66  541.52 1385.74
   542.2    1386  543.68 1386.56  544.85    1387  547.07 1387.84   547.5    1388
  548.66 1388.44  550.06 1388.97  550.15    1389  552.47 1389.86  552.84    1390
  555.28  1390.9  555.55    1391  556.09  1391.2  558.26    1392  559.53 1392.47
  560.98    1393  561.22 1393.09   562.6  1393.6  566.59 1393.82  567.64 1393.88
  569.65    1394  570.74 1394.06  572.47 1394.17   573.3 1394.21  573.73 1394.11
  574.23    1394  576.24 1393.54  578.61    1393  582.12  1392.2  582.98    1392
  584.84 1391.58  587.35    1391  588.44 1390.75  590.05 1390.38   591.7    1390
  592.35 1389.85  592.64 1389.78  593.03 1389.79  594.48 1389.77   595.3 1389.76
  595.67 1389.76  595.73 1389.75  596.15 1389.69  596.49 1389.64  596.77  1389.6
  597.03 1389.57   597.9 1389.44   598.1 1389.41  598.28 1389.39  598.45 1389.36
  598.74 1389.32  598.91 1389.29  599.05 1389.27  599.17 1389.25  599.28 1389.23
  599.38 1389.21  599.47  1389.2  599.55 1389.18  599.62 1389.17  599.68 1389.16
  599.77 1389.14  600.62 1389.02  600.69 1389.01  600.74    1389  622.39 1389.19

Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
   173.6    .025  208.51    .032  234.91    .028  265.09    .032  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.51  291.49             95.48     100  104.29              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  381.63  622.39  1387.9        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 13000

INPUT
Description: Channel Station 48899.16
Station Elevation Data     num=      129
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  160.32    1386  163.82 1385.65  167.18 1385.33  170.52    1385  170.73 1384.98
  171.08 1384.94  174.57 1384.96  177.03 1384.96  199.71 1384.98  200.86 1384.98
```

201.44	1384.99	201.89	1385	203.19	1385	204.21	1384.97	208.51	1385.55
234.91	1378.95	250	1378.65	265.09	1378.95	291.49	1385.55	307.49	1385.87
312.09	1384.72	315.99	1385.69	320.32	1385.68	322.78	1385.56	324.91	1386.01
331.31	1385.97	332.23	1385.77	333.91	1386.19	340.91	1386.54	376.91	1387.26
412.91	1386.55	419.92	1386.2	422.92	1385.7	426.36	1386.56	431.56	1387
433.24	1387.13	433.7	1387.17	433.71	1387.08	433.72	1387	437.39	1386.7
445.98	1386	450.09	1385.82	461.04	1385.32	467.67	1385.44	472.54	1385.46
478.59	1385.26	478.87	1385.25	480.54	1385.24	487.42	1385.19	492.99	1385.15
501.45	1385.05	502.2	1385.04	503.1	1385.04	504.2	1385.03	505.56	1385.02
507.29	1385	507.79	1385	507.84	1385	509.51	1384.98	511.25	1384.96
512.4	1384.95	517.37	1384.9	517.67	1384.91	517.93	1384.91	523.24	1385
523.33	1385	523.4	1385	523.92	1385.01	532.69	1385.14	533.23	1385.15
536.67	1385.21	537.44	1385.55	538.23	1385.9	538.46	1386	540.47	1386.89
540.73	1387	540.79	1387.03	543.01	1388	543.74	1388.32	545.28	1389
547.16	1389.82	547.56	1390	548.1	1390.24	549.84	1391	550.05	1391.09
551.93	1391.91	552.14	1392	552.27	1392.06	554.44	1393	556.63	1393.95
556.7	1393.98	556.71	1393.98	557.34	1394	558.6	1394.04	566.17	1394.29
567.29	1394.01	567.33	1394	568.29	1393.77	571.38	1393	573.07	1392.58
575.42	1392	578.84	1391.15	579.46	1391	581.18	1390.57	583.5	1390
584.08	1389.86	584.97	1389.64	585.33	1389.55	586.1	1389.55	588.22	1389.57
588.25	1389.56	588.33	1389.54	588.41	1389.53	589.39	1389.4	589.45	1389.4
589.54	1389.38	589.59	1389.39	613.35	1389.26	614.48	1389.26	615.59	1389.27
616.68	1389.27	617.76	1389.28	618.83	1389.28	620.97	1389.29	622.36	1389.3
623.74	1389.3	625.12	1389.3	626.48	1389.31	628.36	1389.31		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
160.32	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	96.55	100	103.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
377	628.36	1387.28	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12900

INPUT
Description: Channel Station 48999.16
Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
134.08	1386	147.33	1385.61	160.25	1385.26	161.98	1385.22	165.55	1385.11
173.6	1385.08	193.78	1385	200.52	1384.97	201.78	1384.97	202.63	1385
202.76	1385	203.85	1385.04	204.21	1385.05	204.24	1385.04	204.39	1385
204.8	1385	204.94	1385.07	206.51	1385.47	208.51	1385.47	234.91	1378.87
250	1378.57	265.09	1378.87	291.49	1385.47	307.49	1385.79	312.09	1384.64
316.23	1385.67	320.68	1385.68	324.66	1386.57	333.03	1386.17	335.83	1385.55
336.01	1385.59	343.01	1385.94	379.06	1386.65	415.11	1385.92	422.11	1385.57
425.12	1385.07	431.1	1386.56	431.27	1386.35	435.71	1386.96	442.32	1386.5
449.28	1386	452.76	1385.87	457.72	1385.7	462.85	1385.51	471.54	1385.23
478.35	1385	481.26	1384.91	482.62	1384.87	485.71	1384.9	486.67	1384.91
495.26	1384.98	495.37	1384.99	496.33	1384.97	516.71	1384.71	517.86	1384.69
518.41	1384.69	518.73	1384.68	519.66	1384.67	520.44	1384.69	522.26	1384.72
531.86	1384.91	534.04	1384.87	536.99	1384.82	537.58	1384.81	537.62	1384.83
538.05	1385	538.35	1385.12	540.52	1386	542.42	1386.77	543	1387
543.6	1387.24	545.48	1388	547.13	1388.67	547.96	1389	549.35	1389.56
550.03	1389.83	550.45	1390	551.04	1390.23	552.96	1391	553.63	1391.27
555.47	1392	556.66	1392.48	557.98	1393	558.5	1393.21	558.99	1393.4
561.74	1393.52	568.15	1393.81	571.47	1393.03	571.58	1393	575.77	1392.01
575.81	1392	575.9	1391.98	580.01	1391	581.27	1390.7	584.19	1390
585.27	1389.74	586.96	1389.34	589.66	1389.27	591.36	1389.23	591.4	1389.23
591.44	1389.24	591.48	1389.24	591.5	1389.25	612.59	1389.01	623.61	1388.9

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
134.08	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	101.64	100	98.37	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
365.44	623.61	1387	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12800

INPUT
Description: Channel Station 49099.16
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
163.75	1385.28	169.83	1385.1	173.16	1385.05	176.18	1385	178.69	1384.96
182.04	1384.91	193.57	1384.92	201.57	1384.93	203.2	1384.95	204.07	1384.97
204.89	1384.98	206.51	1385.39	208.51	1385.39	234.91	1378.79	250	1378.49
265.09	1378.79	291.49	1385.39	307.49	1385.71	312.09	1384.56	316.13	1385.57
325.28	1385.61	329.51	1386.54	330.03	1386.53	338.03	1384.53	341.03	1385.03
341.06	1385.03	348.04	1385.37	348.9	1385.39	384.07	1386.09	420.11	1385.36
427.11	1385	430.12	1384.5	437.74	1386.41	440.51	1386.77	445.9	1386.41
452.8	1386	465.35	1385.65	468.82	1385.55	471.31	1385.44	481.44	1385
482.3	1384.97	486.79	1384.77	494.05	1384.72	500.19	1384.67	518	1384.5
520.72	1384.48	522.64	1384.47	528.88	1384.46	528.91	1384.46	529.53	1384.48
536.24	1384.72	536.56	1384.72	537.22	1384.7	542.63	1384.6	543.2	1384.83
543.62	1385	544.98	1385.55	546.08	1386	547.2	1386.45	548.55	1387
549.9	1387.55	550.28	1387.7	551.01	1388	552.8	1388.73	553.47	1389
553.74	1389.11	555.94	1390	556.76	1390.33	558.42	1391	560.08	1391.67
560.9	1392	563.37	1393	563.38	1393	563.77	1393.16	563.82	1393.18
564.8	1393.19	573.73	1393.33	574.56	1393.13	575.12	1393	578.58	1392.19
579.36	1392	583.44	1391.04	583.6	1391	583.94	1390.92	587.82	1390
590.72	1389.31	591	1389.24	591.1	1389.24	592.85	1389.25	593.47	1389.16
594.53	1389	594.98	1388.93	597.53	1388.68	627.85	1388.39		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
163.75	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	103.54	100	96.09	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
383.72	627.85	1386.12	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12700

INPUT
Description: Channel Station 49199.16
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
150.22	1385.14	151.67	1385.16	152.44	1385.17	157.09	1385	165.32	1384.82
171.18	1384.73	172.69	1384.69	178.3	1384.59	180.23	1384.55	181.43	1384.53
183.44	1384.55	201.1	1384.73	202.88	1384.72	204.09	1384.7	206.51	1385.31
208.51	1385.31	234.91	1378.71	250	1378.41	265.09	1378.71	291.49	1385.31
307.49	1385.63	312.09	1384.48	315.87	1385.42	325.02	1385.55	328.37	1386.28
337.44	1384.01	340.45	1384.52	347.46	1384.87	383.52	1385.6	419.58	1384.89
426.59	1384.54	429.59	1384.04	437.61	1386.36	449.92	1385.12	455.8	1385
456.8	1384.98	459.23	1384.93	460.83	1384.9	471.78	1384.98	474.63	1385
476.43	1385.45	478.63	1386	480.29	1386.34	481.01	1386.49	481.59	1386.61
484.23	1386.44	491.55	1386	497.59	1385.82	508.65	1385.48	518.65	1385.08
520.5	1385	522.35	1384.92	526.84	1384.65	535.31	1384.57	541.26	1384.56
553.97	1384.36	560.23	1384.28	571.29	1384.39	572.38	1384.4	573.84	1384.45
580.9	1384.7	582.68	1384.73	584.36	1384.77	584.54	1384.83	584.98	1385
585.26	1385.1	587.63	1386	589.08	1386.55	590.27	1387	591.12	1387.32
591.94	1387.63	592.92	1388	594.91	1388.75	595.57	1389	597.92	1389.89
598.22	1390	600.15	1390.73	600.87	1391	601.02	1391.06	603.51	1392
603.87	1392.14	605.49	1392.75	608.6	1392.88	611.3	1393	613.59	1393.11
615.28	1393.19	615.79	1393.07	616.11	1393	618.14	1392.54	620.48	1392
622.54	1391.52	624.8	1391	627.47	1390.37	629.03	1390	629.77	1389.82
631.71	1389.36	633.21	1389.22	634.03	1389.14	634.32	1389.09	634.84	1389
635.66	1388.86	636.61	1388.72	637.32	1388.64	637.95	1388.55	638.48	1388.48

```
  638.91 1388.41   639.9 1388.32  662.34 1388.12  669.78 1388.15  670.53 1388.14

Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
  150.22    .025  208.51    .032  234.91    .028  265.09    .032  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.51  291.49            100.41     100   99.62              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  359.14  670.53    1386       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 12600

INPUT
Description: Channel Station 49299.16
Station Elevation Data     num=      98
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  150.75  1385.2   151.6  1385.2  152.53  1385.2  155.99    1385   159.4    1385
  159.48    1385  159.53    1385  159.62 1384.99   161.9 1384.64  167.23 1384.48
   171.5 1384.33  175.61 1384.35  195.03  1384.4  198.09 1384.43  201.94 1384.46
  203.49 1384.47  206.51 1385.23  208.51 1385.23  234.91 1378.63     250 1378.33
  265.09 1378.63  291.49 1385.23  307.49 1385.55  312.09  1384.4  315.47 1385.24
  320.01 1386.11  329.59 1383.72   332.6 1384.22   339.6 1384.57  375.65 1385.29
  411.69 1384.57   418.7 1384.23   421.7 1383.73   429.7 1386.48  432.35 1385.78
  433.22    1386  433.51 1386.07  434.89 1386.42  442.16 1386.09  444.13    1386
  445.89 1385.92  462.89 1385.15  466.53 1385.03  467.54    1385  472.63 1384.84
  476.24 1384.73  481.14 1384.57  484.46 1384.55  495.08  1384.5  509.97  1384.4
   513.3 1384.37  517.86  1384.3   527.9 1384.15  530.73 1384.33  533.88 1384.54
  536.68 1384.55  538.29 1384.56  538.96 1384.83  539.39    1385   541.8 1385.97
  541.89    1386  541.97 1386.03   544.4    1387  546.01 1387.64  546.95    1388
  548.92 1388.77  549.52    1389  549.86 1389.13  552.12    1390  552.26 1390.06
  554.41 1390.88  554.73    1391  555.09 1391.14  557.35    1392  558.47 1392.43
   558.7 1392.51  559.12 1392.53  568.72 1392.98  570.27 1392.65  573.44    1392
  576.24 1391.42  578.24    1391  579.86 1390.65  582.92    1390  586.96 1389.11
  587.48    1389  587.69 1388.95  587.75 1388.94  588.41 1388.86  591.24 1388.52
  592.18  1388.4  592.87 1388.32  594.64 1388.12  594.66 1388.12  616.39 1388.11
  619.89 1388.04  625.42 1387.93  625.73 1387.93

Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
  150.75    .025  208.51    .032  234.91    .028  265.09    .032  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        208.51  291.49             94.09     100   105.5              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  432.76  625.73 1386.42       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 12500

INPUT
Description: Channel Station 49399.16
Station Elevation Data     num=      96
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  159.85    1385  160.18    1385  160.57 1384.77  161.22  1384.6  167.18  1384.4
  169.67 1384.33  173.17 1384.32  194.35 1384.35  200.45 1384.38  203.53  1384.4
  208.51 1385.15  234.91 1378.55     250 1378.25  265.09 1378.55  291.49 1385.15
  307.49 1385.47  312.09 1384.32  317.07 1385.56  320.38 1386.19  329.69 1383.87
  330.02 1383.92  332.69 1384.37   339.7 1384.72  375.72 1385.44  377.09 1385.41
  411.75 1384.72  418.76 1384.37  421.76 1383.88  429.76 1386.26  430.32    1386
  430.39 1386.01  432.15 1386.18  433.81 1386.11  436.52    1386  440.42 1385.85
  460.96 1385.04  461.98 1385.01   462.2    1385   472.1 1384.68  475.73 1384.56
  476.41 1384.54  478.41 1384.47  480.17 1384.45  493.51  1384.3  502.45 1384.25
  510.38 1384.21  518.81 1384.01  519.22    1384  519.72 1383.99  526.17 1383.85
```

526.46	1383.87	528.01	1384	528.64	1384.05	532.76	1384.36	535.57	1384.46
536.59	1384.5	537.64	1384.93	537.82	1385	538.25	1385.17	540.3	1386
541.2	1386.37	542.77	1387	544.22	1387.59	545.24	1388	547.34	1388.85
547.71	1389	548.93	1389.5	550.18	1390	550.45	1390.11	550.69	1390.21
552.65	1391	554.47	1391.74	555.11	1392	556.11	1392.41	556.22	1392.45
556.26	1392.47	556.29	1392.48	556.61	1392.49	566.87	1392.78	569.11	1392.26
570.25	1392	571.85	1391.63	574.56	1391	578.23	1390.15	578.87	1390
579.58	1389.83	583.17	1389	583.78	1388.86	584.58	1388.67	589.37	1388.13
590.47	1388	590.71	1387.97	592.94	1387.72	593.45	1387.67	594.5	1387.59
620.68	1387.31								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
159.85	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	100.08	100	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
432.11	620.68	1386.15	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12400

INPUT
Description: Channel Station 49499.16
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
165.06	1384.55	165.37	1384.46	167.21	1384.43	181.56	1384.22	190.79	1384.26
194.9	1384.27	198.25	1384.35	203.35	1384.43	204.11	1384.47	206.51	1385.07
208.51	1385.07	234.91	1378.47	250	1378.17	265.09	1378.47	291.49	1385.07
307.49	1385.39	312.09	1384.24	315.16	1385.01	320.62	1385.06	324.68	1385.93
331.98	1384.1	334.98	1384.61	341.99	1384.96	379.63	1385.71	415.66	1385
422.67	1384.65	425.67	1384.15	432.55	1385.87	433.21	1385.58	433.77	1385.65
434.12	1385.7	434.37	1385.74	435.78	1385.92	441.48	1385.74	464.51	1385
464.53	1385	465.21	1384.98	473.96	1384.68	481.56	1384.4	484.77	1384.37
497.97	1384.21	502.81	1384.15	504.09	1384.14	505.04	1384.12	512.32	1384.02
514.19	1384	515.2	1383.99	529.8	1383.84	531.06	1383.92	532.48	1384
540.24	1384.42	540.48	1384.44	540.53	1384.46	541.82	1384.97	541.89	1385
541.9	1385.01	544.4	1386	545.28	1386.35	546.91	1387	549.28	1387.94
549.42	1388	549.59	1388.07	550.02	1388.24	551.93	1389	552.89	1389.38
554.42	1390	555.73	1390.53	556.88	1391	558.2	1391.54	559.33	1392
559.66	1392.14	560.03	1392.29	566.46	1392.27	570.1	1392.27	570.5	1392.18
571.37	1392	572.79	1391.7	576.11	1391	579.36	1390.32	580.87	1390
584.77	1389.19	585.66	1389	587.44	1388.63	590.27	1388.04	591.22	1388.03
592.41	1388	595.19	1387.59	595.82	1387.51	596.48	1387.55	598.12	1387.76
598.79	1387.57	601.06	1387.16	601.45	1387.09	602.06	1387	602.22	1386.95
602.34	1386.94	602.42	1386.93	602.53	1386.93	607.95	1386.87	625.37	1387.07
626.79	1387.08								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
165.06	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	102.09	100	97.8	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
435.78	626.79	1385.92	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12300

INPUT
Description: Channel Station 49599.16
Station Elevation Data num= 108

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

138.88	1385	143.54	1384.89	147.79	1384.9	152.3	1384.91	164	1384.58
165.24	1384.6	166.81	1384.59	168.05	1384.46	172.78	1384.32	181.31	1384.08
185.2	1384.09	197.5	1384.13	203.32	1384.19	206.51	1384.99	208.51	1384.99
234.91	1378.39	250	1378.09	265.09	1378.39	291.49	1384.99	307.49	1385.31
312.09	1384.16	314.92	1384.86	324.13	1384.81	327.39	1385.75	330.69	1384.93
333.07	1384.33	334.84	1384.63	336.07	1384.83	340.17	1385.04	343.07	1385.18
365.68	1385.63	382.43	1385.97	398.4	1385.65	418.43	1385.25	421.62	1385.09
425.43	1384.9	425.48	1384.89	425.54	1384.87	427.38	1385	431.26	1385.26
434.42	1385.46	435.62	1385.54	436.26	1385.58	438.3	1385.71	445.27	1385.52
464.43	1385	466.35	1384.93	468.4	1384.87	480.32	1384.48	484.22	1384.34
489.48	1384.24	500.61	1384	500.81	1384	501.03	1384	501.13	1384
502.59	1383.99	509.61	1383.95	511.74	1383.94	512.7	1383.94	515.25	1383.93
518.27	1383.91	521.47	1383.91	533.32	1383.88	534.54	1383.95	535.58	1384
537.1	1384.08	543.54	1384.41	544.46	1384.78	545.01	1385	546.74	1385.69
547.5	1386	548.73	1386.49	549.88	1386.95	550	1387	550.42	1387.17
552.49	1388	553.88	1388.55	555	1389	557.12	1389.85	557.5	1390
558.03	1390.21	560	1391	561.25	1391.5	562.53	1392	562.61	1392.03
562.7	1392.07	563.35	1392.07	573.46	1392.2	574.22	1392.04	574.42	1392
575.57	1391.75	578.98	1391	582.38	1390.25	583.24	1390.07	583.54	1390
587.19	1389.2	588.1	1389	591.47	1388.26	592.66	1388	593.02	1387.92
594.39	1387.61	595.85	1387.55	601.99	1387.25	602.86	1387.09	603.44	1387.01
603.83	1387.02	604.06	1387	631.25	1387.09				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
138.88	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	103.82	100	96.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
382.32	631.25	1385.96	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12200

INPUT
Description: Channel Station 49699.16
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
140.02	1385	142.29	1384.89	164.48	1384.21	168.75	1384.14	176.83	1384.07
181.15	1384.1	192.08	1384.16	202.9	1384.1	203.24	1384.09	206.51	1384.91
208.51	1384.91	234.91	1378.31	250	1378.01	265.09	1378.31	291.49	1384.91
307.49	1385.23	312.09	1384.08	313.91	1384.53	319.85	1384.67	322.31	1385.62
326.58	1384.56	329.58	1385.06	336.6	1385.41	377.76	1386.22	413.8	1385.5
413.88	1385.5	420.81	1385.15	421.14	1385.06	422.23	1385	429.02	1385.32
431.29	1385.41	434.37	1385.57	436.24	1385.53	458.24	1385	458.97	1384.98
463.02	1384.89	464.92	1384.84	469.55	1384.67	480.89	1384.23	490.98	1384.05
493.89	1384	495.91	1383.97	496.58	1383.96	497.04	1383.96	498.6	1383.96
511.82	1383.91	528.39	1383.76	529.67	1383.76	530.37	1383.8	531.58	1383.87
533.65	1384	535.87	1384.13	540.52	1384.42	541.75	1384.9	542.02	1385
544.44	1385.93	544.61	1386	546.03	1386.55	547.19	1387	547.37	1387.07
548.51	1387.51	549.78	1388	550.41	1388.24	552.37	1389	553.54	1389.45
554.96	1390	556.82	1390.71	557.56	1391	558.61	1391.4	559.76	1391.85
560.15	1392	560.29	1392	560.31	1392	560.6	1392	561.34	1392.02
562.01	1392.02	562.61	1392.03	570.16	1392.14	570.45	1392.08	570.84	1392
573.51	1391.44	575.62	1391	579.81	1390.12	580.39	1390	581.76	1389.71
585.17	1389	586.21	1388.78	589.93	1388	590.41	1387.89	591.65	1387.63
594.88	1387.38	598.24	1387.1	598.35	1387.09	598.72	1387.1	599.29	1387.02
600.36	1387.04	601	1387	631.37	1387.1				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
140.02	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	92.68	100	106.55	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
378.36	631.37	1386.22	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12100

INPUT
Description: Channel Station 49799.16
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
140.17	1385	149.49	1384.72	159.38	1384.7	166.55	1384.48	174.04	1384.27
176.78	1384.18	187.1	1384.23	190.34	1384.24	197.69	1384.26	202.29	1384.27
204.14	1384.28	204.36	1384.29	206.51	1384.83	208.51	1384.83	234.91	1378.23
250	1377.93	265.09	1378.23	291.49	1384.83	307.49	1385.15	312.09	1384
314.15	1384.51	320.2	1384.63	322.48	1385.42	324.91	1384.81	327.75	1385.29
327.91	1385.31	334.91	1385.66	378.06	1386.53	414.11	1385.82	421.12	1385.47
422.63	1385.09	433.51	1385.22	446.51	1385.03	448.8	1385	449.44	1385
451.04	1384.97	465.65	1384.69	474.44	1384.36	479.58	1384.15	483.14	1384.08
486.89	1384	493.43	1383.87	496.38	1383.81	504.59	1383.82	510.61	1383.83
513.88	1383.78	525.7	1383.59	529.09	1383.53	530.08	1383.6	535.4	1384
539.53	1384.3	540.3	1384.36	540.49	1384.37	540.55	1384.39	540.69	1384.44
542.1	1385	544.29	1385.86	544.65	1386	544.98	1386.13	547.2	1387
549	1387.71	549.75	1388	550.08	1388.13	550.6	1388.33	552.3	1389
554.37	1389.81	554.85	1390	555.19	1390.14	557.4	1391	558.88	1391.58
559.61	1391.87	562.25	1391.98	562.57	1392	563.55	1392.05	568.41	1392.3
570.46	1392.4	570.54	1392.38	572.3	1392	574.98	1391.38	576.68	1391
580.37	1390.16	581.09	1390	585.42	1389.01	585.47	1389	585.81	1388.92
589.82	1388	592.18	1387.46	592.84	1387.31	594.51	1387.22	596.95	1387.1
598.92	1387	600.11	1386.96	600.96	1386.93	601.36	1386.91	601.39	1386.91
622.54	1387.06	636.28	1387.25						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
140.17	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	99.46	100	100.61	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
377.97	636.28	1386.52	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 12000

INPUT
Description: Channel Station 49899.16
Station Elevation Data num= 115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
154.58	1385	156.35	1385	160.95	1385	167.33	1384.6	171.77	1384.34
172.11	1384.33	172.55	1384.3	172.99	1384.29	181.76	1384.11	194.13	1384.23
204.22	1384.32	204.8	1384.32	206.51	1384.75	234.91	1378.15	250	1377.85
265.09	1378.15	291.49	1384.75	307.49	1385.07	312.09	1383.92	313.68	1384.32
326.42	1384.6	329.97	1385.64	331.73	1385.4	332.33	1385.55	332.42	1385.55
339.34	1385.9	342.08	1385.95	384.34	1386.8	420.41	1386.09	427.43	1385.74
430.19	1385.05	437.4	1385	437.61	1385	439.27	1384.98	439.52	1384.98
439.52	1384.99	439.52	1385	440.94	1385	442.54	1385	443.65	1385
445.15	1385	449.86	1385	450.41	1385	450.58	1385	450.85	1385
451.05	1385	457.94	1384.81	471.48	1384.42	475.23	1384.27	477.91	1384.15
479.18	1384.09	480.87	1384	481.41	1383.97	484.94	1383.79	497.25	1383.64
501.8	1383.58	504.29	1383.61	512.65	1383.68	529.37	1383.44	535.61	1383.35
537.06	1383.44	537.82	1383.49	538.51	1383.54	540.09	1383.63	540.72	1383.67
541.89	1383.74	545.3	1383.95	545.78	1383.97	545.78	1383.98	545.8	1384
545.96	1384.06	546.72	1384.34	547.04	1384.46	547.23	1384.53	548.51	1385
549.32	1385.3	550.02	1385.57	551.18	1386	551.62	1386.17	553.84	1387
555.44	1387.6	556.49	1388	558.3	1388.69	559.12	1389	561.38	1389.86
561.75	1390	563.55	1390.68	564.38	1391	565.64	1391.48	566.41	1391.78
566.46	1391.79	566.54	1391.8	572.06	1392	572.72	1392.02	577.53	1392.21
577.61	1392.19	578.46	1392	578.64	1391.96	583	1391	586.67	1390.19
587.51	1390	588.23	1389.84	591.99	1389	592.07	1388.98	593	1388.77
596.44	1388	596.52	1387.98	598.25	1387.59	600.93	1387.45	607.37	1387.1
607.72	1387.12	608.05	1387.19	625.81	1387.44	630.93	1387.45	642.9	1387.31

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
154.58	.025	206.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	291.49	100.05	100	100.03	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
384.19	642.9	1386.8	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11900

INPUT
Description: Channel Station 49999.16 (No Berm)
Station Elevation Data num= 124

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
149.58	1385	150.39	1385	151.91	1385	159.72	1385	160.34	1385
166.77	1384.98	167.59	1384.93	168.62	1385	171.48	1385	174.87	1385
175.77	1384.78	177.73	1384.25	184.67	1384.07	185.04	1384.07	186.26	1384.03
187.65	1384	187.75	1384	187.76	1384	188.72	1384	192.16	1384
192.67	1384	208.51	1384.67	234.91	1378.07	250	1377.77	265.09	1378.07
291.49	1384.67	312.34	1385.08	316.94	1383.93	317.76	1384.14	318.4	1384.14
331.22	1384.69	334.02	1385.06	336.97	1385.72	337.22	1385.78	344.2	1386.11
345.08	1386.15	351.68	1386.28	362.96	1386.51	375.35	1386.76	390.6	1387.07
401.87	1386.84	426.67	1386.35	427.1	1386.33	433.12	1386.03	433.65	1386.01
433.69	1386	433.72	1386	439.06	1384.66	440.08	1384.95	441.54	1384.9
442.69	1384.86	443.21	1384.84	443.43	1384.83	443.45	1384.83	443.64	1384.82
443.96	1384.81	444.32	1384.8	444.53	1384.79	444.65	1384.79	444.72	1384.79
446.64	1384.73	454.83	1384.96	461.96	1384.8	463.46	1384.8	478.35	1384.2
478.37	1384.2	478.39	1384.2	478.4	1384.19	478.41	1384.19	478.43	1384.19
478.46	1384.19	484.34	1384	484.95	1383.99	486.23	1383.96	489.21	1383.77
491.67	1383.6	505.13	1383.6	508.7	1383.59	518.73	1383.67	520.95	1383.69
526.52	1383.62	545.07	1383.38	545.49	1383.4	546.07	1383.42	550.65	1383.57
552.79	1383.65	552.9	1383.69	553.4	1383.88	553.72	1384	556.05	1384.88
556.36	1385	557.23	1385.33	559	1386	559.51	1386.19	561.65	1387
563.25	1387.6	564.32	1388	566.4	1388.77	567.01	1389	568.48	1389.55
569.71	1390	570.48	1390.29	572.4	1391	572.85	1391.17	573.64	1391.46
578.2	1391.57	585.24	1391.75	588.48	1391.13	589.16	1391	593.03	1390.25
594.33	1390	596.65	1389.55	599.5	1389	603.24	1388.27	604.65	1388
605.23	1387.89	613.25	1387.26	614.36	1387.17	616.32	1387.05	616.5	1387.24
616.59	1387.23	624.14	1387.15	638.19	1387.38	642.33	1387.32		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
149.58	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	105.72	100	94.44	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
390.45	642.33	1387.06	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11800

INPUT
Description: Channel Station 50099.16
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
178.23	1385	178.57	1384.94	180.49	1384.59	181.14	1384.55	189.96	1384.11
193.11	1384.14	208.51	1384.59	234.91	1377.99	250	1377.69	265.09	1377.99
291.49	1384.59	315.89	1385.08	320.26	1383.98	320.59	1383.99	332.6	1386.97
333.61	1386.96	344.46	1386.8	344.62	1386.8	344.96	1386.8	345.04	1386.3
346.46	1386.38	392.07	1387.29	428.09	1386.56	435.09	1386.21	439.1	1385.21
441.7	1385	444.51	1384.76	446.97	1384.56	446.98	1384.92	446.98	1385

447.08	1385	447.42	1385	447.72	1385	448.39	1385.32	448.41	1385.31
450.06	1385.48	450.11	1385.47	450.43	1385.4	457.23	1385	464.53	1385
464.83	1385	464.98	1385	465.08	1384.99	466.36	1384.76	469.39	1384.62
470.47	1384.57	472.39	1384.42	477.57	1384.01	478.44	1384.01	478.96	1384
480.25	1384	485.77	1383.97	489.89	1383.81	491.78	1383.73	495.48	1383.71
508.83	1383.6	517.63	1383.73	523.35	1383.81	539.69	1383.48	546.73	1383.34
550	1383.36	550.19	1383.37	552.79	1383.37	554.3	1383.94	554.46	1384
555.68	1384.46	557.1	1385	558.9	1385.68	559.74	1386	561.22	1386.56
562.39	1387	563.15	1387.29	565.04	1388	566.49	1388.55	567.68	1389
569.87	1389.83	570.33	1390	570.72	1390.15	572.98	1391	573.17	1391.07
573.71	1391.28	578.66	1391.42	585.19	1391.61	586.43	1391.38	588.44	1391
590.64	1390.59	593.76	1390	598.86	1389.04	599.08	1389	599.64	1388.89
604.26	1388.03	604.48	1388.01	604.77	1388	614.76	1387.49	616.32	1387.41
616.87	1387.38	617.99	1387.32	618.26	1387.32	637.32	1387.06	646.38	1386.93

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
178.23	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	99.31	100	100.6	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
391.98	646.38	1387.28	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11700

INPUT
Description: Channel Station 50199.16
Station Elevation Data num= 104

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
177.28	1385	177.52	1384.71	177.67	1384.49	178.66	1384.44	184.52	1384.19
201.75	1384.2	203.36	1384.2	203.73	1384.2	203.84	1384.17	204.16	1384.09
204.51	1384	205.27	1384.2	206.51	1384.51	208.51	1384.51	234.91	1377.91
250	1377.61	265.09	1377.91	291.49	1384.51	307.49	1384.83	310.53	1384.07
323.41	1387.29	324.41	1387.28	339.69	1387.05	339.92	1387.05	340	1386.55
341.42	1386.63	387	1387.54	423.01	1386.82	430.01	1386.47	439.73	1384.04
440.59	1384.44	441.62	1384.32	441.65	1384.95	441.65	1385	442.22	1385.51
442.37	1385.65	442.39	1385.67	442.69	1385.94	451.31	1385.53	460.94	1385.08
461.07	1385.04	461.18	1385	463.36	1384.25	464.08	1384	464.19	1383.96
464.37	1383.9	464.61	1383.89	467.35	1383.85	471.8	1383.71	476.28	1383.78
481.86	1383.86	487.25	1383.82	490.25	1383.79	503.26	1383.7	505.66	1383.68
506.55	1383.68	507.86	1383.67	540.41	1383.4	543.79	1383.44	547.19	1383.47
547.89	1383.73	548.62	1384	550	1384.51	551.09	1384.91	551.32	1385
552.3	1385.36	554.01	1386	554.79	1386.29	556.71	1387	557.89	1387.44
559.4	1388	561.69	1388.85	562.09	1389	562.84	1389.28	564.78	1390
565.96	1390.44	567.46	1391	568.85	1391.52	569.37	1391.72	577.18	1391.83
580.54	1391.89	583.31	1391.28	584.61	1391	587.76	1390.31	589.17	1390
590.03	1389.81	593.74	1389	596.51	1388.39	597.63	1388.15	599.04	1388.03
599.42	1388	611.02	1387.03	611.4	1387	611.41	1387	611.46	1387
611.6	1387	611.69	1387	611.79	1386.95	612.19	1386.82	612.88	1386.65
613.47	1386.71	613.75	1386.76	643.22	1386.34	655.3	1386.39		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
177.28	.025	208.51	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
208.51	291.49	95.66	100	104.2	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
387.07	655.3	1387.54	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11600

INPUT

Description: Channel Station 50299.16
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
167.17	1385	170.81	1385.26	174.6	1385	177.87	1385	180.09	1384.68
180.69	1384.59	181.89	1384.55	190	1384.3	197.44	1384.56	201.43	1384.7
204.08	1384.04	204.23	1384	205.02	1384	206.73	1384.87	234.91	1377.83
250	1377.53	265.09	1377.83	291.49	1384.43	307.49	1384.75	314.21	1383.07
331.8	1387.47	332.72	1387.46	332.8	1387.46	342.45	1387.32	342.92	1387.32
342.95	1387.32	343.03	1386.82	344.45	1386.9	390.1	1387.82	426.15	1387.1
433.16	1386.75	444.01	1384.05	444.33	1384.05	449.65	1384.01	450.77	1384
452.32	1384	460.23	1384	463.86	1383.9	466.07	1383.83	466.6	1383.83
466.92	1383.81	467.6	1383.84	471.68	1384	472	1384.01	474.63	1384.12
476.92	1384.21	484.66	1384.13	487.23	1384.09	489.51	1384.06	493.42	1384
515.03	1383.72	516.48	1383.7	516.82	1383.69	517.19	1383.69	517.62	1383.68
518	1383.69	518.53	1383.68	544.19	1383.62	546.88	1383.67	549.87	1383.71
550.03	1383.77	550.59	1383.98	550.64	1384	550.84	1384.08	553.28	1385
554.84	1385.59	555.93	1386	556.51	1386.22	558.58	1387	560.9	1387.87
561.23	1388	561.67	1388.16	563.89	1389	566.2	1389.87	566.56	1390
569.07	1390.94	569.24	1391	569.34	1391.04	571.84	1391.97	571.94	1391.97
574	1392	577.52	1392.05	583.48	1392.14	584	1392.03	584.11	1392
588.13	1391.11	588.63	1391	589.66	1390.77	593.12	1390	595.19	1389.54
597.59	1389	601.57	1388.11	602.04	1388	602.31	1387.94	604.27	1387.5
608.89	1387.1	610.09	1387	611.29	1386.9	617.92	1386.44	618.1	1386.35
618.16	1386.31	618.49	1386.24	630.92	1386.29	642.59	1386.13	650.23	1386.13
661.75	1386.17	663.51	1386.18						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
167.17	.025	206.73	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.73	291.49	100.01	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
389.97	663.51	1387.81	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11500

INPUT
Description: Channel Station 50399.16
Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
167	1385	168.58	1385	177.99	1384.92	181.73	1384.97	187.89	1384.81
192.09	1384.58	195.36	1384.41	199.1	1384.55	201.34	1384.64	202.74	1384.29
203.91	1384	206.23	1384	206.51	1384.85	234.91	1377.75	250	1377.45
265.09	1377.75	291.49	1384.35	307.56	1384.67	313.36	1383.22	331.77	1387.8
331.87	1387.8	332.77	1387.79	333.24	1387.78	347.75	1387.57	348.25	1387.57
348.33	1387.07	349.75	1387.15	395.4	1388.07	431.45	1387.35	438.46	1387
446.5	1385	446.57	1384.94	447.5	1384.69	447.92	1384.59	448.14	1384.53
449.68	1384.13	453.96	1384.7	462.54	1384.9	469.8	1384.85	471.22	1384.59
473.04	1384.22	477.39	1384.19	483.59	1384.13	489.72	1384.06	493.45	1384
494.25	1383.98	494.82	1383.96	495.09	1383.95	502.83	1383.93	522.08	1383.85
544.83	1383.84	550.02	1383.83	550.53	1383.83	553.65	1383.99	553.91	1384
554.42	1384.03	556.74	1384.18	557.99	1384.65	558.9	1385	560.48	1385.6
561.52	1386	563.94	1386.92	564.13	1387	564.67	1387.2	566.75	1388
567.24	1388.18	569.38	1389	570.67	1389.49	572	1390	574.48	1390.94
574.63	1391	574.76	1391.05	574.88	1391.09	576.19	1391.59	577.27	1392
577.42	1392.06	587.64	1392.14	588.78	1392.15	589.15	1392.15	589.16	1392.15
589.87	1392	590.11	1391.95	594.61	1391	597.2	1390.43	599.15	1390
603.49	1389.05	603.72	1389	603.89	1388.96	608.35	1388	610.79	1387.47
612.97	1387	615.05	1386.54	615.95	1386.35	618.71	1386.22	623.72	1386
624.03	1385.98	624.92	1385.93	625.04	1385.97	625.2	1386.01	627.46	1386.01
639.4	1386.06	656.1	1386.1	670.85	1386.16				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
167	.025	206.51	.032	234.91	.028	265.09	.032	291.49	.025

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

```
        206.51  291.49            103.72     100   96.19              .1        .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  291.34  670.85 1384.31        F

CROSS SECTION


RIVER: River
REACH: Ellsworth           RS: 11400

INPUT
Description: Channel Station 50499.16
Station Elevation Data     num=      53
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**********************************************************************************
  155.04     1385   163.15     1385   165.85     1385   182.05     1385   182.79     1385
  187.34 1385.04   191.71 1385.07   192.36 1385.05   193.59     1385   197.47 1384.84
  200.34 1384.73   200.44 1384.73   200.66 1384.74   201.86 1384.44   203.63     1384
  205.62 1384.99   234.91 1377.67      250 1377.37   265.09 1377.67   271.71 1379.32
  285.77 1380.27   301.93 1384.48   317.93  1384.8   322.53 1383.65   327.33 1384.85
  339.62 1387.93    340.1 1387.92   340.62 1387.91   350.96 1387.76   351.19 1387.76
  351.46 1387.76   351.54 1387.26   352.96 1387.34   398.55 1388.25   434.55 1387.53
  441.55 1387.18   449.13 1385.29   450.13     1385   451.06 1384.74   452.98 1384.21
   453.4 1384.37   458.94     1385   459.52     1385    461.4     1385    467.3     1385
  470.17     1385   471.43     1385   472.35 1384.98   474.64 1384.81   483.46 1384.33
  486.98 1384.13    487.8 1384.13      500 1384.07

Manning's n Values         num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
**********************************************************************************
  155.04    .025   205.62    .032   234.91    .028   265.09    .032   301.93    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        205.62  301.93            105.19     100    94.8              .1        .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  398.53     500 1388.25        F

CROSS SECTION


RIVER: River
REACH: Ellsworth           RS: 11300

INPUT
Description: Channel Station 50599.16
Station Elevation Data     num=      66
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**********************************************************************************
  156.58     1385   164.1     1385   166.2 1385.06   166.52 1385.07   168.38 1385.01
  180.63 1385.08   182.83 1385.09   184.15  1385.1   184.47 1385.09   185.39 1385.07
   188.4     1385   191.36 1384.92   191.47 1384.92   191.57 1384.92   194.63     1385
  196.33 1385.04   197.52 1385.07   198.92 1385.11   199.12 1385.06   199.34     1385
  201.62 1384.43   203.34     1384   204.25 1385.25   234.91 1377.59      250 1377.29
  265.09 1377.59   291.49 1384.19   307.49 1384.51   308.61 1384.79   317.88 1384.72
  318.36 1384.83   331.15     1388   332.01 1387.99    345.4 1387.79   345.53 1387.79
  345.91 1387.79   345.99 1387.29   347.41 1387.37   393.24 1388.28   429.44 1387.57
  436.47 1387.22   443.58 1385.45   444.53 1385.16   444.94 1385.05   445.12     1385
  445.24 1384.97   446.37 1384.71    448.2 1384.28   448.22 1384.88   448.22     1385
  449.97 1385.01   460.47 1385.07   462.38 1385.08   463.65 1385.08   469.88 1385.11
   470.3 1385.08   471.27     1385   471.92 1384.95   483.04     1384   497.61 1384.12
  497.84 1384.12      498 1384.12   498.29 1384.12   498.97 1384.13    499.9 1384.13
     500 1384.13

Manning's n Values         num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
**********************************************************************************
  156.58    .025   204.25    .032   234.91    .028   265.09    .032   291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        204.25  291.49             95.44     100  104.32              .1        .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
   393.4     500 1388.29        F

CROSS SECTION
```

RIVER: River
REACH: Ellsworth RS: 11200

INPUT
Description: Channel Station 50699.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.81	107.76	1382.95	123.9	1383	124.01	1383	124.08	1383.94
124.38	1383.95	126.32	1384	127.34	1384.4	129.21	1384.46	129.55	1384.45
133.39	1385	137.31	1385	142.96	1385	176.99	1384.57	178.74	1384.56
179.76	1384.56	180.6	1384.53	183.13	1384.41	189.17	1384.12	196.63	1384.43
200.54	1384.59	202.13	1384.19	202.9	1384	206.2	1384.69	234.91	1377.51
250	1377.21	265.09	1377.51	291.49	1384.11	307.49	1384.43	308.59	1384.7
310	1384.64	314.39	1384.67	326.95	1387.81	327.95	1387.79	339.62	1387.62
339.87	1387.62	340.12	1387.62	340.21	1387.12	341.62	1387.2	387.21	1388.11
423.21	1387.39	430.21	1387.04	436.39	1385.5	438.7	1385	441.72	1384.43
442	1384.38	442	1384.51	442.02	1385	449.37	1385	454.89	1385
456.86	1385	458.2	1385	465.35	1385	468.62	1384.74	475.76	1384.04
481.17	1384.01	482.53	1384.01	488.88	1384.02	492.3	1384.03	500	1384.07

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.2	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.2	291.49	96.62	100	103.41	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	142.96	1385	F
387.827	500	1388.12	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 11100

INPUT
Description: Channel Station 50799.16
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.32	61.61	1382.81	118.8	1383	118.89	1383	118.95	1383.78
119.19	1383.79	127.62	1384	129.32	1384.66	129.33	1384.66	132.44	1385
134.01	1385	134.13	1385	135.62	1385.2	141.18	1386	149.69	1386
161	1386	162.27	1386	163.24	1386	170.91	1385.47	177.31	1385
177.99	1385	180.45	1384.8	182.32	1384.56	185.13	1384.45	192.96	1384.18
199.79	1384.43	200.8	1384.46	201.12	1384.38	202.63	1384	206	1384.66
234.91	1377.43	250	1377.13	265.09	1377.43	291.49	1384.03	307.49	1384.35
309.17	1384.77	313.48	1384.56	317.47	1384.61	329.07	1387.5	330.08	1387.48
342.48	1387.3	342.86	1387.3	342.98	1387.3	343.06	1386.8	344.48	1386.88
390.09	1387.79	426.11	1387.06	433	1386.72	433.11	1386.71	438.58	1385.35
442.12	1385	443.86	1384.67	444.49	1384.56	444.9	1384.48	444.91	1384.58
444.92	1385	454.13	1385	455.86	1385	456.74	1385	457.2	1385
458.84	1385	461.46	1384.85	475.69	1384.04	482.23	1384.02	486.94	1384
494.52	1383.97	497.08	1383.96	498.92	1383.96	500	1383.96		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206	291.49	100.08	100	100.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	163.24	1386	F
390	500	1387.79	F

CROSS SECTION

RIVER: River

REACH: Ellsworth RS: 11000

INPUT
Description: Channel Station 50899.16
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.76	12.16	1382.66	113.95	1383	114.02	1383	114.06	1383.6
114.25	1383.61	129.63	1384	129.64	1384	129.74	1384	129.76	1384
129.86	1384.02	131.16	1384.19	137.28	1385	143.65	1385.84	144.83	1386
149.11	1386.57	152.37	1387	152.77	1387	153.26	1387	155.08	1387
156.92	1387	157.93	1387	161.01	1387	162.25	1387	166.56	1387
168.05	1387	171.04	1387	171.91	1387	173.08	1387	173.27	1387
173.8	1387	173.84	1387	173.93	1386.98	175.33	1386.68	175.91	1386.55
178.47	1386	180.29	1385.61	183.12	1385	183.46	1384.95	184.1	1384.87
190.73	1384.85	194.08	1384.8	194.7	1384.83	198.84	1384.87	200.86	1384.36
202.31	1384	204.14	1385.04	234.91	1377.35	250	1377.05	265.09	1377.35
291.49	1383.95	307.49	1384.27	308.6	1384.54	311.9	1384.82	324.41	1384.69
334.27	1387.16	345.93	1386.98	346.32	1386.98	346.43	1386.98	346.51	1386.48
347.93	1386.56	393.54	1387.47	429.56	1386.74	436.42	1386.4	436.57	1386.39
436.68	1386.37	441.84	1385.08	443.5	1385.04	443.73	1385	444	1384.98
448.49	1384.57	448.5	1384.64	448.51	1385	455.58	1385	460.72	1385
461.38	1385	463.49	1385	464.09	1384.98	471.24	1384.76	476.25	1384.26
478.35	1384.03	478.66	1384	479.01	1383.96	479.1	1383.96	485.64	1383.91
494.3	1383.83	500	1383.8						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	204.14	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
204.14	291.49	104.31	100	94.91	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	173.84	1387	F
393.46	500	1387.48	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10900

INPUT
Description: Channel Station 50999.16
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.65	104.5	1383	104.55	1383	104.58	1383.41	104.71	1383.41
115.21	1383.68	115.43	1383.68	115.77	1383.69	132.34	1384.97	132.82	1385
132.91	1385	133.08	1385	137.6	1385.5	140.72	1385.7	144.31	1385.88
145.38	1385.9	151.51	1386	151.55	1386	151.92	1386	161	1385.98
167.99	1385.96	168.39	1385.96	173.26	1385.93	173.68	1385.94	176.52	1385.91
177.42	1385.89	179.91	1385.77	183.94	1385.21	186.08	1385.17	187.88	1385.13
191.87	1385.04	192.5	1385.03	192.81	1385.02	193.07	1385.03	196.83	1385.2
197.19	1385.22	197.28	1385.19	198.06	1385	199.38	1384.67	202.02	1385.49
234.91	1377.27	250	1376.97	265.09	1377.27	291.49	1383.87	307.49	1384.19
312.09	1383.04	315.89	1383.99	317.12	1384.07	320.37	1384.08	331.58	1386.9
332.57	1386.88	345.67	1386.69	345.72	1386.69	346.17	1386.69	346.26	1386.19
347.68	1386.27	393.32	1387.19	429.38	1386.48	436.39	1386.13	442.54	1384.59
447.43	1384.7	448.54	1384.64	448.55	1384.8	448.55	1385	449.16	1385
459.54	1385	460.26	1385	460.47	1385	460.73	1385	462.9	1384.85
464.75	1384.73	465.43	1384.68	465.47	1384.68	471.67	1384.24	473.21	1384.14
474.82	1384.03	475.33	1384	475.75	1383.97	478.95	1383.76	487.38	1383.7
500	1383.62								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	202.02	.032	234.91	.028	265.09	.032	291.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
202.02	291.49	102.12	100	97.9	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	151.92	1386	F

```
  393.37     500 1387.19       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10800

INPUT
Description: Channel Station 51099.16
Station Elevation Data    num=      84
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
       0 1382.71    86.86     1383    86.89     1383     86.9 1383.22    86.97 1383.22
    92.7 1383.37    92.82 1383.37    93.01 1383.38   102.08 1384.07   108.82 1384.46
  120.69     1385   121.44     1385  126.09 1385.57   128.67     1386   136.85 1386.57
  139.78 1386.68   142.41   1386.7  143.88 1386.71   145.88 1386.69   149.87 1386.64
  152.35 1386.62   155.11   1386.6  158.85 1386.56   161.82 1386.53   170.88 1386.07
  171.19 1386.07   171.63     1386  172.06 1385.91   175.74 1385.15   179.43 1385.04
  181.67     1385  181.77     1385  182.06 1385.02   185.64  1385.2   186.37 1385.22
  196.16   1385.4   196.6 1385.28  197.74     1385   199.64 1384.53   201.74     1384
  201.84 1385.45   234.91 1377.19     250 1376.89   265.09 1377.19   291.49 1383.79
  307.49 1384.11   311.93     1383  326.21 1386.53   326.25 1386.53   327.22 1386.52
  327.38 1386.52   336.99 1386.38   337.1 1386.37   337.59 1386.37   337.67 1385.87
  339.04 1385.95   339.09 1385.96  384.79 1386.88   420.88 1386.17    427.9 1385.82
  435.26 1383.99   435.66     1384  435.72     1384   435.96 1384.04   436.03 1384.05
   436.2 1384.07   436.84 1384.17  440.59 1384.73   440.59 1384.89    440.6     1385
  440.65 1385.19   440.77   1385.6  442.39 1385.48   443.34 1385.41   448.79     1385
  448.89 1384.99   459.83     1384  460.93  1383.9   463.98 1383.62   466.52  1383.5
  471.08 1383.32   487.06 1383.38  497.37 1383.41      500 1383.42

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
*****************************************************************************************
       0    .025   201.84    .032   234.91    .028   265.09    .032   291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        201.84  291.49             95.49     100   104.3              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  143.88 1386.71       F
  292.39     500    1384       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10700

INPUT
Description: Channel Station 51199.16
Station Elevation Data    num=      70
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
       0 1382.74    76.95     1383    76.96     1383    76.96 1383.07    76.98 1383.07
   78.65 1383.11    78.68 1383.11    78.74 1383.11    81.35 1383.31    83.28 1383.42
   87.78 1383.63    95.73 1384.11    95.8 1384.11      100 1384.37   104.79 1384.48
  113.44 1384.56   119.97     1385  121.16     1385   133.27 1385.71   136.63 1385.57
  140.11 1385.53   154.56     1385  155.31     1385   155.48     1385   156.28     1385
  173.28 1384.46   175.69 1384.46     183  1384.5   193.17 1384.74    197.3 1384.82
  197.84 1384.83    197.9 1384.83  197.95 1384.85   198.12 1384.81   204.31 1384.76
  234.91 1377.11      250 1376.81  265.09 1377.11   291.49 1383.71   307.49 1384.03
  308.93 1383.67   319.29 1386.26  320.29 1386.24   334.13 1386.04   334.42 1386.04
  334.63 1386.04   334.71 1385.54  336.13 1385.62   381.71 1386.53   417.71 1385.81
  424.71 1385.46   432.25 1383.58   434.3     1384      436  1384.5   436.63 1384.68
  437.12 1384.83   437.13 1384.58  437.15     1384   440.71 1383.88    444.5 1383.74
  447.02 1383.66   449.75 1383.56  451.51  1383.5   452.33 1383.47   459.57 1383.24
  461.62  1383.2   466.68 1383.16  487.24 1383.28   493.43 1383.32      500 1383.35

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
*****************************************************************************************
       0    .025   204.31    .032   234.91    .028   265.09    .032   291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        204.31  291.49              49.1    49.1    49.1              .3       .5
Ineffective Flow     num=       2
```

```
   Sta L   Sta R    Elev  Permanent
       0  197.95 1384.85       F
  291.34     500 1383.67       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10650.9

INPUT
Description: Begin Channel Bottom Transition (Begin Flow Constriction)
Station Elevation Data    num=      18
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*****************************************************************************************
  206.72 1384.12  234.91 1377.07     250 1376.77  265.09 1377.07  291.49 1383.67
  307.49 1383.99  311.67 1382.94  316.02 1384.03  318.08 1384.06  325.83    1386
  333.77 1385.88  334.27 1385.88  334.35 1385.38  335.77 1385.46  381.35 1386.38
  417.35 1385.66  424.35 1385.31  426.94 1384.66

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
  206.72     .04  234.91    .028  265.09     .04  291.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.72  291.49             27.9    27.9    27.9             .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10623.7

INPUT
Description: Full Riprap Section
Station Elevation Data    num=      29
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*****************************************************************************************
  206.86 1384.06   215.2 1378.58  234.96 1377.05     250 1376.75  265.09 1377.05
  282.86 1378.42  291.49 1383.65  307.66 1383.97  311.88 1383.77  316.28 1384.11
  318.36 1384.15  320.82 1384.34  326.19 1385.68  327.31 1385.88  333.35 1385.79
  333.85 1385.79  333.93 1385.42  334.22 1385.43  334.72 1385.45   334.8 1385.33
  335.35 1385.36  336.24 1385.39  380.77 1386.28   382.3 1386.27  416.64 1385.58
  418.68 1385.49  423.62 1385.25  425.76 1384.82  428.37 1384.17

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  206.86     .04  291.49    .025  428.37    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.86  291.49              10      10      10              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  206.86     211    1384       F
     289  428.37    1384       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10613.7

INPUT
Description: Upstream End of Wingwall
Station Elevation Data    num=      15
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*****************************************************************************************
  206.91 1384.04  215.24 1377.43     250 1376.74  282.86 1377.39  291.49 1383.64
  320.92 1384.23  327.43 1385.85   333.5 1385.76     334 1385.76  334.08 1385.26
   335.5 1385.35  381.08 1386.26  417.08 1385.54  424.08 1385.19  428.85    1384

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  206.91          206.91    .015  291.49    .025
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.91  291.49            12.83   12.83   12.83              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  206.91     216    1384       F
     284  428.85    1384       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10600.87

INPUT
Description: Upstream Face of C7
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  222.25    1385  222.25 1376.73  277.75 1376.73  277.75    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  222.25          222.25    .015  277.75

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        222.25  277.75               61      61      61              .1       .3

CULVERT


RIVER: River
REACH: Ellsworth          RS: 10570

INPUT
Description:
Distance from Upstream XS =       8
Deck/Roadway Width        =      45
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***********************************************
       0  1387.5             500  1387.4

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  222.25    1385  222.25 1376.73  277.75 1376.73  277.75    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  222.25          222.25    .015  277.75

Bank Sta: Left   Right    Coeff Contr.   Expan.
        222.25  277.75             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***********************************************
       0  1387.5             500  1387.4

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  222.25    1385  222.25 1376.68  277.75 1376.68  277.75    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  222.25          222.25    .015  277.75
```

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
        222.25  277.75             .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         =
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 #7          Box        7      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      61     .015     .015          0                .4                  1
Number of Barrels =  5
Upstream   Elevation =  1376.73
Centerline Stations
   Sta.    Sta.    Sta.    Sta.    Sta.
  228.16  239.08     250  260.92  271.84
Downstream Elevation =  1376.68
Centerline Stations
   Sta.    Sta.    Sta.    Sta.    Sta.
  228.16  239.08     250  260.92  271.84

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10539.74

INPUT
Description: Downstream Face of C7
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
  222.25    1385  222.25 1376.68  277.75 1376.68  277.75    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  222.25          222.25    .015  277.75

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        222.25  277.75             11.24   11.24   11.24             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10528.5

INPUT
Description: Downstream End of Wingwall (Full Riprap Width)
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
  204.65 1384.03   204.8 1384.07  206.51 1384.07  217.14 1377.33     250 1376.67
  284.76 1377.36  293.49 1384.07  318.76 1384.58  320.77 1384.07  326.81 1385.58
  332.88 1385.49  333.38 1385.49  333.46 1384.99  334.88 1385.07  380.46 1385.99
  416.46 1385.27  423.46 1384.92   427.2 1383.98

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*******************************
  204.65     .04  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49               10      10      10             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  204.65     217    1384        F
```

```
     283   427.2    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10518.5

INPUT
Description: End Riprap Apron
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  204.61 1384.03  204.75 1384.06  204.77 1384.06  206.51 1384.06  217.14 1378.34
  234.91 1376.96     250 1376.66  265.09 1376.96  284.76 1378.48  293.49 1384.06
   309.6 1384.39  314.24 1384.17  315.25 1384.25  316.44 1384.27   318.7 1384.44
  320.71 1384.18  324.72 1385.18  326.73 1385.55  332.79 1385.46  332.88 1385.46
  333.29 1385.46  333.37 1385.08  333.38 1385.09  333.47 1384.96  334.78 1385.04
  334.89 1385.04  380.26 1385.96   380.8 1385.95  416.17 1385.24  417.06 1385.21
  423.16  1384.9  424.11 1384.71  426.89 1384.01

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
  204.61     .04  217.14    .028  284.76     .04  293.49    .025  426.89    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49             28.35   28.35   28.35              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  204.61     212    1384        F
     288  426.89    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10490.7

INPUT
Description: End Channel Bottom Transition (Fully Expanded Flow)
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  204.51 1384.01  204.65 1384.04  206.51 1384.04  234.91 1376.94     250 1376.64
  265.09 1376.94  293.49 1384.04  309.49 1384.36  314.09 1383.21   315.1 1383.46
  316.28 1383.48   324.5 1385.49   332.6 1385.37   333.1 1385.37  333.19 1384.87
   334.6 1384.95  380.19 1385.87  416.19 1385.15  423.19  1384.8  425.95 1384.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
  204.51    .032  234.91    .028  265.09    .032  293.49    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49             90.7    90.7    90.7              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 10400

INPUT
Description: Channel Station 51499.16
Station Elevation Data    num=      93
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1382.79   71.98 1383.33   73.15 1383.36   73.19 1383.36   73.22    1383
   73.23    1383   83.24    1383   91.46 1383.21   91.96 1383.22   94.57 1383.29
   98.08 1383.42   108.1 1384.29  109.05 1384.34  109.93  1384.4  110.73 1384.44
  111.41 1384.48  112.16 1384.52     113 1384.57  113.92 1384.62  114.67 1384.66
  115.23 1384.69  115.57 1384.71  118.87 1384.71  119.47 1384.78  120.88 1384.93
  121.48    1385  128.62 1385.82  131.35    1386   133.9 1386.17  138.29  1386.3
  138.57 1386.31  138.98 1386.31  139.23 1386.31  144.33 1386.35   145.2 1386.32
  151.21    1386   152.2    1386  152.78    1386  154.04    1386  160.54 1385.41
  162.17  1385.4  163.66 1385.19  164.32 1385.17  165.86 1385.16   167.4 1385.11
```

167.72	1385.09	168.91	1385	169.17	1384.98	171.37	1384.1	171.42	1384.1
173.12	1384	177.46	1383.73	177.48	1383.72	177.51	1383.72	190.55	1383.68
196.24	1383.37	198.77	1383.24	199.33	1383.25	199.44	1383.25	200.88	1383.06
204.51	1383.97	206.51	1383.97	234.91	1376.87	250	1376.57	265.09	1376.87
293.49	1383.97	309.49	1384.29	310.48	1384.04	315.63	1385.33	316.64	1385.31
332.23	1385.08	332.44	1385.08	332.52	1384.58	333.94	1384.67	379.53	1385.58
415.53	1384.86	422.53	1384.51	424.39	1384.04	434.39	1385	434.75	1385.03
435.34	1385.09	436.7	1385.03	437.74	1385	443.95	1384.74	453.85	1384.32
456.78	1384.02	457	1384	457.24	1383.98	463.4	1383.37	474.21	1383.38
486.25	1383.36	499.83	1383.58	500	1383.58				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	99.61	100	100.39	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.38	1384.25	F
294.62	500	1384.25	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10300

INPUT
Description: Channel Station 51599.16
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.09	69.7	1383.61	71.84	1383.67	71.92	1383.67	71.98	1383
71.99	1383	80.14	1383	102.88	1383.57	104.26	1383.61	111.47	1383.79
116.91	1384	117.29	1384	117.93	1384	121.53	1384	131.79	1384
136.34	1384	139.3	1384	148.58	1384.92	149.42	1385	149.75	1385.03
149.91	1385.04	150	1385.04	156.2	1385.35	161.14	1385	162.36	1385
168.56	1384.37	170.84	1384.14	172.23	1384.12	178.99	1383.96	179.38	1384
180.08	1384	182.88	1384	184.91	1383.99	191.58	1383.95	200.3	1383.59
201.01	1383.56	201.36	1383.64	202.77	1383.45	204.51	1383.89	206.51	1383.89
234.91	1376.79	250	1376.49	265.09	1376.79	293.49	1383.89	309.49	1384.21
313.64	1383.17	314.83	1383.47	320.66	1384.92	321.66	1384.91	331.48	1384.76
331.74	1384.76	331.98	1384.76	332.06	1384.26	333.48	1384.34	379.06	1385.26
415.06	1384.53	422.06	1384.18	425.06	1383.68	429.72	1384.85	430.53	1384.7
432.27	1385	432.59	1385.02	435.03	1385.18	444.76	1385.08	448.85	1385.05
451.89	1385.03	451.95	1385.01	451.98	1385	453.42	1384.54	454.35	1384.24
456.83	1384.02	457.1	1384	457.31	1383.98	462.96	1383.48	471.84	1383.41
481.95	1383.36	493.77	1383.6	496.21	1383.66	496.46	1383.77	497.03	1384
498.63	1384.66	499.46	1385	500	1385.22				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	99.63	100	100.39	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.38	1384.17	F
294.62	500	1384.17	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10200

INPUT
Description: Channel Station 51699.16
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.37	68.27	1383.89	71.38	1383.97	71.49	1383.97	71.58	1383
71.59	1383	77.88	1383	115.15	1383.94	117.23	1384	118.1	1384.12

121.13	1384.35	127.54	1384.82	129.56	1384.84	136.77	1384.92	139.1	1384.87
151.1	1384.57	163.16	1384.13	164.66	1384.08	165.94	1384	166.05	1383.99
171.82	1383.93	177.72	1383.74	179.8	1383.67	182.43	1383.71	190.2	1383.83
192.94	1383.81	199.54	1383.79	200.29	1383.71	201.2	1383.62	202.07	1383.8
203.05	1383.44	204.51	1383.81	206.51	1383.81	234.91	1376.71	250	1376.41
265.09	1376.71	293.49	1383.81	309.49	1384.13	311.93	1383.52	316.54	1384.67
317.54	1384.66	331.94	1384.44	332.19	1384.44	332.44	1384.44	332.52	1383.94
333.94	1384.03	379.52	1384.94	415.52	1384.22	422.52	1383.87	422.58	1383.85
424.17	1383.59	426.99	1384.29	427.45	1384.27	433.12	1385	435.36	1385.25
435.58	1385.27	436.17	1385.26	437.25	1385.23	446.88	1385	449.7	1384.93
452.68	1384.86	454.68	1384.3	454.96	1384.22	457	1384.02	457.22	1384
457.71	1383.95	460.11	1383.74	463.67	1383.42	467.85	1383.38	481.44	1383.3
497.85	1383.58	497.94	1383.59	497.97	1383.6	498.05	1383.63	498.93	1384
499.69	1384.32	500	1384.45						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	103.09	100	96.83	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.38	1384.09	F
294.62	500	1384.09	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10100

INPUT
Description: Channel Station 51799.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.73	62.65	1384.19	66.84	1384.3	66.99	1384.3	67.11	1383
67.13	1383	71.38	1383	99.91	1383.72	102.23	1383.76	105.06	1383.81
108.52	1383.87	108.53	1383.87	114.89	1384	115.02	1384	116.23	1384
116.4	1384	118.96	1384	121.09	1384	124.92	1384	141.3	1384
144.15	1384	146.07	1384	149.94	1384	150.76	1384	153.91	1384
156.52	1384.01	157.22	1384.01	164.1	1384.03	166.92	1384.04	167.85	1384.05
170.17	1384	170.21	1384	170.37	1384	177.49	1383.83	180.28	1383.77
187.56	1383.72	192.57	1383.76	196.67	1383.68	198.33	1383.61	200.87	1383.49
202.2	1383.79	202.62	1383.26	204.51	1383.73	206.51	1383.73	234.91	1376.63
250	1376.33	265.09	1376.63	293.49	1383.73	309.49	1384.05	312.44	1383.31
316.47	1384.32	317.46	1384.31	328.43	1384.14	328.64	1384.14	329.14	1384.14
329.23	1383.64	330.61	1383.72	330.65	1383.73	376.33	1384.65	412.41	1383.93
419.43	1383.59	419.68	1383.52	423.75	1384	427.08	1384.51	430.22	1385
431.58	1385.22	432.47	1385.35	434.99	1385.25	439.11	1385	441.06	1385
444.57	1384.92	449.99	1384.81	451.46	1384.48	452.61	1384.24	454.24	1384.07
454.82	1384	459.14	1383.57	460.3	1383.45	461.6	1383.45	476.45	1383.43
479.58	1383.51	481.69	1383.57	492.73	1383.86	494.32	1383.9	494.34	1383.91
494.5	1383.98	494.55	1384	494.69	1384.06	496.14	1384.65	496.98	1385
498.32	1385.55	499.43	1386	500	1386.23				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	94.34	100	105.4	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.26	1384	F
294.43	500	1384	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 10000

INPUT

Description: Channel Station 51899.16
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.97	60.43	1384.43	65.43	1384.56	65.62	1384.56	65.76	1383
65.78	1383	68.43	1383	86.04	1383.44	87.45	1383.47	89.17	1383.5
91.28	1383.54	91.29	1383.54	96.74	1383.65	97.12	1383.66	98.44	1383.68
101.22	1384.46	102.25	1384.5	104.85	1384.6	109.71	1384.79	115.05	1385
147.49	1385.75	161.62	1385.78	164.92	1385.65	165.33	1385.63	171.42	1385.34
173.09	1385.25	173.79	1385.22	174.25	1385.2	178.98	1385	180.52	1384.93
183.17	1384.8	188.07	1384.91	191.95	1384.99	192.27	1385	195.02	1384.89
195.65	1384.86	196.42	1384.65	198.65	1384	199.18	1383.95	204.38	1383.45
204.39	1383.62	204.51	1383.65	206.51	1383.65	234.91	1376.55	250	1376.25
265.09	1376.55	293.49	1383.65	309.49	1383.97	312.69	1383.17	316.12	1384.02
316.22	1384.05	317.22	1384.03	328.01	1383.87	328.11	1383.87	328.51	1383.87
328.59	1383.37	330.01	1383.45	375.66	1384.36	411.72	1383.64	418.73	1383.29
421.73	1382.79	426.31	1383.93	426.4	1384	427.73	1384.35	430.23	1385
431.53	1385.34	432.09	1385.48	433.62	1385.06	433.8	1385	433.92	1385
448.43	1384.11	448.82	1384.09	449.28	1384.06	450.14	1384	456.05	1383.61
456.38	1383.59	456.62	1383.58	457.07	1383.58	475.95	1383.61	490.75	1383.63
495.4	1383.67	495.97	1383.68	496.19	1383.68	496.21	1383.68	496.37	1383.68
496.7	1383.68	497.23	1383.69	500	1383.69				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	293.49	97.24	100	102.97	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	161.62	1385.78	F
319.78	500	1385	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9900

INPUT
Description: Channel Station 51999.16
Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.18	65.94	1384.69	71.87	1384.84	72.09	1384.85	72.25	1383
72.28	1383	73.19	1383	79.19	1383.15	79.67	1383.16	80.25	1383.17
80.96	1383.18	80.99	1383.18	82.83	1383.22	82.95	1383.22	83.4	1383.23
84.33	1383.49	84.68	1383.51	85.55	1383.54	87.17	1383.6	94.47	1383.89
94.5	1383.89	109.34	1384.97	110.61	1385.05	112.8	1385.17	112.86	1385.17
112.91	1385.44	112.97	1385.44	113.02	1385.72	113.24	1385.72	113.54	1385.72
116.79	1385.78	122.75	1385.9	127.38	1386	136.65	1386.69	140.76	1387
142.09	1387	148.68	1387	156.99	1386.54	163.65	1386.17	166.56	1386
170.35	1385.78	174.54	1385.43	176.35	1385.38	182.35	1385	182.51	1385
182.65	1385	182.98	1385	184.78	1385	187.61	1385	188.68	1385
190.25	1384.97	190.4	1384.97	190.43	1384.97	194.94	1384.96	196.88	1384.48
198.78	1384	199.97	1385.2	234.91	1376.47	250	1376.17	265.09	1376.47
293.49	1383.57	309.49	1383.89	317.41	1381.91	325.94	1384.05	326.94	1384.04
335.94	1383.9	336	1383.9	336.49	1383.9	336.57	1383.4	336.59	1383.4
337.99	1383.48	338.09	1383.49	338.41	1383.49	383.73	1384.4	419.85	1383.69
426.87	1383.34	429.88	1382.84	437.91	1385.33	438.36	1385	440.83	1385.65
440.87	1385.66	440.91	1385.67	441.14	1385.66	442.07	1385.58	449.34	1385
450.23	1384.96	457.28	1384.68	460.85	1384.4	462.69	1384.25	471.75	1384.27
478.91	1384.29	485.54	1384.35	487.61	1384.4	489.49	1384.39	500	1384.35

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	199.97	.032	234.91	.028	265.09	.032	293.49	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
199.97	293.49	100.03	100	100.09	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	148.68	1387	F
316.49	500	1384	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9800

INPUT
Description: Channel Station 52099.16
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.41	72.19	1384.97	73.37	1385	73.64	1385.68	73.83	1386
73.84	1386	73.85	1386	76.3	1386	79.2	1386	80.92	1386
84.55	1386	88.05	1386	89.48	1386	93.53	1386	100.69	1386.46
103.76	1386.37	103.86	1386.37	104.12	1386.38	108.12	1386.33	108.29	1386.34
108.41	1386.34	109.54	1386.36	112.08	1386.42	115.77	1386.45	121.18	1386.61
123.91	1386.69	129.62	1387	133.94	1387	133.97	1387	134.06	1387
134.2	1387	136.91	1387	137.01	1387	137.07	1387	137.1	1387
137.81	1387	141.61	1386.72	148.12	1386.35	152.47	1386	153.02	1385.97
160.6	1385.54	165.19	1385.17	166.52	1385.09	167.51	1385	176.21	1384.42
178.95	1384.26	181.78	1384	184.46	1383.8	185.14	1383.75	187.29	1383.6
194.74	1383.08	198.49	1383.07	200.62	1383.07	202.82	1383.06	204.51	1383.49
206.51	1383.49	234.91	1376.39	250	1376.09	265.09	1376.39	288.53	1382.25
302.39	1383.12	303.88	1383.7	319.88	1384.02	320.25	1384.11	328.37	1384.13
331.29	1384.37	331.46	1384.33	332.47	1384.31	332.79	1384.31	344.06	1384.14
344.11	1384.14	344.61	1384.14	344.69	1383.64	346.08	1383.72	346.12	1383.73
391.85	1384.65	427.97	1383.93	434.99	1383.59	438	1383.09	443.76	1384.52
445.5	1385	447.59	1385.52	448.33	1385.71	448.35	1385.24	448.37	1385
450.57	1385	453.27	1385	456.49	1385	458.23	1385.07	463.71	1385.28
465.9	1385.02	466.06	1385	466.34	1384.97	474.98	1384.08	489.44	1384.13
497.08	1384.12	500	1384.14						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.032	234.91	.028	265.09	.032	288.53	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
206.51	302.39	105.55	100	93.83	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	205.38	1383.77	F
294.62	500	1383.77	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9700

INPUT
Description: Channel Station 52199.16 (Riprap for Culvert C8)
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.71	4.24	1384.73	6.5	1384.74	10.16	1384.76	11.7	1384.77
12.99	1384.77	79.81	1382.48	80.24	1382.3	80.49	1382.21	80.87	1382.11
86.93	1382.2	89.09	1382.27	94.43	1382.41	111.9	1382.79	113.85	1382.84
122.12	1383	139.03	1383.43	155.62	1383.81	159.26	1383.91	164.19	1384
168.52	1384.76	170.17	1385	174.18	1385.5	180.42	1385	180.79	1385
189.01	1384.04	189.39	1384	189.44	1383.99	190.27	1383.9	190.58	1383.86
193.68	1383.65	199.66	1383.24	199.71	1383.24	200.59	1383.21	200.96	1383.2
203.44	1383.14	204.51	1383.41	206.51	1383.41	234.91	1376.31	250	1376.01
265.09	1376.31	293.49	1383.41	311.68	1383.77	316.28	1382.62	321.1	1383.82
321.91	1383.9	331.48	1383.55	339.55	1384.57	339.78	1384.51	340.78	1384.49
348.81	1384.37	349.1	1384.37	349.31	1384.37	349.39	1383.87	350.81	1383.96
396.39	1384.87	432.39	1384.15	439.39	1383.8	442.39	1383.3	450.39	1385.36
451.51	1385.55	459.66	1385.14	462.49	1385	464.8	1384.88	468.56	1384.67
470.97	1384.29	472.73	1384	473.73	1383.84	476.99	1383.32	484.12	1383.19
486.21	1383.17	492.57	1383.14	494.35	1383.13	495.95	1383.13	497.31	1383.12
499.57	1383.11	500	1383.11						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	206.51	.04	293.49	.025

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        206.51  293.49             99.48     100  100.56              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0  174.18  1385.5       F
  396.05     500 1384.86       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9600

INPUT
Description: Channel Station 52299.16 (Riprap for Culvert C8)
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0 1382.46   17.32 1381.87    78.1 1382.19   79.81 1382.25   83.97 1382.33
   85.28 1382.35   99.52 1382.65  103.32  1382.8   108.8 1382.99  108.98     1383
  110.25 1383.08  145.79 1384.19  146.46    1384  147.22  1384.4  151.27     1385
     154  1385.4  158.04    1386  159.47 1386.17  160.25 1386.18   161.5 1386.19
   166.9 1386.46   175.8 1386.29  177.03 1386.29  178.87    1386  181.33 1385.42
  183.06    1385  187.07 1384.04  187.24    1384  187.61 1383.92  187.88 1383.86
  189.26 1383.53  192.04 1384.22  194.04 1384.22  225.23 1376.42     250 1375.93
  274.77 1376.42  305.97 1384.22  321.97 1384.54  322.62 1384.38  330.07  1384.4
  331.75 1384.83  332.75 1384.81   343.8 1384.65  345.55 1384.62  345.93 1384.62
  346.05 1384.62  346.12 1384.24  346.14 1384.12  347.21 1384.18  347.55  1384.2
  393.15 1385.11  429.15 1384.39  436.15 1384.04  436.55 1383.94  437.29    1384
  437.41    1384  439.04 1384.14  441.73 1384.36  445.59 1384.69  447.82 1384.88
  447.84 1384.99  447.84    1385  447.93  1385.1   448.2 1385.38   449.7 1385.29
  454.66    1385  460.61 1384.65  465.19 1384.38   465.7  1384.3  467.45    1384
  470.52 1383.49  473.43    1383  475.54 1382.67   476.8 1382.46  479.91 1382.38
   483.1 1382.29  488.37 1382.18  499.72 1382.63     500 1382.64

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .025  194.04     .04  305.97    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        194.04  305.97             96.99     100  104.86              .3       .5
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0   166.9 1386.46       F
  393.29     500 1385.12       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9500

INPUT
Description: Channel Station 52399.16
Station Elevation Data    num=      72
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0 1381.97   80.77  1382.4   84.43 1382.53    93.4 1382.71   96.22 1382.75
  108.27    1383  110.33    1383  113.48    1383  114.79    1383  130.27 1383.64
  134.27 1383.75   143.7    1384  144.79 1384.12  145.98 1384.36  148.68  1384.8
  150.31    1385  154.16 1385.42  155.86 1385.91  156.18 1385.97  156.41    1386
  160.64 1386.69  161.84 1386.71   169.2 1386.33  169.63  1386.3  170.08 1386.26
  170.16 1386.24  171.11    1386  171.73 1385.85  172.59 1387.12   214.9 1376.55
     250 1375.85  285.11 1376.55  316.31 1384.35   332.3 1384.67  334.52 1384.11
  336.69 1384.66   338.2 1385.04  339.19 1385.02  348.51 1384.89   348.9 1384.89
  348.98 1384.39   350.4 1384.47  396.04 1385.39  396.89 1385.37  432.09 1384.67
   439.1 1384.32  440.77  1383.9  441.67    1384  443.04    1384  443.79 1384.02
  449.54 1384.16  449.74 1384.41  450.25    1385   450.3 1385.01  450.56 1385.07
  450.74 1385.11  451.78 1385.07  453.47    1385  457.52 1384.83  462.18 1384.63
  463.24 1384.59  466.95 1384.42  467.62 1384.28   468.9    1384  471.69 1383.44
  473.85    1383  475.73 1382.63  476.96 1382.39  483.67 1382.29  490.47 1382.22
  498.33 1382.55     500 1382.61

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
```

```
*****************************************************************************
       0     .025  172.59     .032   214.9     .028  285.11     .032  316.31     .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        172.59  316.31            100.07     100     100              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  161.84 1386.71        F
  317.92     500 1384.75        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9400

INPUT
Description: Channel Station 52499.16
Station Elevation Data    num=      80
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************
       0 1382.17    86.31 1382.63    92.07 1382.83   100.43     1383   101.61     1383
   101.8     1383   102.28     1383   104.14     1383   105.62     1383    108.8     1383
  110.05     1383   117.05   1383.3   123.74 1383.48   140.23     1384   140.35     1384
  140.98     1384   140.99     1384   141.03     1384   141.05     1384   141.93 1384.14
  144.61 1384.53   147.75     1385   153.04 1385.75   154.16 1385.89   154.82     1386
  157.81  1386.6   159.57 1386.94   159.75 1386.97   159.96     1387   161.03     1387
  166.29     1387   166.45 1386.97   167.55 1386.81   169.31 1386.37   170.78     1386
  171.62 1387.29    214.9 1376.47      250 1375.77   285.11 1376.47   316.31 1384.27
  332.31 1384.59   333.56 1384.27   338.31 1385.46   339.32 1385.45    353.6 1385.24
     354 1385.24   354.08 1384.74    355.5 1384.82   401.14 1385.64   437.19 1385.02
   444.2 1384.67   445.64 1384.31   446.99     1384   453.52   1383.5   453.72 1383.49
  453.72 1383.62   453.73 1383.76   453.74     1384   453.75 1384.77   453.75     1385
  453.76 1385.13   453.77     1386   453.81     1386    454.3     1386   458.48   1385.5
  462.29 1385.04   462.48 1385.02   462.61     1385    465.6 1384.66   467.08 1384.48
  471.16     1384   472.03 1383.91   472.57 1383.86   473.24 1383.75   477.49     1383
  479.14 1382.72   480.15 1382.54   484.79 1382.47    492.7 1382.37      500 1382.49

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
*****************************************************************************
       0     .025  171.62     .032   214.9     .028  285.11     .032  316.31     .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        171.62  316.31             59.46   59.46   59.46              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  166.29    1387        F
  317.92     500 1384.67        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9340.54

INPUT
Description: Begin Channel Bottom Transition, Begin Flow Contraction
Station Elevation Data    num=      16
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************
  178.57  1385.5    214.9 1376.42      250 1375.72    285.1 1376.42   316.31 1384.22
  332.31 1384.54   338.48     1383   349.07 1385.62   356.53 1385.51   357.03 1385.51
  357.11 1385.01   358.53   1385.1   404.17 1385.79   440.22 1385.25   447.23   1384.9
   454.5 1383.09

Manning's n Values        num=       4
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
*****************************************************************
  178.57     .04    214.9     .028    285.1     .04   316.31     .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        178.57  316.31             25.88   25.88   25.88              .3       .5

CROSS SECTION
```

```
RIVER: River
REACH: Ellsworth          RS: 9314.67

INPUT
Description: Full Riprap Section
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
  176.55 1385.99  196.42 1378.08  213.91 1376.42     250  1375.7  285.09  1376.4
  303.15 1378.14   316.3  1384.2  332.49 1384.53  338.73  1384.1  346.91 1384.87
   347.5 1384.82  349.45 1385.31  351.58 1385.66     357 1385.58   357.5 1385.57
  357.54 1385.48  357.58  1385.4  358.11 1385.41  358.19 1385.08  359.02 1385.13
   359.6 1385.16  404.92 1385.84   405.2 1385.83  440.72 1385.31  441.68 1385.27
  447.68 1384.97  448.78 1384.77  456.13 1382.94

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  176.55     .04   316.3    .025  456.13    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.55   316.3               10      10      10              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  176.55     198    1384        F
     303  456.13    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9304.67

INPUT
Description: Upstream End of Wing Wall
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
  175.54 1386.23  195.68 1376.78     250 1375.69  303.14 1376.75  316.29 1384.19
  347.08 1384.81  347.68 1384.66  351.78 1385.69  357.78  1385.6  358.35  1385.6
  358.43  1385.1  359.85 1385.18  405.44 1385.86  441.45 1385.33  448.45 1384.98
  456.95 1382.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  175.54          175.54    .015  316.29    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.54  316.29              15.85   15.85   15.85              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  175.54     203    1384        F
     297  456.95    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9288.82

INPUT
Description: Upstream Face of C9
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************
   210.5    1385   210.5 1375.68   289.5 1375.68   289.5    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
   210.5           210.5    .015   289.5

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          210.5  289.5               81      81      81              .3       .5

CULVERT
```

```
RIVER: River
REACH: Ellsworth          RS: 9248

INPUT
Description:
Distance from Upstream XS =      12
Deck/Roadway Width        =      57
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0  1385.6             500  1385.6

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
***************************************************************
   210.5    1385   210.5 1375.68   289.5 1375.68   289.5    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   210.5           210.5    .015   289.5

Bank Sta: Left   Right    Coeff Contr.   Expan.
         210.5   289.5             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0  1385.6             500  1385.6

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
***************************************************************
   210.5    1385   210.5 1375.61   289.5 1375.61   289.5    1385

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   210.5           210.5    .015   289.5

Bank Sta: Left   Right    Coeff Contr.   Expan.
         210.5   289.5             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
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 #9         Box        8      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      81     .015     .015          0                  .4                  1
Number of Barrels =  6
Upstream   Elevation =  1375.68
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.    Sta.
   217.5   230.5   243.5   256.5   269.5   282.5
Downstream Elevation =  1375.61
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.    Sta.
   217.5   230.5   243.5   256.5   269.5   282.5
```

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9207.65

INPUT
Description: Downstream Face of C9
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
210.5	1385	210.5	1375.61	289.5	1375.61	289.5	1385

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
210.5		210.5	.015	289.5	

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
210.5	289.5	14.17	14.17	14.17	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9193.48

INPUT
Description: Downstream End of Wingwall
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
171.54	1387.15	195.96	1376.68	250	1375.6	303.42	1376.67	316.32	1384.1
340.41	1384.58	341.93	1384.2	348.82	1385.95	354.99	1385.86	355.49	1385.86
355.57	1385.36	356.99	1385.44	402.6	1386.12	438.62	1385.58	445.63	1385.23
448.29	1384.56								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
171.54	.04	316.32	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.54	316.32	10	10	10	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
171.54	203	1384	F
297	448.29	1384	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 9183.48

INPUT
Description: End Full Riprap Section
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
172.19	1386.98	196.41	1377.65	214.01	1376.31	250	1375.59	285.12	1376.3
303.42	1377.71	316.32	1384.09	332.08	1384.41	335.21	1384.26	340.54	1384.67
342.06	1384.48	344.83	1385.18	348.99	1385.96	353.71	1385.89	354.2	1385.88
354.28	1385.76	355.19	1385.76	355.68	1385.77	355.69	1385.77	355.77	1385.39
357.2	1385.46	400.57	1386.12	403.05	1386.14	436.03	1385.63	439.25	1385.56
442.92	1385.37	446.3	1385.03	448.98	1384.36				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
172.19	.04	196.41	.028	303.42	.04	316.32	.025	448.98	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.19	316.32	29.74	29.74	29.74	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
172.19	198	1384	F

```
     302  448.98    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9154.01

INPUT
Description: End Channel Bottom Transition
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  174.14 1386.46  214.91 1376.27     250 1375.57  285.12 1376.27  316.32 1384.07
  332.32 1384.39   335.5  1383.6  345.27 1386.04  354.29 1385.91  354.79 1385.91
  354.87 1385.41  356.29 1385.49  401.88 1386.23  437.88 1385.65  444.88  1385.3
  451.03 1383.76

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
  174.14    .032  214.91    .028  285.12    .032  316.32    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.14  316.32             11.01   11.01   11.01              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9143

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.79   20.06 1382.85   42.22 1382.91   65.35 1382.97   81.36 1383.01
   87.73 1383.03   87.75 1383.03   87.85 1383.03   88.06 1383.03  109.74 1383.94
  112.07 1384.03  112.12 1384.03  112.19 1384.03  118.92 1384.35  120.98 1384.45
  122.74 1384.54  133.85 1385.03   137.3 1385.19  155.57 1386.03  167.18  1386.2
  168.86 1386.27  169.27 1386.17  169.81 1386.03  173.46 1385.12  173.81 1385.03
  174.28 1384.91  177.66 1384.07  177.82 1384.03  178.47 1384.03  179.11 1384.03
  182.09 1384.46   214.9 1376.26     250 1375.56  285.11 1376.26  317.92 1384.46
     318 1384.03  322.04 1384.03  334.25 1384.03  337.35 1384.03  337.41    1384
  337.49  1383.9  338.14 1383.03  339.02 1382.83  339.28 1382.77   339.4 1382.74
   339.4 1382.94  339.41 1383.03  339.42 1383.87  339.42 1384.03  339.42 1384.26
  339.44 1385.03  339.44 1385.06  339.45 1385.58  339.45 1386.03  340.41  1386.1
  340.57 1386.11  340.63 1386.12  340.66 1386.12  340.68 1386.12   340.7 1386.12
  340.71 1386.12  340.74 1386.12  340.82 1386.12   341.1 1386.12   345.3 1386.06
  347.07 1386.03  350.68  1385.8  356.24  1385.4  380.62 1385.94   384.8 1386.03
  388.54  1386.1  403.26  1386.4  417.21 1386.12  421.87 1386.03  422.69 1386.01
  439.29 1385.68  444.02 1385.31  447.51 1385.03  448.27 1384.84  451.51 1384.03
   453.4 1383.68   455.1 1383.37  455.38 1383.31  455.39  1383.5  455.42 1384.03
  456.16 1384.23  456.85 1384.42  457.21 1384.51  458.36 1384.81  464.35 1384.52
  474.47 1384.03  474.77 1384.02  474.85 1384.01  476.47 1383.71  480.08 1383.03
  480.86 1382.88  484.24 1382.22  488.27 1382.21  493.06 1382.26     500 1382.51

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  182.09    .032   214.9    .028  285.11    .032  317.92    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92               43      43      43              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.46        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9100

INPUT
Description: Channel Station 52799.16
```

```
Station Elevation Data     num=       64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1382.76   20.06 1382.82   42.22 1382.88   65.35 1382.94   81.36 1382.98
   87.73    1383   87.75    1383   87.85    1383   88.06    1383  109.74 1383.91
  112.07    1384  112.12    1384  112.19    1384  118.92 1384.32  120.98 1384.42
  122.74 1384.51  133.85    1385   137.3 1385.16  155.57    1386  167.18 1386.17
  168.86 1386.24  169.27 1386.14  169.81    1386  173.46 1385.09  173.81    1385
  174.28 1384.88  174.47 1386.33  214.89 1376.23     250 1375.53   285.1 1376.23
   316.3 1384.03  332.31 1384.35  332.71 1384.25  339.68 1386.12  340.27 1386.11
  340.68  1386.1  355.92 1385.88  356.23 1385.88  356.31 1385.38  357.73 1385.46
  403.34 1386.38  439.36 1385.66  446.37 1385.31  452.48 1383.78   453.4 1383.65
   455.1 1383.34  455.38 1383.28  455.39 1383.47  455.42    1384  456.16  1384.2
  456.85 1384.39  457.21 1384.48  458.36 1384.78  464.35 1384.49  474.47    1384
  474.77 1383.99  474.85 1383.98  476.47 1383.68  480.08    1383  480.86 1382.85
  484.24 1382.19  488.27 1382.18  493.06 1382.23     500 1382.48

Manning's n Values         num=        5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
       0    .025  174.47    .032  214.89    .028   285.1    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.47   316.3            100.01     100  100.01              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.46        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 9000

INPUT
Description: Channel Station 52899.16
Station Elevation Data     num=       68
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1382.76    13.8 1382.79   30.65 1382.84   56.31  1382.9   74.16 1382.95
   74.62 1382.95   94.01    1383   94.09    1383   94.38    1383    94.6    1383
   94.78    1383  107.72 1383.58  108.37 1383.61  117.36 1383.93  117.49 1383.94
  119.31    1384  124.44 1384.18  128.22 1384.32  133.02 1384.49  146.94 1384.99
  146.99    1385  147.12    1385   167.8 1385.74  168.93 1385.79  170.18 1385.83
   170.6 1385.72  173.49    1385  175.24 1386.06  214.89 1376.15     250 1375.45
   285.1 1376.15  316.31 1383.95  332.31 1384.27  336.85 1383.13     349 1386.16
     350 1386.14  359.16 1386.01  359.34 1386.01  359.66 1386.01  359.74 1385.51
  361.16 1385.59  406.77  1386.5  442.79 1385.78  449.79 1385.43  455.08 1384.11
  455.71    1384  458.62 1383.57  458.98 1383.52  458.99 1383.69     459    1384
  459.88  1384.4  460.39 1384.63  461.19    1385  461.24 1385.02  461.48 1385.11
   461.7 1385.09  463.14    1385  468.36  1384.6  476.82    1384  477.22 1383.97
  477.31 1383.97     478 1383.87  483.95    1383  484.15 1382.98  485.84 1382.76
  488.65 1382.78  495.75 1382.75     500 1382.79

Manning's n Values         num=        5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
       0    .025  175.24    .032  214.89    .028   285.1    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.24  316.31            100.08     100  100.06              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.35        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 8900

INPUT
Description: Channel Station 52999.16
Station Elevation Data     num=       82
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1382.74    9.21 1382.77   25.76 1382.81   27.52 1382.81  101.37    1383
```

```
  101.97    1383  102.09    1383  102.53    1383  113.45 1383.59  122.89    1384
  126.41 1384.13   129.8 1384.26  136.84 1384.52  143.74 1384.78  145.04 1384.83
  146.17 1384.87  149.48    1385  159.45 1385.39  166.77 1385.68  168.43 1385.75
  169.94 1385.81  170.26 1385.73  170.49 1385.67  173.16    1385  173.17    1385
  175.21 1385.99   214.9 1376.07     250 1375.37  285.11 1376.07  316.31 1383.87
  332.31 1384.19  336.49 1383.14  348.56 1386.17  349.55 1386.16  362.58 1385.96
  362.76 1385.96  363.08 1385.96  363.16 1385.46  364.58 1385.54  410.19 1386.45
  446.21 1385.73  453.22 1385.38   457.5 1384.31  460.16    1384  462.18  1383.8
  462.58 1383.76  462.59 1383.96  462.59    1384  462.65 1384.48  462.68 1384.77
  462.71    1385   463.6 1385.26  464.01 1385.38  464.32 1385.46   464.5 1385.51
  464.59 1385.53  465.05 1385.65  467.59 1385.51  476.64    1385  481.62 1384.73
   484.4 1384.59  485.17 1384.95  485.27    1385  485.95 1385.31  486.23 1385.44
  487.42    1386  488.51  1386.5  489.62    1387  491.48 1387.84  491.83    1388
  492.09 1388.12  494.03    1389  495.75 1389.78  496.23    1390  497.13 1390.41
  498.44    1391  498.78 1391.16  498.89  1391.2  498.92 1391.22  499.42 1391.56
   499.9 1391.61     500 1391.59

Manning's n Values        num=       5 .
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  175.21    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.21  316.31            105.14     100   94.38              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.27        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 8800

INPUT
Description: Channel Station 53099.16 (Riprap for Culvert C10)
Station Elevation Data    num=      64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.73   28.22  1382.8   38.26 1382.82   75.35 1382.88    82.2 1382.91
   82.75 1382.91  104.71    1383   105.1    1383  105.46    1383  105.51    1383
  105.81    1383  126.42 1383.96  127.24    1384   129.3  1384.1  149.61    1385
  163.73 1385.49  169.76 1385.73  170.74 1385.49   172.7    1385  173.84 1384.72
  175.44 1385.85   214.9 1375.99     250 1375.29  315.92 1376.32  316.02 1383.14
  329.51 1383.41  348.57 1385.97  348.61 1385.97  349.56 1385.96  362.37 1385.77
  362.83 1385.77  362.91 1385.27  364.33 1385.35  409.96 1386.27     446 1385.55
  453.01  1385.2   457.2 1384.16  461.52    1384  462.34    1384  462.34 1384.01
  462.45    1385  463.47 1385.19  463.86 1385.27  464.62  1385.4   467.9 1385.32
  480.48    1385   484.2 1384.91  484.78  1384.9  484.96 1384.98     485    1385
  485.67  1385.3  487.21    1386  488.44 1386.56  489.41    1387  491.34 1387.88
  491.62    1388  492.16 1388.25  493.82    1389  494.65 1389.38  496.01    1390
  497.03 1390.47  497.12 1390.51  497.43 1390.52     500 1390.55

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************
       0    .025  175.44     .04  316.02    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.44  316.02            105.5     100   95.16              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.19        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 8700

INPUT
Description: Channel Station 53199.16
Station Elevation Data    num=      74
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.65   25.38  1382.7   31.79 1382.73   33.53 1382.72   72.55 1382.88
    74.9 1382.89   95.76 1382.98   95.78 1382.98    95.9 1382.98   95.94 1382.98
```

```
  101.59    1383  116.75 1383.62  123.08 1383.86  127.22    1384  128.36    1384
  139.32 1384.32  142.15 1384.45  148.86 1384.66  152.03  1384.8  157.46    1385
  164.16    1385  164.42 1384.99  166.65 1385.03  171.39 1385.07  171.89 1385.14
  172.92 1384.88  175.47 1384.24  176.45    1384  177.65 1385.22   214.9 1375.91
     250 1375.21  285.11 1375.91  316.31 1383.71   332.3 1384.03  333.59 1383.71
  341.62  1385.7  342.63 1385.68  354.97  1385.5  355.37  1385.5  355.47  1385.5
  355.55    1385  356.97 1385.09  402.64    1386   438.7 1385.29  445.71 1384.94
  448.75 1384.18  452.93  1384.4  455.02 1384.24  455.09 1384.24  455.13 1384.23
  455.16 1384.23  455.23 1384.22  455.33 1384.22  455.94 1384.17  455.97 1384.19
  457.22    1385  457.96 1385.47  458.02 1385.51   458.9 1385.49  478.28 1385.03
   479.6 1385.59  480.58    1386  482.88 1386.97  482.95    1387  483.03 1387.03
   485.3    1388  486.05 1388.32   487.6    1389  489.34 1389.78  489.82    1390
     490 1390.08  490.79 1390.45  496.03 1390.75     500 1390.98

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  177.65    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        177.65  316.31             90.15     100  108.77              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.11       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 8600

INPUT
Description: Channel Station 53299.16
Station Elevation Data    num=      81
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0  1382.6     1.7  1382.6    4.13 1382.59   38.99 1382.73   44.05 1382.74
   62.55 1382.82   62.75 1382.83   63.62 1382.83   63.92 1382.84   70.26 1382.86
   73.79 1382.88   74.76 1382.89  103.36    1383   104.4    1383  104.74    1383
  107.65    1383  108.48    1383  108.65    1383  111.93 1383.14  135.96    1384
  139.51 1384.16  148.23 1384.57  157.25    1385  159.12  1385.2  169.18 1385.77
   169.2 1385.78  172.11 1385.05   172.3    1385  172.52 1384.94  173.06 1386.29
  214.89 1375.83     250 1375.13   285.1 1375.83   316.3 1383.63   332.3 1383.95
  333.88 1383.55  341.22 1385.39  342.22 1385.37   353.4 1385.21  353.66 1385.21
  353.74 1384.71  355.16 1384.79  400.75  1385.7  436.76 1384.98  443.76 1384.63
   446.8 1383.87  448.38    1384  452.95 1384.39  453.76 1384.45  453.79 1384.56
  453.89    1385  453.97 1385.01  455.14  1385.2  455.71 1385.26  455.76 1385.27
  455.84 1385.31  456.95 1385.29  472.91    1385  474.45 1384.97  475.48 1384.95
  475.57 1384.99   475.6    1385  476.37 1385.32  478.01    1386  478.68 1386.27
  479.92 1386.75  480.15 1386.83  480.71    1387  480.72    1387  480.76 1387.01
  481.04 1387.14  482.76 1387.87  483.05    1388  483.17 1388.06  485.26    1389
   487.3 1389.93  487.45    1390   488.3 1390.39  488.49 1390.48  492.08 1390.63
     500 1390.99

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  173.06    .032  214.89    .028   285.1    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        173.06   316.3             100.12     100  100.04              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  317.92     500 1384.03       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 8500

INPUT
Description: Channel Station 53399.16
Station Elevation Data    num=      93
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.55    1.46 1382.55    9.96 1382.57   26.64 1382.64   27.06 1382.65
```

28.82	1382.66	29.42	1382.67	35.13	1382.69	42.99	1382.74	45.14	1382.75
100.22	1382.97	100.6	1382.97	104.1	1382.98	104.33	1382.98	105.27	1382.99
109.08	1383	109.28	1383	110.72	1383	110.77	1383	110.82	1383
110.89	1383	111.11	1383	137.07	1383.8	143.34	1384	164.65	1384.87
167.38	1385	168.23	1385	169.97	1385	171.93	1385	172.66	1384.82
172.79	1384.79	173.59	1384.59	173.99	1384.48	175.93	1384	178.15	1384.93
214.89	1375.75	250	1375.05	285.1	1375.75	316.3	1383.55	332.31	1383.87
335.45	1383.08	343.56	1385.11	344.56	1385.1	355.25	1384.94	355.49	1384.94
355.75	1384.94	355.83	1384.44	357.25	1384.52	402.84	1385.43	438.85	1384.71
445.85	1384.36	447.88	1383.85	449.16	1384	450.27	1384.11	451.95	1384.28
455.98	1384.69	455.98	1384.77	455.99	1385	456.13	1385.11	456.36	1385.3
456.51	1385.42	456.6	1385.49	456.6	1385.5	456.61	1385.5	456.62	1385.51
456.63	1385.52	456.64	1385.53	456.96	1385.77	464.04	1385.48	474.17	1385.07
475.85	1385	475.89	1385	475.9	1385	475.92	1385	475.98	1385
476.02	1385	476.04	1384.99	477.27	1385.46	478.34	1385.86	478.71	1386
480.67	1386.75	481.26	1386.97	481.34	1387	481.43	1387.04	483.93	1388
485.67	1388.69	486.45	1389	486.78	1389.13	489.02	1390	489.08	1390.04
489.16	1390.08	495.05	1390.38	500	1390.62				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	178.15	.032	214.89	.028	285.1	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
178.15	316.3	101.68	100	98.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
317.92	500	1383.95	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8400

INPUT
Description: Channel Station 53499.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.53	10.66	1382.59	14.06	1382.61	62.22	1382.8	64.52	1382.79
67.57	1382.8	69.85	1382.8	79.25	1382.88	117.05	1383	118.84	1383
138.29	1383.6	151.51	1384	154.37	1384.16	169.41	1385	171.02	1385
171.29	1385	171.83	1384.88	173.39	1384.54	174.18	1384.34	175.53	1384
177.71	1383.78	178.76	1384.7	214.9	1375.67	250	1374.97	285.11	1375.67
316.31	1383.47	332.31	1383.79	334.99	1383.12	342.11	1384.9	343.11	1384.88
357.32	1384.67	357.66	1384.67	357.75	1384.17	359.16	1384.26	404.75	1385.17
440.75	1384.45	447.75	1384.1	452.04	1383.02	457.07	1384.67	457.9	1384.92
457.98	1384.87	458.67	1384.48	464.79	1384.4	477.9	1384.22	479.46	1384.87
479.78	1385	480.22	1385.23	481.75	1386	482.62	1386.4	483.9	1387
485.84	1387.89	486.07	1388	486.23	1388.07	488.25	1389	488.71	1389.21
490.2	1389.9	491.21	1389.94	492.77	1390	499.73	1390.3	500	1390.31

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	178.76	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
178.76	316.31	108.13	100	92.32	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
317.92	500	1383.87	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8300

INPUT
Description: Channel Station 53599.16
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.56	9.64	1382.6	14.37	1382.59	16.96	1382.6	21.81	1382.58

41.62	1382.77	77.96	1382.88	82.55	1382.89	100.75	1382.97	106.95	1382.99
107.07	1382.99	107.22	1382.99	108.91	1383	139.73	1383.93	141.56	1383.98
142.11	1384	142.73	1384.03	143.02	1384.04	169.8	1384.87	172.01	1384.8
174.29	1384.23	174.62	1384.15	175.22	1384	177.38	1384.97	177.39	1384.97
214.9	1375.59	250	1374.89	285.11	1375.59	316.31	1383.39	332.31	1383.71
335.73	1382.85	342.59	1384.57	343.97	1384.55	352.67	1384.43	352.89	1384.43
352.97	1383.93	354.39	1384.01	400.15	1384.93	435.28	1384.24	436.28	1384.22
436.33	1384.22	443.31	1383.87	444.22	1383.65	445	1384	447.52	1384
452.38	1384.79	453.55	1385	453.75	1385.05	453.9	1385.1	453.95	1385.11
455.95	1385.09	464.76	1385	468.14	1384.85	475.98	1384.45	476.92	1384.88
477.17	1385	478.88	1385.79	479.33	1386	479.63	1386.14	481.47	1387
481.83	1387.17	483.61	1388	484.51	1388.42	485.75	1389	487.6	1389.86
487.72	1389.92	487.8	1389.92	490.58	1390	497.13	1390.2	500	1390.28

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	177.39	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
177.38	316.31	91.63	100	109.15	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8200

INPUT
Description: Channel Station 53699.16
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.53	16.6	1382.68	44.71	1382.77	48.23	1382.78	62.1	1382.84
66.81	1382.86	69.01	1382.83	71.78	1382.82	76.63	1382.85	79.43	1382.86
84.77	1382.89	86.78	1382.92	97.76	1383	100.06	1383	103.05	1383
111.4	1383	112.3	1383	114.18	1383	125.17	1383.25	149.39	1383.86
151.24	1384	153.99	1384.32	159.18	1385	164.96	1385.35	167.96	1385.53
168.52	1385.56	169.41	1385.52	169.43	1385.52	169.57	1385.49	171.51	1385
172.54	1384.74	175.51	1384	176.25	1385.17	214.9	1375.51	250	1374.81
285.11	1375.51	316.31	1383.31	332.3	1383.63	332.45	1383.59	334.84	1384.33
335.84	1384.31	348.06	1384.14	348.19	1384.14	348.28	1383.64	349.69	1383.72
395.28	1384.63	431.28	1383.91	438.28	1383.56	441.28	1383.06	449.11	1385.04
449.68	1385	450.13	1385.14	450.48	1385.25	456.88	1385.13	464.14	1385
468.28	1384.92	470.4	1384.88	471.78	1384.86	471.84	1384.89	472.11	1385
472.55	1385.19	474.46	1386	474.77	1386.13	476.81	1387	477.79	1387.42
479.15	1388	480.02	1388.37	481.49	1389	482.9	1389.6	483.82	1390
484.31	1390.21	484.7	1390.38	488.03	1390.48	496.03	1390.71	496.79	1390.37
497.61	1390	497.95	1389.85	499.84	1389	500	1388.93		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	176.25	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.25	316.31	96	100	103.91	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8100

INPUT
Description: Channel Station 53799.16
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.61	15.18	1382.65	17.69	1382.66	27.6	1382.7	30.95	1382.72
35.27	1382.67	40.72	1382.64	43.98	1382.66	50.14	1382.69	53.57	1382.71
58.77	1382.79	87.48	1383	87.79	1383	88.19	1383	90.55	1383
91.99	1383	92.18	1383	92.67	1383	97.27	1383	97.34	1383
98	1383	112.84	1383.11	121.66	1383.18	124.9	1383.2	126.47	1383.21
127.9	1383.23	128.46	1383.21	129.11	1383.21	133.63	1383.41	142.21	1383.67
149.25	1383.88	152.38	1383.96	153.86	1384	155.37	1384	160.03	1384
160.47	1383.23	160.6	1383	161.58	1383	161.88	1383	162.22	1383.13

164.54	1384	165.16	1384.27	166.86	1385	167.11	1385.11	167.18	1385.15
168.81	1385.18	169.8	1385.2	170.24	1385.09	170.61	1385	173.81	1384.2
174.61	1384	175.32	1385.32	214.89	1375.43	250	1374.73	285.1	1375.43
316.3	1383.23	332.3	1383.55	336.11	1382.6	342.44	1384.18	343.44	1384.16
351.66	1384.04	352.01	1384.04	352.09	1383.54	353.51	1383.63	399.16	1384.54
434.05	1383.84	435.2	1383.82	441.76	1383.49	442.21	1383.47	445.22	1382.97
453.1	1385.35	453.22	1385	453.58	1385.09	454.86	1385.43	464.32	1385.35
474.74	1385.26	476.24	1385.88	476.52	1386	476.95	1386.18	478.91	1387
481.17	1387.95	481.3	1388	481.49	1388.08	483.69	1389	484.66	1389.41
486.07	1390	487.24	1390.49	487.49	1390.6	487.62	1390.65	488.81	1390.69
498.92	1391	498.94	1391	498.96	1391	498.99	1391	499.3	1391.01
499.32	1391	499.33	1391	499.5	1390.92	500	1390.7		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	175.32	.032	214.89	.028	285.1	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.32	316.3	100.26	100	100.05	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 8000

INPUT
Description: Channel Station 53899.16
Station Elevation Data num= 115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.5	.9	1382.49	9.29	1382.45	10.91	1382.46	20.74	1382.51
22.19	1382.52	30.85	1382.66	42.55	1382.74	78.74	1383.4	84.65	1383.5
100	1383.62	102.05	1383.63	104.63	1383.64	107.99	1383.65	112.52	1383.66
113.57	1383.66	117.65	1383.98	117.87	1384	117.9	1384	118.11	1384
123.83	1384.35	124.86	1384.4	125.72	1384.45	126.45	1384.49	127.07	1384.52
127.61	1384.55	128.07	1384.58	134.7	1384.94	135.44	1384.94	135.75	1384.94
135.98	1384.94	142.58	1384.93	143.88	1384.91	145.62	1384.88	148.07	1384.83
150.36	1384.81	152.9	1384.76	154.44	1384.73	155.49	1384.68	160.41	1384.5
161.5	1384.5	163.1	1384.49	163.45	1384.49	163.92	1384.49	164.05	1384.49
166.9	1384.48	172.52	1384.13	172.87	1384.22	173	1384.14	173.22	1384.01
173.25	1384	173.25	1383.84	173.28	1383.23	173.43	1383.2	174.33	1383
176.05	1383	177.89	1383	180.78	1383	181.15	1383	181.99	1383.15
183.7	1383.15	214.9	1375.35	250	1374.65	285.11	1375.35	316.3	1383.15
332.3	1383.47	334.67	1382.88	337.55	1384.03	338.52	1384.14	338.86	1384.15
339.34	1384.27	340.1	1384.46	340.73	1384.45	341.1	1384.45	344.34	1384.4
346.1	1384.37	353.41	1384.27	356.72	1384.22	356.87	1384.22	357.22	1384.22
357.28	1383.87	357.3	1383.72	358.3	1383.78	358.72	1383.8	369.93	1384.03
404.37	1384.72	407.57	1384.65	428.93	1384.23	438.92	1384.03	440.41	1384
446.9	1383.68	447.42	1383.65	450.16	1383.2	450.43	1383.15	451.16	1383.37
458.32	1385.48	460.43	1385.75	477.43	1385.46	479.59	1385.43	479.73	1385.48
479.93	1385.57	480.96	1386	482.33	1386.57	483.36	1387	485.12	1387.72
485.8	1388	486.18	1388.15	488.26	1389	489.34	1389.44	490.73	1390
491.57	1390.34	492.42	1390.68	494.76	1390.8	498.47	1391	500	1391.06

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	183.7	.032	214.9	.028	285.11	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
183.7	316.3	105.08	100	94.7	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7900

INPUT
Description: Channel Station 53999.16
Station Elevation Data num= 162

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.05	.35	1383.06	3.85	1383.12	5.97	1383.16	9.87	1383.22
11	1383.24	13.78	1383.28	16.49	1383.39	16.72	1383.4	16.92	1383.41

17.08	1383.41	17.25	1383.42	17.44	1383.43	17.65	1383.44	21.86	1383.6
22.35	1383.63	23.09	1383.66	24.22	1383.71	25.37	1383.76	26.42	1383.81
27.81	1383.87	28.4	1383.9	29.39	1383.95	30.58	1384	30.84	1384.01
32.15	1384.07	35.13	1384.21	36.44	1384.27	37.08	1384.3	37.41	1384.31
37.69	1384.32	37.92	1384.34	38.13	1384.34	38.36	1384.36	38.59	1384.37
40.73	1384.47	45.63	1384.49	46.3	1384.48	47.17	1384.47	48.35	1384.46
53.06	1384.45	54.73	1384.41	58.68	1384.4	59.75	1384.39	61.9	1384.39
63.73	1384.47	65.68	1384.57	67.35	1384.49	72.21	1384.62	72.29	1384.62
72.39	1384.62	75.71	1384.64	78.83	1384.76	81.86	1384.82	84.13	1384.47
84.58	1384.36	85.14	1384.24	85.67	1384.15	86.41	1384	86.43	1384
87.06	1383.87	87.37	1383.8	87.69	1383.74	89.04	1383.56	89.85	1383.28
90.63	1383	90.72	1382.97	90.8	1382.94	92.36	1382.39	93.46	1382
93.85	1381.86	94.21	1381.74	95.14	1381.4	96.24	1381	96.38	1380.95
96.49	1380.91	97.5	1380.53	98.66	1380.09	98.75	1380.05	98.88	1380
100.04	1379.55	101.44	1379	101.64	1378.92	102.07	1378.75	103.21	1378.29
103.95	1378	104.86	1377.64	106.49	1377	106.64	1376.94	107.02	1376.79
108.23	1376.31	109.02	1376	109.75	1375.71	110.78	1375.32	111.01	1375.22
111.13	1375.17	111.29	1375.11	111.34	1375.09	111.49	1375.03	111.56	1375
111.65	1374.97	111.78	1374.92	112.2	1374.78	112.48	1374.68	112.63	1374.63
112.87	1374.54	118.11	1374.46	120.15	1374.38	121.57	1374.33	123.04	1374.27
124.52	1374.16	128.39	1374.04	130.35	1373.98	134.44	1374.03	170.6	1383.07
182.09	1383.47	183.7	1383.07	214.9	1375.27	250	1374.57	285.11	1375.27
316.31	1383.07	332.31	1383.39	332.76	1383.5	340.82	1383.41	346.04	1383.61
350	1384.6	351	1384.58	359.51	1384.46	359.95	1384.46	360.01	1384.46
360.1	1383.96	361.51	1384.04	407.1	1384.95	441.42	1384.26	443.1	1384.23
449.84	1383.89	450.1	1383.88	453.1	1383.38	453.37	1383.47	460.98	1386
461.17	1385.6	462.76	1386	462.79	1386.01	462.89	1386.04	463.35	1386.03
464.07	1386.01	464.49	1386	466.22	1385.95	481.73	1385.44	482.67	1385.84
483.03	1386	484.13	1386.48	485.35	1387	487.35	1387.87	487.66	1388
489.3	1388.7	489.99	1389	490.49	1389.22	492.32	1390	492.64	1390.14
494.31	1390.85	500	1390.94						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	183.7	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	316.31	100.63	100	99.55	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	182.09	1383.47	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7800

INPUT
Description: Channel Station 54099.16
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380.73	.85	1380.4	1.92	1380	2.32	1379.85	2.72	1379.7
4.57	1379	5.27	1378.74	7.1	1378	7.25	1377.94	9.22	1377.08
9.4	1377.01	9.41	1377	9.44	1376.99	11.62	1376	12.73	1375.5
13.83	1375	15	1374.47	15.96	1374.04	16.04	1374	16.11	1373.97
16.32	1373.87	16.37	1373.85	16.64	1373.83	16.69	1373.83	17.79	1373.76
18.07	1373.74	18.52	1373.7	21.73	1373.44	22.88	1373.34	25.68	1373.11
26.39	1373.06	27.11	1373	28.08	1372.92	32.59	1372.58	38.44	1372.58
48.39	1372.65	53.68	1372.67	60.39	1372.64	64.23	1372.53	66.31	1372.5
72.97	1372.35	80.91	1372.29	81.47	1372.31	81.66	1372.31	87.94	1372.44
91.95	1372.48	92.42	1372.48	95.78	1372.5	99.3	1372.54	104.06	1372.64
109.66	1372.83	111.62	1372.9	112	1372.92	112.97	1372.97	113.55	1373
114.19	1373.04	114.57	1373.05	114.81	1373.06	115.01	1373.07	115.2	1373.07
122.03	1373.16	122.71	1373.17	125.13	1373.27	125.48	1373.28	129.7	1373.44
131.18	1373.82	131.88	1374	132.53	1373.47	170.6	1382.99	182.09	1383.39
183.7	1382.99	214.9	1375.19	250	1374.49	285.11	1375.19	316.31	1382.99
332.3	1383.31	333.53	1383.61	335.95	1383.59	341.4	1384.96	342.4	1384.94
357.66	1384.72	357.83	1384.72	357.91	1384.22	359.33	1384.3	404.91	1385.22
440.91	1384.5	447.91	1384.15	450.91	1383.65	458.83	1385.93	459.03	1385.54
460.85	1386	461.39	1386.13	461.64	1386.2	461.67	1386.04	461.67	1386
467.27	1385.83	480.34	1385.42	481.04	1385.74	481.61	1386	483.13	1386.69
483.82	1387	484.16	1387.15	486.04	1388	486.88	1388.38	488.26	1389
489.13	1389.39	490.49	1390	491.84	1390.61	492.34	1390.83	492.72	1391
492.73	1391.01	492.76	1391.02	493.99	1391.05	496.37	1391.12	497.12	1391.15

497.43 1391.15 497.58 1391.16 499.15 1391.2 500 1391.18

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	183.7	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	316.31	92.33	100	107.1	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	182.09	1383.39	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7700

INPUT
Description: Channel Station 54199.16
Station Elevation Data num= 185

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1372.14	2.15	1372.22	2.75	1372.25	3.08	1372.26	3.19	1372.26
10.97	1372.58	17.96	1372.69	20.02	1372.75	20.38	1372.76	20.73	1372.77
21.03	1372.78	21.26	1372.79	21.9	1372.8	24.47	1372.87	29.54	1373
31.08	1373.04	31.84	1373.06	38	1373.21	44.74	1373.36	51.14	1373.51
55.57	1373.5	58.84	1373.59	59.24	1373.6	59.97	1373.63	61.3	1373.67
63.02	1373.73	66.15	1373.86	67.42	1373.89	69.54	1373.95	69.56	1373.96
69.65	1374	69.81	1374.07	70.36	1374.29	70.57	1374.36	70.99	1374.52
71	1374.52	71.25	1374.59	71.81	1374.79	72.31	1375	72.34	1375.01
72.96	1375.28	73.65	1375.57	74.38	1375.87	74.68	1376	76.08	1376.59
77.06	1377	77.81	1377.31	79.43	1378	79.55	1378.05	79.87	1378.19
81.36	1378.81	81.8	1379	83.08	1379.54	84.16	1380	84.7	1380.23
85.37	1380.51	86.53	1381	87.07	1381.23	87.33	1381.33	88.08	1381.62
89.12	1382	90.21	1382.38	90.92	1382.39	91.36	1382.37	92.88	1382.34
101.22	1382.63	104.15	1382.63	108.37	1382.7	114.59	1382.76	119.75	1382.76
122.48	1382.91	123.65	1382.95	125.01	1383	125.58	1383	125.96	1383
126.63	1383	127.13	1382.21	127.25	1382	127.36	1381.66	127.65	1381
128.27	1380.05	128.33	1380.02	128.39	1380	128.43	1380	128.57	1380
128.62	1380	128.85	1380	130.13	1379.12	130.26	1379	130.39	1378.91
130.79	1378.64	130.93	1378.81	131.08	1379	131.52	1379.53	131.9	1380
132.71	1380.98	132.73	1381	132.9	1381	132.97	1381	133.88	1381.27
135.02	1381.61	135.35	1381.71	135.86	1381.86	136.33	1382	137.66	1382.19
138.41	1382.29	138.63	1382.32	138.8	1382.34	138.93	1382.35	140.34	1382.61
141.88	1382.69	146.72	1382.89	146.87	1382.88	146.88	1382.88	146.89	1382.88
146.94	1382.88	147.04	1382.88	151.84	1382.57	152.03	1382.59	153.57	1382.84
155.45	1382.84	156.47	1382.76	158.65	1382.66	160.66	1382.56	161.37	1382.52
161.68	1382.5	161.85	1382.54	163.47	1382.81	170.09	1382.98	171.05	1383
171.09	1383	176.07	1383.12	176.56	1383.13	176.77	1383.14	176.8	1383.13
177.33	1383	178.49	1383	178.96	1383	180.48	1383	181.94	1383
182.09	1383.31	182.83	1383.12	214.89	1375.11	250	1374.41	285.1	1375.11
316.3	1382.91	332.3	1383.23	334.74	1383.84	344.55	1383.63	346.65	1383.74
352.32	1385.14	353.33	1385.13	362.51	1384.99	362.58	1384.99	363.01	1384.99
363.09	1384.49	364.51	1384.58	410.2	1385.5	446.29	1384.78	453.3	1384.43
456.31	1383.93	464.13	1386.22	464.46	1386	464.69	1386.06	465.9	1386.36
468.66	1386.26	476.04	1386	481.96	1385.79	485.51	1385.66	485.91	1385.82
486.33	1386	487.34	1386.41	488.77	1387	490.64	1387.77	491.2	1388
492.46	1388.52	493.64	1389	493.91	1389.11	495.94	1389.95	496.07	1390
496.09	1390.01	498.24	1390.91	498.93	1390.95	499.85	1391	500	1391.01

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	182.83	.032	214.89	.028	285.1	.032	316.3	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	316.3	100.03	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	182.09	1383.31	F

CROSS SECTION

RIVER: River

REACH: Ellsworth RS: 7600

INPUT
Description: Channel Station 54299.16
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.48	.06	1377.5	.54	1377.67	1.49	1378	1.78	1378.1
2.06	1378.2	3.27	1378.62	4.34	1379	4.73	1379.14	5.11	1379.27
6.21	1379.66	7.18	1380	7.39	1380.07	7.5	1380.11	8.42	1380.44
8.59	1380.5	9.57	1380.85	9.78	1380.92	10	1381	11.36	1381.47
11.4	1381.49	11.43	1381.5	15.35	1381.95	15.78	1382	17.05	1382.04
23.14	1382.3	23.76	1382.28	25.38	1382.27	34.32	1382.16	36.51	1382.14
36.77	1382.13	37.03	1382.12	37.21	1382.11	37.27	1382.11	37.31	1382.11
37.32	1382.1	37.34	1382.11	39.55	1382.25	39.63	1382.26	39.69	1382.26
39.74	1382.27	43.15	1382.53	45.69	1382.5	47.82	1382.5	54.62	1382.49
57.32	1382.54	59.03	1382.58	64.12	1382.51	86.54	1382.36	88.34	1382.37
89.96	1382.42	108.31	1382.84	108.8	1382.83	109.11	1382.83	109.32	1382.83
110.64	1382.83	122.8	1382.69	127.02	1382.77	129.12	1382.79	131.38	1382.73
135.04	1382.82	138.32	1382.9	140.16	1382.91	140.22	1382.91	140.29	1382.91
140.9	1382.91	148.98	1382.94	177.07	1382.98	177.09	1382.99	177.1	1382.99
179.28	1383	180.25	1383	182.09	1383.23	183.03	1382.99	214.89	1375.03
250	1374.33	285.11	1375.03	316.31	1382.83	332.31	1383.15	335.26	1383.89
339.39	1383.84	349.2	1384.08	354.73	1385.47	355.73	1385.45	369.36	1385.25
369.8	1385.25	369.86	1385.25	369.95	1384.75	371.37	1384.83	417.06	1385.75
453.14	1385.04	460.16	1384.69	463.16	1384.19	470.21	1385.95	470.29	1386
470.61	1386.08	471.92	1386.39	473.75	1386.21	475.33	1386	491.52	1385.71
492.67	1385.69	492.69	1385.7	493.15	1385.89	493.43	1386	493.51	1386.03
495.86	1387	497.92	1387.85	498.29	1388	498.41	1388.05	500	1388.71

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	183.03	.032	214.89	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	316.31	102.51	100	99.47	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	182.09	1383.23	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 7500

INPUT
Description: Channel Station 54399.16
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380.03	1.4	1380.27	4.97	1380.58	5.7	1380.63	5.92	1380.65
6.14	1380.66	6.34	1380.67	6.51	1380.67	8.56	1380.75	8.7	1380.75
8.88	1380.77	9.12	1380.78	9.44	1380.81	9.9	1380.84	10.22	1380.86
10.78	1380.89	11.3	1380.91	11.86	1380.95	12.17	1380.95	12.37	1380.95
12.7	1380.95	12.83	1380.96	13.28	1380.97	14.01	1381	14.1	1381
15.12	1381.06	15.16	1381.04	15.25	1381.07	15.56	1381.1	18.55	1381.5
21.1	1381.72	21.52	1381.74	23.18	1381.92	25.1	1382	25.2	1382
25.46	1382	25.89	1382.02	26.08	1382.02	26.57	1382.03	28.72	1382.11
36.79	1382.23	40.64	1382.38	42.65	1382.44	45.83	1382.53	48.72	1382.59
51.83	1382.65	52.12	1382.65	52.37	1382.65	56.27	1382.63	59.43	1382.61
60.45	1382.57	60.81	1382.57	64.88	1382.5	66.1	1382.55	70.33	1382.76
70.61	1382.76	70.74	1382.76	70.78	1382.76	71.42	1382.77	72.48	1382.77
90.56	1382.85	107.26	1383	108.28	1383	110.16	1383	113.01	1383
115.21	1383	118.02	1383	160.59	1383.46	163.95	1383.49	173.67	1383.68
173.9	1383.62	176.44	1383	177.15	1383	179.32	1383	179.87	1383.7
214.9	1374.95	250	1374.25	285.11	1374.95	316.31	1382.75	341.91	1383.26
343.99	1383.78	355.17	1384.19	358.82	1384.24	364.51	1385.66	365.51	1385.65
375.76	1385.5	375.99	1385.5	376.07	1385	377.49	1385.08	423.1	1386
459.12	1385.28	466.13	1384.93	469.13	1384.43	474.2	1385.7	475.2	1386
475.45	1386.06	475.87	1386.15	476.6	1386.32	476.64	1386.03	476.64	1386
477.45	1386	477.49	1386	477.58	1386.01	477.61	1386.01	477.93	1386.01
478.24	1386	485.15	1385.89	498.62	1385.68	499.14	1385.91	499.34	1386
500	1386.29								

Manning's n Values num= 5

```
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  179.87    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        179.87  316.31            109.18     100   89.79              .1       .3
Ineffective Flow     num=        1
   Sta L   Sta R    Elev  Permanent
       0  182.09 1383.15        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7400

INPUT
Description: Channel Station 54499.16
Station Elevation Data    num=      72
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0  1382.6    9.77 1382.72   13.13 1382.74   17.85 1382.76   23.01 1382.76
   89.47    1383   94.94    1383   95.78    1383   98.56    1383   99.16    1383
  100.22    1383  100.77    1383   102.3    1383  102.81    1383  107.85    1383
  172.56  1383.7  172.64  1383.7  173.33  1383.7   173.6 1383.63  175.35  1383.2
  176.16    1383  176.56    1383  176.74    1383   177.3    1383  179.49 1383.72
   186.5 1381.97   214.9 1374.87     250 1374.17  285.11 1374.87  316.31 1382.67
  337.57 1383.09  340.41  1383.8  352.65 1384.13  353.28 1384.29  359.91 1385.93
  360.44 1385.92  360.92 1385.91  363.47 1385.87  365.96 1385.84  369.81 1385.78
  373.72 1385.72  373.94 1385.72  374.22 1385.72  374.26 1385.44   374.3 1385.22
  374.92 1385.26  375.72  1385.3  391.16 1385.61  421.44  1386.2  446.78 1385.69
  457.54 1385.48  458.02 1385.45  464.56 1385.13  464.62 1385.11  465.21 1384.96
  465.86  1385.1  472.28    1386  473.12 1386.12  474.17 1386.26   474.9 1386.14
   475.7    1386  475.91 1385.96  476.03 1385.94  476.08 1385.93  495.52 1385.71
  497.12 1385.69   497.2 1385.73  497.76    1386   499.8 1386.97  499.86    1387
  499.92 1387.03     500 1387.07

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025   186.5    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        179.49  316.31             96.46     100  105.69              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7300

INPUT
Description: Channel Station 54599.16
Station Elevation Data    num=      68
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1382.83   22.92    1383   37.95    1383   41.79    1383   54.51    1383
   61.12    1383   65.23    1383  134.87 1383.53  139.54 1383.58  143.95 1383.59
  174.22 1383.37  174.84 1383.37  174.87 1383.36  174.89 1383.36  174.94 1383.34
  175.79 1383.13  176.29    1383  179.55 1382.67  180.46  1383.4   214.9 1374.79
     250 1374.09  285.11 1374.79   316.3 1382.59  332.31 1382.91  336.55 1383.97
  350.17 1384.13  357.22 1386.14  358.18 1386.12  366.84 1385.99  367.31 1385.99
  367.34 1385.99  367.42 1385.49  368.75 1385.57  368.84 1385.58  414.44 1386.48
  450.45 1385.76  457.45 1385.41  458.88 1385.05  464.65 1385.99  465.07    1386
  465.52 1386.06  466.36 1386.18  466.36 1386.15  466.37    1386  466.43    1386
   466.7    1386  467.34    1386  467.61    1386  467.68    1386  467.89 1385.98
   468.7  1385.9  469.35 1385.83  473.93 1385.79  487.54 1385.69  490.41 1385.67
  490.44 1385.69  490.58 1385.76  491.07    1386  492.89  1386.9   493.1    1387
  493.17 1387.03  495.12    1388     496 1388.43  497.15    1389  498.54 1389.69
  499.17    1390  499.55 1390.19     500 1390.41

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .025  180.46    .032   214.9    .028  285.11    .032   316.3    .025

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

```
        180.46   316.3            97.94     100  102.45              .1        .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7200

INPUT
Description: Channel Station 54699.16
Station Elevation Data    num=      62
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1382.88   19.55 1382.99   20.34 1382.99    21.9    1383   21.94    1383
    22.1    1383    23.7    1383   25.22    1383   28.87    1383   30.26    1383
   31.18    1383   84.85 1383.22   95.92 1383.26  173.68 1383.51  173.69 1383.51
   173.7 1383.51  173.72  1383.5  173.84 1383.47  175.73    1383  176.76  1382.9
  179.59 1383.53  214.89 1374.71     250 1374.01   285.1 1374.71   316.3 1382.51
  332.31 1382.83  338.41 1384.35  344.44 1384.54   350.6 1386.49   351.6 1386.48
  366.42 1386.26  366.51 1386.26  366.92 1386.26     367 1385.76  368.42 1385.84
     414 1386.75     450 1386.03     457 1385.68  458.03 1385.43  463.37    1386
  464.32  1386.1  464.37  1386.1   464.7  1386.1  465.88 1386.01   468.5 1386.06
  470.48 1386.03  472.75    1386  481.32 1385.84  488.98 1385.69  489.34 1385.85
  489.68    1386  491.17 1386.67  491.91    1387  493.81 1387.86  494.12    1388
  494.79 1388.31  496.26    1389  497.58 1389.62  498.39    1390  498.61  1390.1
  499.36 1390.45     500 1390.76

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
       0    .025  179.59    .032  214.89    .028   285.1    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        179.59   316.3            100.01     100  100.03              .1        .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7100

INPUT
Description: Channel Station 54799.16
Station Elevation Data    num=      61
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1383.09     5.3 1383.11    6.86 1383.12   44.84  1383.2   85.12 1383.33
  104.93 1383.38  172.78 1383.66   172.8 1383.65  172.81 1383.65  172.85 1383.64
  174.46 1383.24  175.41    1383  179.05 1383.59  214.89 1374.63     250 1373.93
   285.1 1374.63   316.3 1382.43  332.31 1382.75  338.62 1384.33  347.63 1384.28
  357.11 1386.65  358.11 1386.64   366.4 1386.51  366.82 1386.51   366.9 1386.51
  366.99 1386.01   368.4  1386.1  413.99 1387.01  449.99 1386.29  456.99 1385.94
   458.4 1385.59  462.37    1386  462.71    1386  462.79    1386  462.86    1386
  462.87    1386  463.18 1386.03  463.23 1386.02  463.41    1386  464.12    1386
  464.76    1386  465.61 1386.05  467.31 1386.16  468.27  1386.2  469.08 1386.19
  479.62    1386  488.69 1385.85  488.89 1385.84  488.93 1385.86  489.23    1386
  489.75 1386.25  491.32    1387  492.68 1387.65  493.42    1388  493.92 1388.24
  495.53    1389  496.84 1389.62  497.64    1390  498.32 1390.32  499.76    1391
     500 1391.11

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
       0    .025  179.05    .032  214.89    .028   285.1    .032   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        179.05   316.3             95.01     100  105.49              .1        .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 7000

INPUT
Description: Channel Station 54899.16
Station Elevation Data    num=      48
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.25	90.86	1383.7	150.14	1384	156.45	1384.05	160.42	1384.09
170.6	1384.18	170.66	1384.16	170.76	1384.14	170.91	1384.1	171.31	1384
176.47	1384.15	214.9	1374.55	250	1373.85	285.11	1374.55	316.31	1382.35
332.31	1382.67	339.42	1384.45	345.06	1384.36	353.7	1387.02	354.7	1387
369.03	1386.79	369.18	1386.79	369.53	1386.79	369.62	1386.29	371.04	1386.37
416.69	1387.29	449.99	1386.63	452.75	1386.58	459.76	1386.23	461.62	1385.76
461.64	1385.99	464.71	1385.94	465.34	1385.98	465.77	1386	468.8	1386.18
469.62	1386.23	471.16	1386.32	475.9	1386.27	491.5	1386.06	492.07	1386.33
492.99	1386.75	493.52	1387	493.96	1387.2	495.72	1388	497.66	1388.88
497.93	1389	499.34	1389.64	500	1389.94				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	176.47	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.47	316.31	103.4	100	95.97	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6900

INPUT
Description: Channel Station 54999.16
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.25	60.93	1383.57	64.02	1383.58	96.55	1383.71	102.73	1383.73
107.83	1383.75	116.1	1383.79	159.31	1383.98	160.59	1383.98	162.37	1383.98
163.38	1383.99	165.62	1383.99	168.48	1384	169.27	1384	169.91	1384
170.28	1384	170.65	1384.01	170.66	1384.01	170.68	1384	176.67	1384.02
214.9	1374.47	250	1373.77	285.11	1374.47	316.31	1382.27	338.97	1382.72
346.41	1384.58	355.77	1384.54	366.35	1387.18	367.36	1387.17	375.77	1387.04
375.96	1387.04	376.27	1387.04	376.35	1386.54	377.77	1386.63	423.41	1387.54
459.45	1386.83	466.45	1386.48	469.09	1385.82	469.64	1385.89	469.88	1385.87
470.06	1385.89	471.67	1386	472.38	1386.04	477.37	1386.34	497.43	1386.38
497.83	1386.38	497.89	1386.41	499.21	1387	499.41	1387.09	500	1387.35

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	176.67	.032	214.9	.028	285.11	.032	316.31	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.67	316.31	100.01	100	100.11	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6800

INPUT
Description: Channel Station 55099.16
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.01	16.02	1383.06	16.44	1383.06	17.11	1383.06	25.11	1383.1
32.55	1383.13	57.06	1383.24	82.58	1383.38	163.85	1383.96	170.75	1383.88
171.38	1383.72	171.69	1383.65	172.61	1383.42	174.29	1383	176.8	1383.91
214.9	1374.39	250	1373.69	285.11	1374.39	316.31	1382.19	342.65	1382.71
350.24	1384.61	353.2	1384.6	361.18	1387.44	361.39	1387.52	362.38	1387.5
377.09	1387.28	377.11	1387.28	377.59	1387.28	377.67	1386.78	379.04	1386.86
379.09	1386.86	424.68	1387.77	460.69	1387.05	467.69	1386.7	470.98	1385.88
471.03	1385.85	472.23	1385.94	472.96	1386	475.85	1386.22	478.91	1386.44
498.69	1386.45	499.11	1386.45	499.14	1386.46	500	1386.82		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	176.8	.032	214.9	.028	285.11	.032	316.31	.025

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         176.8  316.31            103.39     100   95.64              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6700

INPUT
Description:
Station Elevation Data    num=      80
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1382.77   29.21 1382.96   30.49 1382.96   31.83 1382.96   33.28 1382.97
   36.08 1382.98   41.52 1383.01   42.65    1383   44.43    1383    47.4    1383
   48.62    1383   49.71    1383   50.18 1383.01   60.16  1383.1   71.16 1383.21
   79.19 1383.31   79.42 1383.31   85.11 1383.32   86.23 1383.33  111.03 1383.47
  113.86 1383.48  136.97 1383.61  145.08 1383.65  151.55 1383.73  165.73 1383.82
  168.33 1383.93  169.61 1383.98  169.74 1383.99  169.97    1384  170.11    1384
  170.15    1384  170.18    1384  170.22    1384  170.23    1384  170.62  1383.9
   171.4 1383.71     172 1383.56  172.32 1383.48  172.46 1383.44  172.57 1383.41
   172.8 1383.36   173.6 1383.16  174.23    1383  174.79 1382.86  175.19 1382.76
  176.11 1382.53  176.16 1383.99   214.9 1374.31     250 1373.61  285.11 1374.31
  316.31 1382.11  337.18 1382.53  346.46  1384.9  353.75 1384.69  365.63 1387.67
  365.72 1387.67  366.63 1387.65  374.63 1387.53  374.68 1387.53  375.13 1387.53
  375.22 1387.03  376.63 1387.12  422.23 1388.03  458.24  1387.3  465.24 1386.95
  469.08 1385.99  469.18    1386  469.19    1386  469.36 1385.96  469.45 1385.96
  469.83 1385.99  469.95    1386  470.24 1386.02  477.02 1386.52  494.37  1386.5
  497.24 1386.49  497.74  1386.7  498.45    1387  499.81 1387.58     500 1387.66

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
       0    .025  176.16    .032   214.9    .028  285.11    .032  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         176.16  316.31            12.38   12.38   12.38              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6687.62

INPUT
Description: Begin Channel Bottom Transition (Begin Flow Contraction)
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  178.89  1383.3  214.89  1374.3     250  1373.6   285.1  1374.3   316.3  1382.1
  342.65 1382.62  351.11 1384.74   354.9 1384.63  367.05 1387.68  374.32 1387.57
  374.82 1387.57   374.9 1387.07  376.32 1387.15  421.92 1388.06  457.93 1387.34
  464.93 1386.98  468.75 1386.03

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
  178.89     .04  214.89    .028   285.1     .04   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         178.89   316.3            14.9    14.9    14.9              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6675.17*

INPUT
Description: Upatream End of Riprap
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  176.57 1383.87  202.74 1375.76  213.75 1374.31     250 1373.59   285.1 1374.29
  295.63 1375.71   316.3 1382.09  342.61 1382.61  347.57 1383.28  351.06 1384.15
  354.84 1384.57  366.98 1387.61   367.7 1387.69  373.71  1387.6  374.23  1387.6
```

```
  374.29  1387.6  374.37 1387.35  374.73 1387.36  374.81 1387.11  375.79 1387.17
  376.23 1387.18  421.45 1388.09  421.76 1388.09  457.53 1387.37  457.71 1387.37
  464.54 1387.02   464.7 1386.99  468.52 1386.05

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*******************************
  176.57     .04   316.3    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.57   316.3                 10      10      10              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  176.57     203    1382       F
     297  468.52    1382       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6662.73

INPUT
Description: Upstream End of Wing Wall
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  174.26 1384.44  201.25 1374.55     250 1373.58  295.63 1374.49  316.31 1382.08
  347.53  1382.7  367.62 1387.72  373.62 1387.63   374.2 1387.63  374.28 1387.13
   375.7 1387.21  421.29 1388.12  457.31  1387.4  464.31 1387.05  468.28 1386.06

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  174.26          174.26    .015  316.31    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.26  316.31                15.93   15.93   15.93              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  174.26     210    1382       F
     291  468.28    1382       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6646.88

INPUT
Description: Upstream Face of C11
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************
     217  1385.5     217 1373.56     283 1373.56     283  1385.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
     217             217    .015     283

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           217     283                 61      61      61              .3       .5

CULVERT


RIVER: River
REACH: Ellsworth          RS: 6615

INPUT
Description:
Distance from Upstream XS =      6.5
Deck/Roadway Width        =       48
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=       2
```

```
    Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**************************************************
       01384.186             5001387.795

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
     217  1385.5     217 1373.56     283 1373.56     283  1385.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
     217             217    .015     283

Bank Sta: Left   Right    Coeff Contr.   Expan.
           217    283              .3       .5

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**************************************************
       01384.186             5001387.795

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
     217  1385.5     217 1373.47     283 1373.47     283  1385.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
     217             217    .015     283

Bank Sta: Left   Right    Coeff Contr.   Expan.
           217    283              .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
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 #11        Box        8      12
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                0      61     .015     .015         0                .4                 1
Number of Barrels =  5
Upstream   Elevation =  1373.57
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
     224     237     250     263     276
Downstream Elevation =  1373.46
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
     224     237     250     263     276

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6585.95

INPUT
Description: Downstream Face of C11
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
     217  1385.5     217 1373.47     283 1373.47     283  1385.5
```

```
Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
     217             217    .015     283

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           217     283             14.26   14.26   14.26              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6571.49

INPUT
Description: Downstream End of Wing Wall
Station Elevation Data     num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  174.66 1384.21  204.82 1374.36     250 1373.45   299.2 1374.44  324.89  1384.1
  340.89 1384.42  343.64 1385.11  357.22 1385.11  368.81 1387.98  374.72 1387.89
  375.29 1387.89  375.37 1387.39   376.7 1387.47  422.43 1388.39  458.48 1387.67
  465.49 1387.33  469.29 1386.38

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  174.66          174.66     .04  324.89    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.66  324.89                 10      10      10              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  174.66     210    1384        F
     291  469.29    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6559.04*

INPUT
Description: Downstream End of Riprap
Station Elevation Data     num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  174.93 1384.13  204.98 1375.46  214.79 1374.14     250 1373.44  285.42 1374.14
  298.77 1375.93  324.23 1383.92  340.03 1384.23  340.43 1384.29  343.22 1384.98
  344.08 1385.09  356.59 1385.15  356.97 1385.19  367.99 1387.95   368.7 1388.03
  374.68 1387.94  375.26 1387.93  375.34 1387.68  376.49 1387.71  376.69 1387.71
     377 1387.72  378.48 1387.52  422.99 1388.42  423.62 1388.42  459.27 1387.71
  459.49  1387.7   466.2 1387.37  466.59 1387.32  470.44 1386.35

Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************
  174.93     .04  214.79    .028  285.42     .04  324.23    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.93  324.23                 14.9    14.9    14.9              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  174.93     204    1384        F
     296  470.44    1384        F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6546.60

INPUT
Description: End Channel Bottom Transition (Fully Expanded Flow)
Station Elevation Data     num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
*******************************************************************************
  175.19 1384.05  214.91 1374.12     250 1373.42  285.11 1374.12  323.57 1383.73
  339.57 1384.05  343.67 1385.08  356.33 1385.18  367.87 1388.09  376.48 1387.96
  376.99 1387.96  378.49 1387.54  424.19 1388.46  460.28 1387.75   467.3  1387.4
  471.59 1386.33

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
  175.19    .032  214.91    .028  285.11    .032  323.57    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        175.19  323.57             19.6    19.6    19.6              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6527

INPUT
Description:
Station Elevation Data    num=      76
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1383.56  110.59 1384.04  113.65 1384.04  123.88 1384.04  124.04 1384.04
  124.12 1384.04  124.18 1384.04  124.72 1384.04   127.4 1384.04   130.2 1384.06
  142.56  1384.1  165.74 1384.19  168.53  1384.2  168.74 1384.15  169.16 1384.04
  169.46 1383.97  173.15 1383.04  175.55 1382.44  176.09 1383.79  182.09 1382.29
   214.9 1374.09     250 1373.39  285.11 1374.09  317.92 1382.29  318.88 1382.04
  330.19 1382.04  334.12 1382.04  339.78 1382.04   343.7 1382.04  348.17 1382.04
  349.34 1382.34  352.04 1383.04   355.9    1384  356.07 1384.04  356.23 1384.08
  356.25 1384.08  360.19 1385.04  360.21 1385.04  360.22 1385.05  360.29 1385.06
  360.41 1385.09  360.42 1385.36  360.43 1386.04  360.46 1386.15  360.59 1387.04
  362.65 1387.56  364.55 1388.04  364.86 1388.08  365.89 1388.22  366.73 1388.33
  371.49 1388.23  376.35 1388.14  381.39 1388.04  381.45 1387.72  381.46 1387.62
  385.56 1387.71  388.79 1387.79  399.73 1388.04  400.95 1388.06  428.69 1388.62
  435.72 1388.48  438.97 1388.42  457.14 1388.06  457.97 1388.04  458.19 1388.04
  458.31 1388.04  464.86 1387.91  469.67 1387.45  471.71 1387.26  473.98 1387.04
  474.56  1386.9  476.39 1386.44  478.69 1386.56  482.55 1386.76  495.51 1386.81
     500 1386.82

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.09  317.92             27      27      27              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 6500

INPUT
Description: Channel Station 55399.16
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1383.52  110.59    1384  113.65    1384  123.88    1384  124.04    1384
  124.12    1384  124.18    1384  124.72    1384   127.4    1384   130.2 1384.02
  142.56 1384.06  165.74 1384.15  168.53 1384.16  168.74 1384.11  169.16    1384
  169.46 1383.93  173.15    1383  174.47 1384.16   214.9 1374.05     250 1373.35
  285.11 1374.05  324.05 1383.79  340.05 1384.11  343.72 1385.03  356.65 1385.07
  365.73 1388.31  366.73  1388.3  381.25 1388.09  381.41 1388.09  381.76 1388.09
  381.84 1387.59  383.27 1387.67  429.14 1388.59  465.37 1387.88  472.41 1387.53
  476.92 1386.41  478.69 1386.52  482.55 1386.72  495.51 1386.77     500 1386.78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.47  324.05             92.36     100  109.95              .1       .3
```

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6400

INPUT
Description: Channel Station 55499.16
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.37	29.72	1383.5	35.39	1383.52	132.05	1384	134.8	1384
136.42	1384	139.22	1384	140.89	1384	143.15	1384	143.9	1384
146.31	1384	147.5	1384	148.24	1384	149.32	1384	149.82	1384
150.4	1384	157.69	1384.04	168.19	1384.1	168.35	1384.06	168.61	1384
169.44	1383.79	172.59	1383	174	1384.14	214.89	1373.91	250	1373.21
285.11	1373.91	325.27	1383.95	341.27	1384.27	344.19	1385.01	375.3	1385.26
388.18	1388.37	389.21	1388.35	398.91	1388.21	399.11	1388.21	399.42	1388.21
399.5	1387.71	400.95	1387.79	447.46	1388.71	484.18	1387.98	491.33	1387.63
495.15	1386.7	496.7	1387	496.8	1387	496.85	1387	496.94	1387
497.86	1387.01	499.18	1387.03	500	1387.04				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
174	325.27	89.93	100	111.65	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6300

INPUT
Description: Channel Station 55599.16
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.48	63.98	1383.8	106.21	1384	110.96	1384	114.55	1384
131.6	1384.11	134.86	1384.14	142.15	1384.18	165.85	1384.38	166.61	1384.39
166.66	1384.38	166.8	1384.34	168.15	1384	172.01	1383.03	172.14	1383
172.17	1384.46	214.9	1373.77	250	1373.07	285.11	1373.77	328.6	1384.65
344.6	1384.97	347.74	1385.75	402	1386.29	410.45	1388.35	411.47	1388.34
427.25	1388.1	427.67	1388.1	427.77	1388.1	427.85	1387.6	429.33	1387.69
476.85	1388.57	514.38	1387.83	521.68	1387.47	523.31	1387.08	523.38	1387.06

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.17	328.6	95.01	100	105.75	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6200

INPUT
Description: Channel Station 55699.16
Station Elevation Data num= 173

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.55	91.55	1384	94.94	1384.02	98.15	1384.05	164.96	1384.64
165.46	1384.52	166.01	1384.38	167.52	1384	169.15	1383.59	170.58	1384.71
214.9	1373.63	250	1372.93	285.11	1373.63	331.63	1385.27	347.63	1385.59
351.26	1386.49	352.07	1385	352.71	1385.16	356.07	1386	357.88	1386.45
358.52	1386.61	358.6	1386.23	358.8	1386	359.06	1386	359.11	1385.94
359.12	1385.94	359.39	1385.99	359.42	1386	359.66	1386.04	359.89	1386.09
360.04	1386.11	360.23	1386.15	360.36	1386.17	360.43	1386.19	360.51	1386.19
360.59	1386.17	360.69	1386.19	360.78	1386.15	360.94	1386.08	360.99	1386.06

361.15	1386	361.21	1385.97	361.22	1385.97	361.51	1385.85	361.54	1385.82
361.71	1385.74	361.79	1385.67	361.89	1385.63	361.92	1385.61	362.03	1385.5
362.07	1385.48	362.1	1385.46	362.13	1385.44	362.28	1385.28	362.32	1385.24
362.52	1385.01	362.53	1385.01	363.67	1385.33	363.77	1385.29	363.85	1385.27
364.11	1385.32	364.87	1385.5	365.32	1385.58	365.75	1385.68	367.14	1386
368.28	1386.09	368.55	1386.05	368.58	1386.04	369.04	1386.03	369.12	1386.04
374.2	1386.14	376.81	1386.2	379.56	1386.66	384.49	1386.8	384.89	1386.81
385.67	1386.83	389.56	1386.76	392.65	1386.73	393.99	1386.72	397.58	1386.76
397.72	1386.76	400.73	1386.8	400.93	1386.81	409.75	1386.47	409.88	1386.48
411.12	1386.41	411.61	1386.44	411.63	1386.44	411.66	1386.44	411.69	1386.44
411.72	1386.44	411.75	1386.45	411.78	1386.45	411.92	1386.46	412.15	1386.46
412.59	1386.47	415.44	1386.3	415.82	1386.31	416.54	1386.38	416.63	1386.39
417.1	1386.36	420.52	1386	424.56	1385.66	424.59	1385.65	424.61	1385.65
424.64	1385.64	424.67	1385.63	424.7	1385.62	424.74	1385.6	424.78	1385.59
424.82	1385.58	424.87	1385.56	424.91	1385.55	424.97	1385.53	425.43	1385.47
427.53	1385.21	428.34	1385.13	428.96	1385	429.8	1385	430.09	1384.97
431.52	1384.74	431.92	1384.8	432.05	1384.82	432.24	1384.84	432.49	1384.88
432.81	1384.92	433.39	1385	433.43	1385.01	433.45	1385.01	433.91	1385.07
434.35	1385.13	434.65	1385.17	437.19	1385.52	438.16	1385.65	439.97	1385.89
440.77	1386	442.51	1386.24	444.47	1386.5	446.39	1386.76	448.14	1387
451.43	1387.48	454.78	1387.96	455.81	1387.9	456.08	1387.88	456.71	1387.84
457.43	1387.79	459.44	1387.67	464.81	1387.32	465.55	1387.33	465.65	1387.33
465.71	1387.34	466.45	1387.35	466.47	1387.35	466.51	1387.35	466.55	1387.35
466.6	1387.35	466.64	1387.35	466.67	1387.36	466.69	1387.36	466.74	1387.36
466.82	1387.36	466.94	1387.36	467.15	1387.36	467.5	1387.37	486.44	1387.74
488.23	1387.78	490.22	1387.82	492.45	1387.86	494.94	1387.91	497.41	1387.96
499.69	1388	499.73	1388	500	1388.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.58	331.63	89.55	100	112.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6100

INPUT
Description: Channel Station 55799.16
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.59	82.13	1384	127.02	1384.24	165.47	1384.45	165.56	1384.43
165.64	1384.4	165.89	1384.34	166.3	1384.24	167.25	1384	168.95	1383.57
170.94	1384.48	214.9	1373.49	250	1372.79	285.1	1373.49	331.47	1385.08
347.47	1385.4	350.86	1386.25	352.83	1385	353.8	1385.24	354.83	1385.5
356.84	1386	357.44	1386.15	357.77	1386.23	358.03	1386.3	358.11	1386.32
359.48	1386.33	375.69	1386.5	380.5	1386.76	380.58	1386.76	380.75	1386.75
386.04	1386.54	387.17	1386.46	388.61	1386.34	390.9	1386.15	391.94	1386.06
392.71	1386	392.75	1386	392.87	1385.99	393.07	1385.99	393.42	1386
395.03	1386.04	398.03	1386.11	415.59	1386.65	416.61	1386.87	417.31	1387
417.83	1387.12	418	1387.16	418.27	1387.12	418.94	1387.01	419.04	1387
419.08	1386.99	420.97	1386.71	424.51	1386.74	425.18	1386.74	425.99	1386.74
451.35	1387	456.73	1386.39	458.65	1386.28	463.29	1386.04	463.4	1386.04
464.11	1386	472.96	1385.44	474.9	1385.31	477.66	1385.25	479.15	1385.42
479.74	1385.34	480.55	1385.36	482.36	1385.56	483.92	1385.51	484.19	1385.4
484.62	1385.24	484.94	1385.09	485.14	1385	485.14	1384.72	485.14	1384.58
485.57	1384.63	486.17	1384.69	486.35	1384.71	489.16	1385	491.63	1385.26
493.09	1385.41	496.06	1385.72	497.57	1385.87	498.8	1386	499.69	1386.09
500	1386.13								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.94	331.47	89.86	100	110.57	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 6000

INPUT
Description: Channel Station 55899.16
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.6	79.15	1384	160.87	1384.42	164.86	1384.44	164.99	1384.4
165.11	1384.37	165.75	1384.21	170.44	1384.47	214.89	1373.35	250	1372.65
285.1	1373.35	329.24	1384.39	345.24	1384.71	348.4	1385.5	349.31	1384
352.78	1384.87	353.32	1385	353.57	1385.06	355.34	1385.51	369.13	1385.81
376.55	1386	377	1386	378.38	1386.09	378.9	1386.13	379.06	1386.14
393.66	1386.29	397.21	1386.33	399.7	1386.35	406.47	1386.41	452.27	1386.92
457.22	1386.93	487.79	1387	489.27	1387	494.74	1387	496.07	1387
497.58	1387	500	1387						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.44	329.24	93.44	100	106.76	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5900

INPUT
Description: Channel Station 55999.16
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.59	25.64	1383.72	58.28	1383.87	78.75	1383.97	84.8	1384
93.86	1384.04	115.63	1384.15	155.47	1384.34	159.16	1384.35	160.69	1384.36
161.52	1384.36	162.31	1384.37	164.28	1384.38	164.36	1384.36	164.44	1384.34
164.72	1384.27	165.15	1384.16	165.78	1384	170.11	1384.41	214.89	1373.21
250	1372.51	285.11	1373.21	330.96	1384.68	346.96	1385	351.07	1386.03
353.38	1384.95	353.57	1385	353.81	1385.06	355.39	1385.46	357.57	1386
357.94	1386.08	358.18	1386.14	358.33	1386.14	358.43	1386.14	358.54	1386.14
358.69	1386.14	359.07	1386.14	360.99	1386.13	362.88	1386.13	364.09	1386.14
364.98	1386.14	366.17	1386.14	366.69	1386.14	367.76	1386.14	368.52	1386.14
377.89	1386.14	381.11	1386.14	383.25	1386.14	403.59	1386.24	405.81	1386.25
409.17	1386.26	418.09	1386.32	480.91	1386.46	481.26	1386.46	481.77	1386.47
481.94	1386.47	481.99	1386.47	483.09	1386.47	500	1386.59		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.11	330.96	93.19	100	106.49	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5800

INPUT
Description: Channel Station 56099.16
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.54	34.88	1383.67	110.24	1383.97	113.15	1383.98	118.47	1384
143.99	1384.11	158.55	1384.18	164.47	1384.2	164.68	1384.15	165.17	1384.03
165.29	1384	166.23	1383.76	166.65	1383.66	169.28	1383	170.23	1384.24
214.89	1373.07	250	1372.37	285.11	1373.07	332.74	1384.98	348.74	1385.3
352.08	1386.14	354.11	1384.96	354.27	1385	354.43	1385.04	354.92	1385.16
358.28	1386	358.43	1386.04	358.83	1386.14	380.65	1386.14	381.9	1386.14
382.06	1386.14	382.39	1386.14	382.87	1386.14	383.3	1386.14	383.59	1386.14
391.32	1386.14	394.62	1386.14	395.33	1386.14	397.72	1386.14	398.92	1386.14
404.84	1386.14	406.43	1386.14	406.96	1386.14	410.84	1386.14	412.16	1386.14

```
  437.89 1386.14  454.26 1386.14   458.7 1386.14  464.08 1386.14  475.33 1386.14
  479.87 1386.14  483.47 1386.14  486.34 1386.14  495.15 1386.19     500 1386.21

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.23  332.74             88.19     100  110.63              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 5700

INPUT
Description: Channel Station 56199.16
Station Elevation Data     num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1383.36    8.49 1383.39   18.98 1383.42   60.55 1383.56   68.48 1383.59
   79.49 1383.63  157.81 1383.89  165.51 1383.91  165.62 1383.91  165.74 1383.91
  165.84 1383.91  165.89 1383.91  165.96 1383.91  166.27 1383.84  166.44 1383.79
  166.79 1383.71  167.59 1383.51   169.6    1383  170.85 1383.94   214.9 1372.93
     250 1372.23   285.1 1372.93  329.51 1384.03  345.51 1384.35  352.64 1386.14
  353.94 1384.57  355.67    1385   356.5  1385.2   359.6 1385.98  360.19 1385.98
  367.16 1385.96  370.03 1385.96  371.29 1385.92   371.4 1385.92  372.11 1385.93
  391.65 1385.88   392.9 1385.89  393.85  1385.9  393.92  1385.9  394.44  1385.9
  422.08 1385.84  422.77 1385.85  427.96 1385.88  446.81 1385.86  466.25 1385.91
   466.5 1385.91  467.71 1385.92  469.85 1385.93  473.13 1385.95   475.6 1385.96
  476.25 1385.96  482.85    1386  483.17    1386  486.08 1386.02     500 1386.11

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .032   214.9    .028   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.85  329.51             93.95     100  105.17              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 5600

INPUT
Description: Channel Station 56299.16
Station Elevation Data     num=      73
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1383.09    8.65 1383.12   18.96 1383.16   78.36 1383.36  104.34 1383.47
  120.76 1383.53  132.85 1383.57  163.38 1383.68  163.42 1383.68  163.44 1383.68
  163.65 1383.68  164.95 1383.69  165.47 1383.69  165.63 1383.65  165.79 1383.61
  166.64  1383.4  168.23    1383  171.26  1383.7  214.89 1372.79     250 1372.09
   285.1 1372.79  327.36 1383.36  343.36 1383.68  348.56 1384.98  350.07 1383.67
  351.41    1384  353.24 1384.46   355.4    1385  355.85 1385.11  355.98 1385.14
  362.11 1385.07  376.49    1385  381.77 1384.95  381.83 1384.95  382.07 1384.95
  399.96 1384.82  400.46 1384.82  401.28 1384.82  425.74 1384.75  431.73 1384.75
  433.31 1384.75  438.85 1384.76  440.73 1384.76   443.2 1384.77  444.93 1384.78
  446.04 1384.78   446.2 1384.78  448.24 1384.79  448.83 1384.79  449.26 1384.79
  450.85 1384.79   452.7 1384.79  455.48  1384.8     460 1384.81  460.29 1384.81
  460.53 1384.81  460.85 1384.81  461.83 1384.82  463.48 1384.82  465.79 1384.82
  468.83 1384.84  470.49 1384.84  471.42 1384.84  476.78 1384.84  477.96 1384.85
  478.19 1384.85  479.86 1384.85  487.69 1384.86  491.71 1384.88  493.42 1384.89
  495.22 1384.89  497.22 1384.89     500  1384.9

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .032  214.89    .028   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        171.26  327.36              93.4     100  105.25              .1       .3
```

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5500

INPUT
Description: Channel Station 56399.16
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.82	5.38	1382.83	10.81	1382.85	22.39	1382.89	41.87	1382.96
55.9	1383	61.61	1383.02	89.13	1383.11	101.81	1383.15	117.17	1383.2
164.92	1383.36	166.33	1383.36	166.34	1383.36	166.35	1383.36	166.38	1383.35
166.42	1383.34	167.77	1383	170.7	1382.27	171.17	1382.15	171.76	1382
172.02	1383.37	214.89	1372.65	250	1371.95	285.1	1372.65	326.09	1382.9
342.09	1383.22	345.54	1384.08	348.06	1383	352.05	1383.99	352.08	1384
352.54	1384.11	352.63	1384.14	353.64	1384.14	354.27	1384.14	362.77	1384.11
363.48	1384.11	364.64	1384.11	381.19	1384.07	399.11	1384.04	399.72	1384.04
401.32	1384.04	401.36	1384.04	401.73	1384.04	404.49	1384.04	405.67	1384.03
411.27	1384.03	412.76	1384.03	421.8	1384.02	422.45	1384.02	422.51	1384.02
423.59	1384.02	425.37	1384.02	426.56	1384.02	438.02	1384.01	438.08	1384.01
443.83	1384	447.36	1383.99	472.19	1383.93	472.35	1383.94	472.43	1383.94
500	1384.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.02	326.09	91.63	100	106.73	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5400

INPUT
Description: Channel Station 56499.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.56	18.84	1382.6	25.21	1382.61	37.36	1382.64	49.24	1382.68
66.78	1382.74	79.25	1382.76	92.76	1382.81	103.04	1382.84	107.19	1382.85
118.51	1382.89	140.17	1382.95	145.5	1382.96	147.02	1382.96	147.71	1382.97
148.19	1382.97	149.79	1382.97	152.9	1382.97	158.82	1382.98	163.81	1382.99
165.79	1382.99	167.02	1383	169.87	1382.29	170.38	1382.16	171.02	1382
172.24	1381.69	172.97	1383	214.89	1372.51	250	1371.81	285.1	1372.51
323.48	1382.11	339.48	1382.43	342.31	1383.14	344.03	1381.87	344.54	1382
346.8	1382.57	348.54	1383	348.58	1383.01	349.09	1383.14	352.61	1383.14
356.15	1383.14	359.95	1383.2	368.32	1383.14	370.21	1383.14	376.98	1383.14
382.39	1383.14	392.18	1383.14	392.39	1383.14	392.84	1383.14	398.31	1383.21
398.38	1383.21	399.72	1383.19	400.34	1383.19	425.75	1383.35	443.74	1383.42
446.47	1383.41	454.28	1383.39	455.74	1383.39	456.52	1383.4	500	1383.59

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.97	323.48	100.13	100	100.03	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5300

INPUT
Description: Channel Station 56599.16
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.15	26.95	1382.21	30.68	1382.22	33.51	1382.23	53.63	1382.27

57.26	1382.29	96.45	1382.4	107.57	1382.43	127.17	1382.5	131.25	1382.51
163.84	1382.63	163.88	1382.63	164.49	1382.63	165.18	1382.63	168.31	1382.64
168.75	1382.53	169.22	1382.42	170.73	1382.04	170.88	1382	172.8	1381.52
173.77	1382.66	214.9	1372.37	250	1371.67	285.11	1372.37	323.92	1382.08
339.92	1382.4	342.8	1383.12	345.47	1382	348.11	1382.66	349.48	1383
349.59	1383.03	350.01	1383.13	350.82	1383.13	352.66	1383.14	353.62	1383.14
354.35	1383.14	355	1383.14	385.12	1383.14	390.23	1383.14	403.44	1383.14
411.01	1383.14	416.83	1383.14	454.88	1383.14	457.55	1383.14	462.88	1383.14
463.02	1383.14	471.4	1383.18	472.2	1383.19	500	1383.38		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.77	323.92	92.52	100	106.5	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5200

INPUT
Description: Channel Station 56699.16
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1381.79	17.24	1381.82	21.82	1381.82	35.11	1381.84	36.31	1381.84
46.66	1381.86	52.58	1381.88	64.9	1381.9	65.79	1381.9	85.31	1381.94
85.93	1381.94	105.15	1381.98	109.71	1381.98	110.49	1381.98	120.5	1382
124.14	1382.01	124.63	1382.01	142.22	1382.03	142.98	1382.03	145.88	1382.04
156.81	1382.05	160.07	1382.06	165.02	1382.07	168.14	1382.07	169.8	1382.07
169.85	1382.06	170.09	1382	170.15	1381.98	170.43	1381.91	174.08	1381
175.54	1382.07	214.9	1372.23	250	1371.53	285.1	1372.23	322.93	1381.69
338.93	1382.01	342.38	1382.87	345.74	1382	348.13	1382.6	349.64	1382.97
349.97	1382.99	350.06	1383	350.17	1383.01	352.62	1383.14	353.43	1383.14
354.56	1383.14	358.42	1383.09	364.77	1383.09	372.85	1383.05	388.23	1383.05
394.69	1383.04	417.15	1383.02	433.74	1383.02	443.16	1383.02	449.88	1383.03
470.56	1383.17	500	1383.26						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.54	322.93	96.11	100	103.33	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 5100

INPUT
Description: Channel Station 56799.16
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1381.34	3.51	1381.34	8.95	1381.35	13.81	1381.35	18.07	1381.36
20.5	1381.36	25.53	1381.37	31.08	1381.38	39.19	1381.4	45.43	1381.41
53.63	1381.43	169.96	1381.45	170.27	1381.45	171.97	1381.46	172.11	1381.42
172.25	1381.39	173.32	1381.12	177.41	1381.47	214.9	1372.09	250	1371.39
285.1	1372.09	317.08	1380.09	333.08	1380.41	338.18	1381.68	338.56	1380
339.07	1380.13	342.58	1381	343.16	1381.14	346.48	1381.97	346.81	1381.98
347.32	1382	347.49	1382.01	351.09	1382.14	353.25	1382.14	355.11	1382.14
367.84	1382.14	378.56	1382.14	386.94	1382.14	387.16	1382.14	394.4	1382.14
394.84	1382.14	395.49	1382.14	397.36	1382.14	399.92	1382.14	400.99	1382.14
404.1	1382.14	404.44	1382.14	404.47	1382.14	409.92	1382.14	410.61	1382.14
410.93	1382.14	412.21	1382.14	423.31	1382.14	430.35	1382.14	437.78	1382.14
438.42	1382.16	452.89	1382.69	500	1382.82				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
       0    .032   214.9    .028   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        177.41  317.08             95.3     100  103.78              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 5000

INPUT
Description: Channel Station 56899.16
Station Elevation Data    num=      60
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1380.92   35.37    1381   35.83    1381   37.76    1381    43.1 1381.01
   44.64 1381.01   81.88 1381.08   98.76  1381.1  116.89 1381.13   124.7 1381.14
  151.85 1381.19  167.76 1381.21  172.23 1381.22  172.35 1381.19  172.47 1381.17
  172.78 1381.09  173.13    1381  177.92  1381.2  214.89 1371.95     250 1371.25
  285.11 1371.95   320.4 1380.78   336.4  1381.1  340.03 1382.01  342.15 1380.78
  343.04    1381  343.72 1381.17  347.05    1382  347.27 1382.05   347.4 1382.09
  349.38 1382.11  351.77 1382.14  353.03 1382.14  353.53 1382.14  353.68 1382.14
   353.8 1382.14  356.81 1382.14  425.11 1382.14  425.61 1382.14  427.58 1382.14
  429.04 1382.14  429.71 1382.14  433.01 1382.14  436.87 1382.14  437.87 1382.14
   439.9 1382.14  440.86 1382.14  442.03 1382.14  442.73 1382.14  444.89 1382.14
  445.71 1382.14  448.63 1382.14  452.63 1382.14  452.68 1382.14  454.18 1382.14
  461.26 1382.14  461.78 1382.14  465.42 1382.27  486.12 1382.32     500 1383.08

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         177.92  320.4             95.36     100  103.76              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 4900

INPUT
Description: Channel Station 56999.16
Station Elevation Data    num=      86
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1380.47    8.31 1380.48   18.12 1380.53   48.52  1380.7   52.32 1380.71
   77.64 1380.89   79.83  1380.9    81.3  1380.9   82.19 1380.91    98.6    1381
  107.91    1381  140.38    1381  145.37 1380.99  145.89 1380.99  164.07 1380.93
  172.94 1380.86  173.54 1380.72  173.91 1380.62  174.88 1380.38   176.4    1380
   178.6 1380.89  214.89 1371.81     250 1371.11  285.11 1371.81  320.97 1380.78
  336.97  1381.1  340.83 1382.06  341.78 1380.58  343.45    1381  345.05  1381.4
  347.46    1382  347.69 1382.06  348.01 1382.14  348.02 1382.14  355.01 1382.14
  358.67 1382.14   363.6 1382.14  363.94 1382.14  368.57 1382.14   388.1 1382.14
  391.75 1382.14  393.81 1382.14  394.85 1382.14  431.66 1382.62  433.07 1382.64
  435.19 1382.65  437.71 1382.68  439.67 1382.71  439.94 1382.72  445.71 1382.81
  447.36 1382.81  448.88 1382.84  449.83 1382.86  450.07 1382.86  450.33 1382.86
  451.74 1382.87  453.23 1382.89   453.4 1382.89  453.45 1382.89  455.21  1382.9
  455.36  1382.9  455.59  1382.9  455.92  1382.9  456.33 1382.91  456.82 1382.91
  457.39 1382.91  458.46 1382.92  460.03 1382.92  462.13 1382.93  462.42 1382.93
  464.09 1382.94  465.32 1382.94  467.21 1382.93  467.52 1382.93  467.96 1382.93
  468.78 1382.94  469.37 1382.94  470.32 1382.94  471.63 1382.93  473.27 1382.93
  474.37 1382.92  475.78 1382.92  476.46 1382.93  476.87 1382.93  492.14 1382.28
     500 1381.93

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          178.6  320.97            95.44     100  104.05              .1       .3

CROSS SECTION
```

RIVER: River
REACH: Ellsworth RS: 4800

INPUT
Description: Channel Station 57099.16
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380	12.31	1380.04	25.86	1380.07	34.25	1380.1	36.72	1380.11
47.97	1380.15	57.65	1380.17	69.68	1380.19	79.08	1380.21	86.04	1380.23
90.44	1380.23	95.46	1380.25	132.38	1380.33	140.92	1380.35	169.24	1380.46
170.88	1380.47	173.73	1380.48	174.08	1380.39	174.48	1380.29	175.62	1380
179.59	1380.5	214.9	1371.67	250	1370.97	285.1	1371.67	317.7	1379.82
333.7	1380.14	337.42	1381.07	339.82	1380	343.32	1380.87	343.83	1381
344.06	1381.06	346.4	1381.64	348.61	1381.82	351	1382	352.22	1382.09
352.81	1382.14	353.46	1382.14	354.11	1382.14	356.23	1382.09	360.08	1382.03
361.45	1382	361.48	1382	366.83	1381.9	367.85	1381.88	377.32	1381.72
377.5	1381.72	380.39	1381.68	385.67	1381.61	387.3	1381.58	390.64	1381.54
393.27	1381.5	414.17	1381.21	419.55	1381.14	421.81	1381.13	422.45	1381.13
431.67	1381.11	459.7	1381.09	460	1381.09	460.58	1381.09	462.31	1381.09
467.68	1381.37	472.59	1381.15	500	1381.23				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
179.59	317.7	90.21	100	108.18	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4700

INPUT
Description: Channel Station 57199.16
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379.42	9.78	1379.41	14.7	1379.42	18.07	1379.43	19.72	1379.44
22.89	1379.44	22.98	1379.44	23.16	1379.44	23.44	1379.44	24.15	1379.44
28.91	1379.45	30.09	1379.45	31.69	1379.46	32.75	1379.46	33.27	1379.46
39.81	1379.47	45.34	1379.48	48.93	1379.5	53.56	1379.5	57.1	1379.51
64.48	1379.53	71.43	1379.56	83.77	1379.6	92.68	1379.64	98.64	1379.66
117.27	1379.71	123.51	1379.73	160.35	1379.81	173.73	1379.87	174.42	1379.87
174.99	1379.87	175.23	1379.87	175.7	1379.88	177.72	1379.68	181.77	1379.81
184.5	1379.13	214.89	1371.53	250	1370.83	285.1	1371.53	317.5	1379.63
333.5	1379.95	334.5	1380.2	335.73	1379	336.02	1379	336.54	1379
338.38	1379.46	340.54	1380	341.12	1380.15	341.29	1380.19	345.32	1380.15
345.69	1380.15	346.1	1380.15	346.18	1380.15	353.95	1380.34	354.7	1380.34
362.31	1380.51	368.29	1380.6	368.51	1380.6	374.66	1380.68	375.17	1380.67
375.77	1380.67	376.46	1380.66	377.23	1380.66	378.48	1380.67	379.03	1380.67
395.6	1380.73	397.74	1380.74	398.36	1380.73	404.76	1380.69	418.15	1380.61
428.81	1380.57	429.94	1380.57	430.86	1380.56	439.69	1380.54	441.97	1380.53
443.11	1380.53	446.36	1380.52	452.24	1380.54	486.83	1380.62	500	1380.65

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
181.77	317.5	26	26	26	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4674

INPUT
Description: Channel Station 57235.16,
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
*******************************************************************************
      0 1379.21    3.49 1379.19    8.98 1379.19   15.78 1379.19    25.7 1379.19
  38.27 1379.19   66.99 1379.19   77.24 1379.19   77.38 1379.19   77.66 1379.19
  84.65 1379.19   84.96 1379.19   93.13 1379.19   99.34 1379.19  105.16 1379.21
 107.26 1379.22  127.27 1379.29  141.21 1379.34  156.55 1379.41   163.8 1379.44
 172.59 1379.48  174.27 1379.49  177.18 1379.51  177.45 1379.44  177.79 1379.36
 178.46 1379.19  178.68 1379.19  178.69 1379.19   179.9 1379.19  182.09 1379.72
  214.9 1371.52     250 1370.82  285.11 1371.52  317.92 1379.72  336.87 1379.19
 342.35 1379.19  342.46 1379.19  343.64 1379.19  346.97 1379.19  348.01 1379.43
 348.48 1379.55  348.97 1379.67  352.45 1379.72  353.09 1379.72  353.71 1379.73
 354.27 1379.73  356.24 1379.75  371.26 1379.89  372.47  1379.9  373.51 1379.91
 379.82 1379.95  388.24 1380.03   400.2 1380.12  409.75 1380.19  414.54 1380.21
 416.17 1380.21  417.04 1380.21  423.45 1380.23  428.91 1380.23  431.09 1380.23
 432.77 1380.23  434.89 1380.23  439.96 1380.24  443.45 1380.25     500 1380.38

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92                 10      10      10              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 4664

INPUT
Description: Channel Station 57235.16,
Station Elevation Data    num=      65
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1379.21    3.49 1379.19    8.98 1379.19   15.78 1379.19    25.7 1379.19
  38.27 1379.19   66.99 1379.19   77.24 1379.19   77.38 1379.19   77.66 1379.19
  84.65 1379.19   84.96 1379.19   93.13 1379.19   99.34 1379.19  105.16 1379.21
 107.26 1379.22  127.27 1379.29  141.21 1379.34  156.55 1379.41   163.8 1379.44
 172.59 1379.48  174.27 1379.49  177.18 1379.51  177.45 1379.44  177.79 1379.36
 178.46 1379.19  178.68 1379.19  178.69 1379.19   179.9 1379.19  182.09 1379.71
  214.9 1371.51     250  1370.8  285.11 1371.51  317.92 1379.71  336.87 1379.19
 342.35 1379.19  342.46 1379.19  343.64 1379.19  346.97 1379.19  348.01 1379.43
 348.48 1379.55  348.97 1379.67  352.45 1379.72  353.09 1379.72  353.71 1379.73
 354.27 1379.73  356.24 1379.75  371.26 1379.89  372.47  1379.9  373.51 1379.91
 379.82 1379.95  388.24 1380.03   400.2 1380.12  409.75 1380.19  414.54 1380.21
 416.17 1380.21  417.04 1380.21  423.45 1380.23  428.91 1380.23  431.09 1380.23
 432.77 1380.23  434.89 1380.23  439.96 1380.24  443.45 1380.25     500 1380.38

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92                 64      64      64              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 4600

INPUT
Description: Channel Station 57299.16
Station Elevation Data    num=      68
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1379.02    3.49     1379    8.98     1379   15.78     1379    25.7     1379
  38.27     1379   66.99     1379   77.24     1379   77.38     1379   77.66     1379
  84.65     1379   84.96     1379   93.13     1379   99.34     1379  105.16 1379.02
 107.26 1379.03  127.27  1379.1  141.21 1379.15  156.55 1379.22   163.8 1379.25
 172.59 1379.29  174.27  1379.3  177.18 1379.32  177.45 1379.25  177.79 1379.17
 178.46     1379  178.68     1379  178.69     1379  179.77 1379.31  180.49 1379.49
 182.49 1379.49   214.9 1371.39     250 1370.69  285.11 1371.39   317.5 1379.49
  333.5 1379.81  335.73 1379.26  336.87     1379  342.35     1379  342.46     1379
 343.64     1379  346.97     1379  348.01 1379.24  348.48 1379.36  348.97 1379.48
 352.45 1379.53  353.09 1379.53  353.71 1379.54  354.27 1379.54  356.24 1379.56
```

371.26	1379.7	372.47	1379.71	373.51	1379.72	379.82	1379.76	388.24	1379.84
400.2	1379.93	409.75	1380	414.54	1380.02	416.17	1380.02	417.04	1380.02
423.45	1380.04	428.91	1380.04	431.09	1380.04	432.77	1380.04	434.89	1380.04
439.96	1380.05	443.45	1380.06	500	1380.19				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	94.44	100	105.1	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4500

INPUT
Description: Channel Station 57399.16
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379	1.17	1379	4.22	1379	7.96	1379	12.6	1379
16.85	1379	22.46	1379	24.03	1379	24.85	1379	81.21	1379
82.63	1379	85.52	1379	86.89	1379	91.23	1379	92.69	1379
94.42	1379	100.28	1379	102.15	1379	104.07	1379	111.42	1379
113.2	1379	115.08	1379	123.92	1379	141.52	1379	141.99	1379
148.17	1379	154.85	1379.02	156.59	1379.02	161.4	1379.04	170.98	1379.07
176.51	1379.1	176.69	1379.06	176.85	1379.02	176.92	1379	177.96	1379
179.06	1379	179.52	1379	179.56	1379.12	180.49	1379.35	182.49	1379.35
214.9	1371.25	250	1370.55	285.1	1371.25	317.5	1379.35	333.5	1379.67
335.97	1379.06	344.66	1379	344.85	1379.05	345.05	1379.1	345.15	1379.12
345.25	1379.15	352.88	1379.15	356.18	1379.15	396.06	1379.45	397.22	1379.45
438.99	1379.67	440.03	1379.7	440.18	1379.71	479.62	1379.59	500	1379.63

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	95.83	100	103.83	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4400

INPUT
Description: Channel Station 57499.16
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.83	13.52	1378.85	15.02	1378.84	17.97	1378.84	23.91	1378.85
32.96	1378.86	39.59	1378.86	43.68	1378.86	45.55	1378.86	47.07	1378.86
52.03	1378.86	60.3	1378.85	93.1	1378.77	104.59	1378.76	115.02	1378.73
127.72	1378.72	130.02	1378.72	145.2	1378.71	147.47	1378.7	150.27	1378.7
153.75	1378.69	157.87	1378.69	177.62	1378.68	178.36	1378.68	180.49	1379.21
182.49	1379.21	214.89	1371.11	250	1370.41	285.1	1371.11	317.5	1379.21
333.5	1379.53	335.97	1378.92	340.12	1378.92	340.23	1378.92	340.41	1378.93
340.63	1378.93	340.94	1378.94	341.42	1378.96	342.64	1379	344.13	1379.05
344.77	1379.07	346.72	1379.14	353.73	1379.14	358.48	1379.14	359.26	1379.14
361.35	1379.14	369.89	1379.14	369.91	1379.14	371.14	1379.14	372.97	1379.14
381.55	1379.14	381.62	1379.14	383.44	1379.14	385.74	1379.14	386.29	1379.14
386.79	1379.14	388.69	1379.14	400.14	1379.14	407.35	1379.14	407.64	1379.14
407.73	1379.14	442.08	1379.31	444.24	1379.38	444.56	1379.4	500	1379.22

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	92.56	100	107.14	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4300

INPUT
Description: Channel Station 57599.16
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.49	9.73	1378.45	17.93	1378.45	32.84	1378.45	38.33	1378.44
39.89	1378.44	43.03	1378.44	47.78	1378.44	51.22	1378.44	53.34	1378.44
61.2	1378.43	61.97	1378.43	64.46	1378.42	68.59	1378.42	155.71	1378.18
159.63	1378.18	176.97	1378.19	180.49	1379.07	182.5	1379.07	214.9	1370.97
250	1370.27	285.11	1370.97	317.51	1379.07	333.5	1379.39	337.6	1378.37
338.35	1378.29	338.7	1378.38	400.76	1378.9	404.41	1378.93	409.79	1379
411.37	1379.01	450.61	1379.14	451.71	1379.14	463.64	1378.97	464.14	1379.04
467.57	1379.02	500	1378.91						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.5	317.51	95.8	100	103.64	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4200

INPUT
Description: Channel Station 57699.16
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.19	16.62	1378.16	60.41	1378	60.6	1378	60.78	1378
63.96	1378	68.23	1378	70.62	1378	78.96	1378	80.64	1378
122.89	1378	148.17	1378	166.86	1378.04	171.26	1378.04	176.95	1378.05
180.49	1378.93	182.49	1378.93	214.9	1370.83	250	1370.13	285.1	1370.83
317.5	1378.93	333.51	1379.25	338.26	1378.07	338.53	1378	338.55	1378.01
338.79	1378.07	343.26	1378.12	348.39	1378.18	400.24	1378.77	424.47	1379
429.78	1379.03	447.63	1379.14	447.75	1379.14	447.78	1379.14	450.42	1379.14
450.6	1379.14	451	1379.14	453.19	1379.14	453.35	1379.14	453.43	1379.14
453.48	1379.14	453.54	1379.14	453.91	1379.13	457.12	1379.1	457.15	1379.1
457.18	1379.09	500	1378.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	96.42	100	103.62	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 4100

INPUT
Description: Channel Station 57799.16
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.85	9.32	1377.83	11.94	1377.83	60.17	1377.8	76.76	1377.76
108.16	1377.7	132.78	1377.64	175.42	1377.52	180.49	1378.79	182.49	1378.79
214.89	1370.69	250	1369.99	285.1	1370.69	317.51	1378.79	333.5	1379.11
337.69	1378.07	339.56	1378	339.79	1378.06	339.88	1378.08	344.34	1378.09
351.71	1378.1	352.57	1378.1	353.56	1378.09	386.76	1378.11	387.68	1378.11
396.18	1378.14	405.22	1378.33	405.52	1378.33	405.97	1378.34	406.53	1378.36
407.21	1378.37	408.07	1378.4	409	1378.42	410	1378.44	425.8	1378.78

```
  426.64 1378.79  428.14 1378.83     432  1378.9  437.09    1379  438.41 1379.02
  441.45 1379.03  447.89 1379.08  452.56 1379.14  452.91 1379.14   453.1 1379.14
  458.49 1379.14  460.14 1379.04  460.21 1379.04  460.29 1379.04  461.01 1379.03
     500 1378.64

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
**************************************************
       0    .032  214.89    .028   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.49  317.51            95.47  .  100  103.98             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 4000

INPUT
Description: Channel Station 57899.16
Station Elevation Data     num=      40
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
*******************************************************************************************
       0 1377.44   23.38 1377.39   32.92  1377.4  149.14  1377.3  175.32 1377.36
  180.49 1378.65   182.5 1378.65   214.9 1370.55     250 1369.85  285.11 1370.55
  317.51 1378.65  333.51 1378.97  339.28 1377.53  339.69 1377.54   339.7 1377.54
  339.71 1377.54  339.72 1377.54  339.73 1377.54  339.75 1377.54  339.83 1377.54
  383.47  1377.8  413.92    1378  414.16    1378  414.21    1378  414.24    1378
  430.64  1378.1  436.23 1378.14  437.54 1378.14  438.33 1378.14  439.24 1378.14
  439.93 1378.14   440.5 1378.14  442.35 1378.14  447.23 1378.14  448.99 1378.14
  450.24 1378.14  458.73 1378.27  468.19 1378.58  469.66 1378.58     500 1378.51

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
**************************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         182.5  317.51            94.83     100  104.71             .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3900

INPUT
Description: Channel Station 57999.16
Station Elevation Data     num=      65
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
*******************************************************************************************
       0 1377.05   18.61    1377   21.25    1377   36.09    1377   59.28    1377
   71.99    1377   74.71    1377   75.24    1377   98.14 1377.04  103.85 1377.05
  117.01 1377.08  120.93 1377.09  146.77 1377.16  151.23 1377.17  174.52 1377.23
  175.39 1377.24  180.49 1378.51   182.5 1378.51   214.9 1370.41     250 1369.71
  285.11 1370.41  317.51 1378.51  333.51 1378.83  340.29 1377.14  340.51 1377.14
   347.5 1377.14  348.65 1377.14  348.76 1377.14  348.87 1377.14  349.09 1377.14
   349.2 1377.14   355.4 1377.14  371.86 1377.26  372.15 1377.26  372.97 1377.27
  373.95 1377.28  375.48 1377.29  376.74 1377.29   401.4 1377.47  406.22 1377.51
  408.76 1377.53  411.32 1377.55  413.86 1377.57  416.32 1377.59  436.72  1377.7
  438.48 1377.72  451.01 1377.83  454.84 1377.86  461.25 1377.89  463.28  1377.9
  468.79 1377.94  468.89 1377.94  470.59 1377.96  472.02 1377.96  474.04 1377.97
   474.6 1377.97  477.22 1377.98  479.17 1377.98  480.43 1377.98  481.53 1377.99
  481.62 1377.99  481.71 1377.99  482.23 1377.99  482.27 1377.99     500 1377.95

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
**************************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         182.5  317.51             95.3     100   104.2             .1       .3

CROSS SECTION
```

RIVER: River
REACH: Ellsworth RS: 3800

INPUT
Description: Channel Station 58099.16
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377	24.89	1377	32.75	1377	42.32	1377	53.22	1377
61.1	1377	72	1377	72.32	1377	72.69	1377	73.09	1377
73.54	1377	80.53	1377	80.88	1377	81.28	1377	81.74	1377
82.28	1377	82.92	1377	83.68	1377	86.61	1377	95.49	1377
101.29	1377	105.03	1377	115.15	1377	116.25	1377	116.61	1377
125.21	1377	125.37	1377	126.29	1377	126.48	1377	126.91	1377
132.29	1377.01	133.06	1377.01	134.88	1377.01	142.13	1377.03	149.63	1377.05
155.02	1377.06	159.03	1377.08	171.39	1377.11	172.57	1377.11	175.48	1377.12
180.49	1378.37	182.49	1378.37	214.89	1370.27	250	1369.57	285.1	1370.27
317.5	1378.37	333.5	1378.69	340.05	1377.06	347.08	1377.05	355.41	1377.05
365.69	1377.04	402.98	1377.07	408.94	1377.06	417.7	1377.14	424.21	1377.14
430.86	1377.14	457.42	1377.14	460.1	1377.14	460.38	1377.14	463.65	1377.1
475.33	1377	478.11	1376.97	499.46	1376.74	499.95	1376.77	500	1376.77

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.5	92.84	100	106.52	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3700

INPUT
Description: Channel Station 58199.16
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.95	46.01	1377	55.64	1377	62.08	1377	70.95	1377.73
73.94	1378	77.08	1378.94	77.29	1379	78.48	1379.35	80.69	1380
81.51	1380.23	84.15	1381	87.3	1381.87	87.74	1382	88.2	1382.12
91.21	1383	92.6	1383	94.02	1383	104.27	1383.54	105.64	1383.64
107.63	1383.79	110.49	1384	111.38	1384	111.84	1384	118.76	1384.12
128.05	1384.24	141.8	1384.6	143.7	1384.63	144.87	1384.61	145.41	1384.48
147.33	1384	147.47	1383.97	156.49	1384.73	175.56	1377	180.49	1378.23
182.49	1378.23	214.89	1370.13	250	1369.43	285.1	1370.13	317.51	1378.23
333.5	1378.55	339.72	1377	340.2	1377	341.29	1377.27	344.18	1378
346.65	1378.62	348.17	1379	349.08	1379.23	351.27	1379.77	359.44	1379.24
363.17	1379	377.5	1378.12	379.28	1378	380.39	1378	380.73	1378
380.93	1378	389.6	1377.64	401.41	1377	401.87	1377	402.78	1377
403.49	1377	404.22	1377	404.99	1377	407.06	1377	407.81	1377
417.66	1376.62	420.92	1376.58	422.16	1376.58	424.38	1376.55	441.91	1376.35
443.17	1376.33	451.11	1376.18	453.75	1376.14	455.11	1376.14	474.29	1376.14
483.73	1376.14	485.86	1376.14	487.87	1376.14	489.38	1376.14	491.13	1376.14
493.47	1376.14	493.49	1376.14	493.6	1376.14	500	1376.14		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.51	94.33	100	105.12	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3600

INPUT
Description: Channel Station 58299.16
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	1376.68	25.83	1376.77	39.85	1376.79	40.55	1376.79	47.71	1376.82
62.77	1376.87	69.83	1376.88	90.68	1376.98	95.81	1377	97.33	1377.64
98.05	1378	99.02	1378.48	100.15	1378.96	100.25	1379	102.31	1379.97
102.38	1380	103.58	1380.65	104.38	1381	106.09	1382	106.1	1382
108.17	1383	109.82	1383.79	110.11	1383.87	110.25	1384	110.46	1384
110.83	1384	116.14	1384	122.67	1384	129.17	1384.09	134.72	1384.04
135.44	1384.02	137.34	1384	138.92	1383.83	139.61	1383.83	141.88	1383.52
143.99	1383.57	146.33	1383.73	147.6	1383.69	148.75	1383.4	150.36	1383
150.49	1382.97	150.93	1382.86	152.89	1382.37	154.36	1382	166.8	1382.03
176.87	1377.19	180.49	1378.09	182.49	1378.09	214.89	1369.99	250	1369.29
285.1	1369.99	317.51	1378.09	333.51	1378.41	340.59	1376.64	341.63	1377
342.76	1377.28	342.84	1377.3	342.87	1377.3	355.43	1377	357.64	1376.95
363.98	1376.88	376.81	1376.7	392.91	1376.29	398.18	1376.18	400.84	1376.13
405.28	1376	406.39	1376	411.65	1376	440.7	1376	452.63	1376
460.64	1376	499.85	1375.45	500	1375.45				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.49	317.51	94	95.35	97.2	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3505.64

INPUT
Description: Channel Station 58393.52
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.37	4.43	1376.37	13.11	1376.41	20.11	1376.44	24.24	1376.46
52.75	1376.5	72.81	1376.53	87.01	1376.58	103.15	1376.65	114.23	1376.66
121.42	1376.66	165.68	1376.85	167.32	1376.86	172.89	1376.88	173.83	1376.65
174.38	1376.51	175.5	1376.23	176.43	1376	177.23	1376	178.47	1376
179.06	1376	182.09	1378.08	214.9	1369.88	250	1369.17	285.11	1369.88
317.92	1378.08	325.97	1376	326.49	1376	327.19	1376	338.22	1376
340.56	1376.59	342.17	1377	342.52	1377.09	343.01	1377.22	348.96	1377.1
353.24	1377	353.41	1377	359.52	1376.87	361.23	1376.83	363.36	1376.79
398.74	1376	399.48	1376	400.36	1376	400.88	1376	401.59	1376
401.85	1376	407.79	1376	409.61	1376	500	1376		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.013	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
182.09	317.92	31.99	31.99	31.99	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3473.65

INPUT
Description: Channel Station 58425.51, bend or earth channel section
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.33	4.43	1376.33	13.11	1376.37	20.11	1376.4	24.24	1376.42
52.75	1376.46	72.81	1376.49	87.01	1376.54	103.15	1376.61	114.23	1376.62
121.42	1376.62	165.68	1376.81	167.32	1376.82	172.89	1376.84	173.83	1376.61
174.38	1376.47	175.5	1376.19	176.43	1375.96	177.23	1375.96	178.47	1375.96
179.06	1375.96	182.09	1378.04	214.9	1369.84	250	1369.13	285.11	1369.84
317.92	1378.04	325.97	1375.96	326.49	1375.96	327.19	1375.96	338.22	1375.96
340.56	1376.55	342.17	1376.96	342.52	1377.05	343.01	1377.18	348.96	1377.06
353.24	1376.96	353.41	1376.96	359.52	1376.83	361.23	1376.79	363.36	1376.75
398.74	1375.96	399.48	1375.96	400.36	1375.96	400.88	1375.96	401.59	1375.96
401.85	1375.96	407.79	1375.96	409.61	1375.96	500	1375.96		

```
Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .032   214.9    .013  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92               .01     .01     .01              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3473.64

INPUT
Description: Channel Station 58425.52, begin 12' concrete apron
Station Elevation Data     num=       51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1376.33    4.43 1376.33   13.11 1376.37   20.11  1376.4   24.24 1376.42
   52.75 1376.46   72.81 1376.49   87.01 1376.54  103.15 1376.61  114.23 1376.62
  121.42 1376.62  165.68 1376.81  167.32 1376.82  172.89 1376.84  173.83 1376.61
  174.38 1376.47   175.5 1376.19  176.43 1375.96  177.23 1375.96  178.47 1375.96
  179.06 1375.96  182.09 1378.04     215 1379.53     215 1369.13     250 1369.13
     285 1369.13     285 1379.53  317.92 1378.04  325.97 1375.96  326.49 1375.96
  327.19 1375.96  338.22 1375.96  340.56 1376.55  342.17 1376.96  342.52 1377.05
  343.01 1377.18  348.96 1377.06  353.24 1376.96  353.41 1376.96  359.52 1376.83
  361.23 1376.79  363.36 1376.75  398.74 1375.96  399.48 1375.96  400.36 1375.96
  400.88 1375.96  401.59 1375.96  401.85 1375.96  407.79 1375.96  409.61 1375.96
     500 1375.96

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .032     215    .013     285    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            215     285                12      12      12              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3461.64

INPUT
Description: Channel Station 58437.52, end of 12' concrete apron
Station Elevation Data     num=       51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1376.33    4.43 1376.33   13.11 1376.37   20.11  1376.4   24.24 1376.42
   52.75 1376.46   72.81 1376.49   87.01 1376.54  103.15 1376.61  114.23 1376.62
  121.42 1376.62  165.68 1376.81  167.32 1376.82  172.89 1376.84  173.83 1376.61
  174.38 1376.47   175.5 1376.19  176.43 1375.96  177.23 1375.96  178.47 1375.96
  179.06 1375.96  182.09 1378.04     215 1379.53     215 1369.13     250 1369.13
     285 1369.13     285 1379.53  317.92 1378.04  325.97 1375.96  326.49 1375.96
  327.19 1375.96  338.22 1375.96  340.56 1376.55  342.17 1376.96  342.52 1377.05
  343.01 1377.18  348.96 1377.06  353.24 1376.96  353.41 1376.96  359.52 1376.83
  361.23 1376.79  363.36 1376.75  398.74 1375.96  399.48 1375.96  400.36 1375.96
  400.88 1375.96  401.59 1375.96  401.85 1375.96  407.79 1375.96  409.61 1375.96
     500 1375.96

Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************
       0    .032  182.09    .032     215    .013     285    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            215     285               .01     .01     .01              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3461.63

INPUT
```

Description: Channel Station 58437.53, front of drop stucture, ele increase 1'
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.33	4.43	1376.33	13.11	1376.37	20.11	1376.4	24.24	1376.42
52.75	1376.46	72.81	1376.49	87.01	1376.54	103.15	1376.61	114.23	1376.62
121.42	1376.62	165.68	1376.81	167.32	1376.82	172.89	1376.84	173.83	1376.61
174.38	1376.47	175.5	1376.19	176.43	1375.96	177.23	1375.96	178.47	1375.96
179.06	1375.96	182.09	1378.04	215	1379.53	215	1370.13	250	1370.13
285	1370.13	285	1379.53	317.92	1378.04	325.97	1375.96	326.49	1375.96
327.19	1375.96	338.22	1375.96	340.56	1376.55	342.17	1376.96	342.52	1377.05
343.01	1377.18	348.96	1377.06	353.24	1376.96	353.41	1376.96	359.52	1376.83
361.23	1376.79	363.36	1376.75	398.74	1375.96	399.48	1375.96	400.36	1375.96
400.88	1375.96	401.59	1375.96	401.85	1375.96	407.79	1375.96	409.61	1375.96
500	1375.96								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	215	.013	285	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215	285	1	1	1	.3	.5

CROSS SECTION

.

RIVER: River
REACH: Ellsworth RS: 3460.63

INPUT
Description: Channel Station 58438.53, top of drop stucture, ele increase 1'
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.33	4.43	1376.33	13.11	1376.37	20.11	1376.4	24.24	1376.42
52.75	1376.46	72.81	1376.49	87.01	1376.54	103.15	1376.61	114.23	1376.62
121.42	1376.62	165.68	1376.81	167.32	1376.82	172.89	1376.84	173.83	1376.61
174.38	1376.47	175.5	1376.19	176.43	1375.96	177.23	1375.96	178.47	1375.96
179.06	1375.96	182.09	1378.04	215	1379.53	215	1371.13	250	1371.13
285	1371.13	285	1379.53	317.92	1378.04	325.97	1375.96	326.49	1375.96
327.19	1375.96	338.22	1375.96	340.56	1376.55	342.17	1376.96	342.52	1377.05
343.01	1377.18	348.96	1377.06	353.24	1376.96	353.41	1376.96	359.52	1376.83
361.23	1376.79	363.36	1376.75	398.74	1375.96	399.48	1375.96	400.36	1375.96
400.88	1375.96	401.59	1375.96	401.85	1375.96	407.79	1375.96	409.61	1375.96
500	1375.96								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	215	.013	285	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
215	285	16	16	16	.3	.5

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3444.63

INPUT
Description: Channel Station 58454.53, End of drop strucute, dumped riprap behaind the walls
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.09	2.06	1375.09	16.08	1375.14	18.16	1375.16	20.94	1375.18
55.62	1375.42	63.61	1375.47	88.37	1375.67	101.38	1375.74	119.94	1375.86
127.46	1375.92	151.04	1376.07	152.05	1376.08	153.67	1376.09	170.29	1376.15
172.9	1376.17	174.73	1376.19	174.96	1376.13	175.13	1376.09	177.8	1375.82
182.09	1372.04	215	1371.52	215	1363.13	250	1363.13	285	1363.13
285	1371.52	317.92	1372.04	326.43	1375.09	346.18	1375.09	347.13	1375.09
347.72	1375.09	349.31	1375.49	351.73	1376.09	352.38	1376.25	353.12	1376.44
354.7	1376.83	382.13	1376.36	398.27	1376.09	398.42	1376.09	398.54	1376.09
399.9	1376.09	400.61	1376.09	402.01	1376.09	403.06	1376.09	432.92	1376.09
434.87	1376.09	438.19	1376.09	441.3	1376.09	443.94	1376.09	500	1376.09

```
Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0    .032  182.09     .04     215    .013     285     .04  326.43    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92              .1      .1      .1              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3444.62

INPUT
Description: Channel Station 58454.54,  dumped riprap on bottom
Station Elevation Data     num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1375.09    2.06 1375.09   16.08 1375.14   18.16 1375.16   20.94 1375.18
   55.62 1375.42   63.61 1375.47   88.37 1375.67  101.38 1375.74  119.94 1375.86
  127.46 1375.92  151.04 1376.07  152.05 1376.08  153.67 1376.09  170.29 1376.15
   172.9 1376.17  174.73 1376.19  174.96 1376.13  175.13 1376.09   177.8 1375.82
  182.09 1372.04     215 1371.52     215 1363.13     250 1363.13     285 1363.13
     285 1371.52  317.92 1372.04  326.43 1375.09  346.18 1375.09  347.13 1375.09
  347.72 1375.09  349.31 1375.49  351.73 1376.09  352.38 1376.25  353.12 1376.44
   354.7 1376.83  382.13 1376.36  398.27 1376.09  398.42 1376.09  398.54 1376.09
   399.9 1376.09  400.61 1376.09  402.01 1376.09  403.06 1376.09  432.92 1376.09
  434.87 1376.09  438.19 1376.09   441.3 1376.09  443.94 1376.09     500 1376.09

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************
       0    .032  182.09     .04  326.43    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92             11.71   11.71   11.71              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3432.91

INPUT
Description: Channel Station 58466.24,  end of vertical walls, dumped riprap on
             bottom
Station Elevation Data     num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1375.09    2.06 1375.09   16.08 1375.14   18.16 1375.16   20.94 1375.18
   55.62 1375.42   63.61 1375.47   88.37 1375.67  101.38 1375.74  119.94 1375.86
  127.46 1375.92  151.04 1376.07  152.05 1376.08  153.67 1376.09  170.29 1376.15
   172.9 1376.17  174.73 1376.19  174.96 1376.13  175.13 1376.09   177.8 1375.82
  182.09 1372.04     215 1371.52     215 1363.13     250 1363.13     285 1363.13
     285 1371.52  317.92 1372.04  326.43 1375.09  346.18 1375.09  347.13 1375.09
  347.72 1375.09  349.31 1375.49  351.73 1376.09  352.38 1376.25  353.12 1376.44
   354.7 1376.83  382.13 1376.36  398.27 1376.09  398.42 1376.09  398.54 1376.09
   399.9 1376.09  400.61 1376.09  402.01 1376.09  403.06 1376.09  432.92 1376.09
  434.87 1376.09  438.19 1376.09   441.3 1376.09  443.94 1376.09     500 1376.09

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************
       0    .032  182.09     .04  317.92    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92              7.83    7.83    7.83              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 3425.08

INPUT
```

Description: Channel Station 58474.07, end of dumped riprap on bottom
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.09	2.06	1375.09	16.08	1375.14	18.16	1375.16	20.94	1375.18
55.62	1375.42	63.61	1375.47	88.37	1375.67	101.38	1375.74	119.94	1375.86
127.46	1375.92	151.04	1376.07	152.05	1376.08	153.67	1376.09	170.29	1376.15
172.9	1376.17	174.73	1376.19	174.96	1376.13	175.13	1376.09	177.8	1375.82
182.09	1372.04	215	1363.13	250	1363.13	285	1363.13	317.92	1372.04
326.43	1375.09	346.18	1375.09	347.13	1375.09	347.72	1375.09	349.31	1375.49
351.73	1376.09	352.38	1376.25	353.12	1376.44	354.7	1376.83	382.13	1376.36
398.27	1376.09	398.42	1376.09	398.54	1376.09	399.9	1376.09	400.61	1376.09
402.01	1376.09	403.06	1376.09	432.92	1376.09	434.87	1376.09	438.19	1376.09
441.3	1376.09	443.94	1376.09	500	1376.09				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	177.8	.04	326.43	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
177.8	326.43	25.08	25.08	25.08	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3400

INPUT
Description: Channel Station 58499.16, Type "B" Bank Protection on Left Bank.
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375	2.06	1375	16.08	1375.05	18.16	1375.07	20.94	1375.09
55.62	1375.33	63.61	1375.38	88.37	1375.58	101.38	1375.65	119.94	1375.77
127.46	1375.83	151.04	1375.98	152.05	1375.99	153.67	1376	165.68	1376.02
214.9	1363.72	250	1363.02	285.11	1363.72	333.63	1375.85	349.63	1376.17
352.2	1376.81	352.38	1376.16	353.12	1376.35	354.7	1376.74	382.13	1376.27
398.27	1376	398.42	1376	398.54	1376	399.9	1376	400.61	1376
402.01	1376	403.06	1376	432.92	1376	434.87	1376	438.19	1376
441.3	1376	443.94	1376	500	1376				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.032	165.68	.04	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
165.68	333.63	127.83	100	65.35	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3300

INPUT
Description: Channel Station 58599.16 Type "B" Bank Protection on Left Bank.
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1373.46	2.16	1373.47	6.4	1373.37	6.63	1373.36	6.92	1373.37
8.1	1373.37	29.41	1373.24	29.5	1373.24	29.57	1373.24	29.59	1373.24
29.64	1373.23	29.7	1373.23	29.9	1373.21	32.28	1373	32.38	1372.99
33.18	1372.92	34.58	1372.8	37.48	1372.86	42.22	1372.93	43.52	1373
44.47	1373.04	45.34	1373.07	45.73	1373.08	46.09	1373.1	47.94	1373.22
52.11	1373.26	55.2	1373.37	72.66	1373.62	85.62	1373.91	86.87	1373.92
90.76	1373.92	93.19	1373.94	104.08	1374	104.75	1374	104.76	1374
110.69	1374.04	114.09	1374.06	115.23	1374.06	117.09	1374.08	117.31	1374.08
117.41	1374.08	117.47	1374.08	119.14	1374.09	122.4	1374.1	122.43	1374.1
124.23	1374.11	125.48	1374.1	134.66	1374.09	140	1374.1	147.57	1374.1
157.04	1374.05	160.78	1374.05	171.05	1374.24	172.62	1374.05	214.9	1363.49
250	1362.78	285.11	1363.49	332.76	1375.4	348.76	1375.72	350.93	1376.26
356.76	1376.16	361.17	1376.12	373.59	1376.05	375.13	1376.03	380.65	1376
384.99	1376	390.71	1376	392.3	1376	397.65	1376	401.91	1376
405.23	1376	407.68	1376	410.07	1376	410.89	1376	431.81	1376

441.31	1376	448.72	1376	455.74	1376	462.59	1376	464.35	1376
481.01	1376	483.71	1376	487.95	1376	491.53	1376	494.33	1376
500	1376								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.032	171.05	.04	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.05	332.76	113.64	100	82.22	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3200

INPUT
Description: Channel Station 58699.16 Type "B" Bank Protection on Left Bank.
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1364.33	.2	1364.33	1.53	1364.33	2.68	1364.33	4.17	1364.32
5.31	1364.32	6.19	1364.32	6.89	1364.32	11.66	1364.32	12.04	1364.31
12.22	1364.31	17.97	1364.2	21.05	1364.2	26.72	1364.16	27.89	1364.15
28.02	1364.14	28.13	1364.14	28.22	1364.14	29.4	1364.13	32.66	1364.01
32.88	1364	33.82	1363.97	34.51	1363.94	34.78	1363.93	34.93	1363.93
35.19	1363.92	35.51	1363.91	39.4	1363.82	43.51	1363.77	46.03	1363.75
52.42	1363.68	56.64	1363.64	58.67	1363.62	63.42	1363.45	64.43	1363.43
69.36	1363.57	72.13	1363.72	75.28	1363.77	78.31	1363.73	81.96	1363.68
83.44	1363.73	83.53	1363.74	83.69	1363.75	83.95	1363.77	84.58	1363.81
84.7	1363.82	86	1363.91	87.48	1364	88.26	1364.05	89.52	1364.13
90.34	1364.17	90.96	1364.2	91.48	1364.22	94.23	1364.31	96.27	1364.3
100.35	1364.3	105.22	1364.34	107.68	1364.35	108.36	1364.36	112.06	1364.43
116.59	1364.47	122.64	1364.06	160.6	1373.55	173.7	1373.55	214.9	1363.25
250	1362.55	285.11	1363.25	330.12	1374.51	346.12	1374.83	351.25	1376.11
353.13	1376.38	364	1376.46	371.8	1376.42	375.08	1376.44	385.5	1376.39
391.16	1376.36	394.63	1376.34	408.83	1376.27	410.62	1376.27	411.59	1376.28
413.48	1376.31	416.83	1376.35	425.66	1376.29	430.89	1376.25	434.85	1376.25
435.08	1376.25	435.87	1376.26	437.18	1376.29	438.89	1376.31	441.69	1376.31
445.95	1376.28	452.51	1376.2	456.91	1376.17	460.97	1376.12	463.19	1376.09
463.56	1376.11	464.23	1376.14	465.17	1376.17	465.78	1376.2	466.14	1376.21
466.25	1376.22	466.39	1376.22	466.58	1376.23	466.79	1376.24	467.21	1376.25
467.81	1376.28	474.61	1376.22	476.21	1376.24	480.67	1376.34	485.95	1376.47
493.77	1376.42	500	1376.52						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.032	173.7	.04	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.7	330.12	120.07	100	75.53	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	181.6	1375	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3100

INPUT
Description: Channel Station 58799.16, Type "B" bank protection across entire channel.
Station Elevation Data num= 124

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.54	6.68	1376.53	11.28	1376.57	22.18	1376.61	31.18	1376.66
37.78	1376.74	46.13	1376.39	48.25	1376.4	48.37	1376.41	50.34	1376.33
52.84	1376.37	56.98	1376.77	58.88	1376.89	58.89	1376.89	58.93	1376.89
58.96	1376.89	59.87	1376.8	60.14	1376.77	60.61	1376.72	63.04	1376.48
64.23	1376.35	65.95	1376.18	67.74	1376	69.81	1375.79	71.91	1375.58
72.81	1375.49	74.4	1375.31	77.86	1375.22	81.26	1375.14	86.71	1375.04
87.94	1375	89.57	1374.95	91.18	1374.9	91.84	1374.87	93.82	1374.81

95.02	1374.78	104.22	1374.2	105.66	1374.18	106.03	1374.16	106.45	1374.13
106.76	1374.11	107.14	1374.08	107.56	1374.06	108.03	1374.02	108.21	1374.02
108.44	1374.01	108.53	1374	108.56	1374	108.71	1373.99	108.77	1374
108.79	1373.99	109.12	1373.89	109.65	1373.74	112.2	1373	113.16	1372.7
114.99	1372.18	115.6	1372	117.16	1371.52	118.69	1371.07	118.86	1371.01
118.9	1371	119.59	1370.62	120.6	1370	121.87	1369.18	122.16	1369
122.96	1368.48	122.98	1368.47	123.42	1368.27	123.66	1368.14	123.76	1368.1
124.01	1368	124.18	1367.93	124.75	1367.71	125.22	1367.65	125.41	1367.63
126	1367.56	126.23	1367.53	127.24	1367.4	127.49	1367.37	127.54	1367.36
127.6	1367.36	127.67	1367.35	127.8	1367.33	127.87	1367.33	128.22	1367.3
128.44	1367.28	129.09	1367.24	129.35	1367.22	130.38	1367.17	130.61	1367.15
131.22	1367	131.71	1366.92	133.86	1366.49	134.31	1366.46	134.8	1366.58
136.49	1367	138.33	1367.75	160.6	1373.32	173.7	1373.32	214.9	1363.02
250	1362.32	285.11	1363.02	334.51	1375.37	350.51	1375.69	355.73	1376.99
364.16	1378	366.81	1378	368.93	1377.59	372.96	1377	373.29	1377
373.97	1377	375.97	1377.11	393.5	1378	397.07	1378	402.6	1378
433.6	1378	434.4	1378	434.81	1378	450.49	1378	467.02	1378
481.71	1378	484.28	1377.93	486.27	1377.88	500	1377.54		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	173.7	.04	334.51	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.7	334.51	134.22	100	55.34	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	170.74	1374.94	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 3000

INPUT
Description: Channel Station 58899.16
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.61	28.99	1375.63	35.95	1375.22	39.34	1375.32	40.38	1375.36
40.6	1375.37	40.85	1375.38	41.11	1375.39	41.32	1375.4	41.59	1375.41
41.95	1375.43	42.45	1375.44	43.21	1375.47	44.47	1375.52	47	1375.62
54.7	1375.92	56.89	1376	58.75	1376.07	60.42	1376.14	66.41	1376.37
68.26	1376.44	69.32	1376.48	71.04	1376.54	74.65	1376.51	84.39	1376.46
87.38	1376.48	90.52	1376.39	93.18	1376.38	103.89	1376.06	104.68	1376.05
105.46	1376	110.5	1375.7	113.87	1375.51	116.2	1375.25	118.16	1375.05
118.6	1375	119.01	1374.96	119.03	1374.95	119.06	1374.96	119.65	1375
120.79	1375.04	124.48	1375.34	124.6	1375.33	124.67	1375.32	124.8	1375.31
125.01	1375.3	125.46	1375.27	127.43	1375.13	128.88	1375.02	129.1	1375
130.77	1374.88	132.36	1374.76	133.6	1374.67	134.59	1374.6	139.49	1374.24
141.92	1374.52	142.84	1374.5	143.25	1374.44	144.02	1374.32	144.74	1374.23
145.43	1374.05	145.6	1374	145.62	1374	146.81	1373.68	149.23	1373.06
149.45	1373	152.65	1372.16	153.27	1372	154.41	1371.68	154.71	1371.59
160.6	1373.06	173.7	1373.06	214.89	1362.76	250	1362.06	285.11	1362.76
335.4	1375.33	335.92	1375.46	351.92	1375.78	365.14	1379.09	370.27	1379
371.34	1378.18	371.57	1378	372.94	1378	384.58	1378	390.51	1378
417.32	1378	437.33	1378	439.15	1378	439.82	1378	448.67	1378
451.51	1378	461.98	1377.76	473.85	1378	479.66	1378	489.29	1378
495.55	1377.73	498.61	1377.6	498.63	1377.6	499.39	1377.6	500	1377.6

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.7	335.92	100.02	100	100.15	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2900

INPUT

Description: Channel Station 58999.16
Station Elevation Data num= 132

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.05	29.35	1375.19	30.43	1375.22	30.52	1375.22	30.64	1375.22
30.75	1375.22	30.87	1375.23	30.99	1375.23	31.11	1375.23	31.24	1375.23
31.36	1375.23	31.49	1375.24	31.61	1375.24	31.74	1375.24	31.87	1375.24
32	1375.24	32.14	1375.24	44.49	1375.25	47.26	1375.09	48.68	1375.13
51.01	1375.08	57.86	1375.11	64.8	1375.44	67.72	1375.64	68.92	1375.72
70.4	1375.83	71.04	1375.87	71.84	1375.93	72.9	1376	72.93	1376
73.05	1376.01	85.74	1376.88	94.7	1376.43	101.19	1376.09	102.04	1376
102.08	1376	102.62	1375.95	102.73	1375.94	102.95	1375.92	112.56	1375.06
112.78	1375.04	113.25	1375.05	114.55	1375.03	116.56	1375.02	119.45	1375
119.81	1375	119.88	1375	119.89	1375	119.9	1375	123.68	1375
123.77	1375	123.87	1375	124.95	1374.97	129.92	1374.94	133.13	1374.92
134.01	1374.92	134.83	1374.89	143.67	1374.49	144.88	1374.44	147.99	1374.3
148.57	1374.09	148.81	1374	150.54	1373.36	151.5	1373	154.04	1372.06
154.2	1372	154.3	1371.96	156.91	1371	157.53	1370.77	158.19	1370.53
159.13	1370.5	161.27	1370.22	171.7	1372.83	173.7	1372.83	214.9	1362.53
250	1361.83	285.11	1362.53	330.94	1373.99	346.94	1374.31	367.32	1379.4
367.7	1379.38	368.57	1379.31	368.82	1379.32	369.7	1379.26	380.13	1379.44
380.83	1379.46	381.73	1379.49	387	1379.54	388.63	1379.52	389.72	1379.54
390.53	1379.53	390.69	1379.53	395.7	1379.72	395.87	1379.72	398.55	1380
401.95	1380	402.54	1380	402.83	1380	403.39	1380	413.43	1380.32
414.5	1380.32	416.76	1380.32	418.46	1380.47	421.16	1380.46	421.69	1380.56
422.08	1380.63	422.1	1380.64	422.14	1380.64	422.19	1380.65	424.64	1380.64
424.72	1380.64	424.87	1380.64	425.1	1380.63	425.38	1380.62	425.65	1380.62
426.16	1380.62	427.63	1380.62	429.64	1380.61	431.01	1380.6	432.39	1380.6
433.73	1380.28	437.29	1380.01	445.08	1379.08	452.36	1378.2	459.2	1377.38
465.63	1376.61	467.44	1376.65	481.46	1377.77	483.38	1377.7	490.96	1377.61
493.63	1377.56	500	1377.63						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.7	330.94	100.01	100	100.06	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	181.48	1374	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2800

INPUT
Description: Channel Station 59099.16
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1374.57	46.7	1374.8	57.55	1374.93	57.97	1374.95	58.56	1374.96
62.19	1375	70.2	1375.23	75.09	1375.38	83.12	1375.84	84.46	1375.91
85.91	1376	86.94	1376.06	94.66	1376.52	96.91	1376.31	99.27	1376.09
100.19	1376	100.74	1375.95	102.88	1375.74	104.19	1375.62	107.24	1375.33
116.87	1375.19	123.45	1375.13	140.47	1375.11	141	1375.11	141.15	1375.1
141.19	1375.1	141.28	1375.1	141.44	1375.09	141.62	1375.09	142.1	1375.07
144.25	1375	144.47	1374.99	151.61	1374.29	153.99	1374	154.15	1374
154.23	1374	154.27	1374	159.62	1373.27	159.63	1373.27	159.7	1373.26
159.8	1373.25	159.93	1373.24	161.61	1373	161.63	1373	161.65	1373
161.66	1373	161.67	1373	161.69	1373	162	1372.95	162.77	1372.83
163.61	1372.69	170.91	1372.48	173.46	1372.4	173.66	1372.45	174.39	1372.63
181.13	1370.74	214.89	1362.3	250	1361.6	285.11	1362.3	329.06	1373.29
350.74	1373.72	372.06	1379.05	372.11	1378.9	372.2	1378.9	372.36	1378.94
372.5	1378.93	372.52	1378.93	372.63	1378.93	372.7	1378.93	372.73	1378.93
372.79	1378.93	372.85	1378.93	373.14	1378.97	373.18	1379	373.51	1379.23
374.36	1379.79	374.54	1379.8	374.67	1379.81	374.98	1379.85	380.67	1380
389.68	1380.29	398.07	1380.55	400.93	1380.33	402.6	1380.13	404.16	1379.95
405.63	1379.77	407	1379.61	407.39	1379.62	410.39	1379.86	417.53	1379.61
445.58	1379.26	455.44	1379.08	480.06	1379.35	480.08	1379.35	480.08	1378.92
480.09	1378.48	484.82	1378.23	500	1377.31				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
*************************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        174.39  329.06           100.01     100  100.06              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2700

INPUT
Description: Channel Station 59199.16
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1374.09   23.12  1374.2    65.9 1374.74   67.56 1374.82   69.86 1374.82
   72.22 1374.85   74.79 1374.92   75.51 1374.93   76.31 1374.93   78.48 1374.93
   78.64 1374.94   78.83 1374.95   79.54    1375   85.57 1375.39   95.23    1376
   97.53 1376.15   98.85 1376.23   99.35 1376.17   100.3 1376.05  100.75    1376
  106.39 1375.32  107.17 1375.22  109.03    1375     110 1374.88   112.4 1374.59
  116.24 1374.46  119.01 1374.38  120.53 1374.33  121.11 1374.31  121.89 1374.27
  122.77 1374.24  124.21 1374.19  126.91 1374.09  129.09 1374.01  129.25    1374
  129.61 1373.99  130.01 1373.97  130.02 1373.97  130.21 1373.96  135.52 1373.51
  136.88 1373.39   143.7    1373  143.74    1373  143.78    1373  143.83    1373
   144.6 1372.95  146.75  1372.8  147.67 1372.75  148.13 1372.72  149.62 1372.66
  152.29 1372.58  152.96 1372.62  163.36 1372.96  164.46    1373  164.58    1373
  165.28 1373.03  169.96 1373.18  170.46 1373.18   214.9 1362.07     250 1361.37
  285.11 1362.07  299.01 1362.97   338.5 1372.84   354.5 1373.16  386.23 1381.09
  386.64 1380.99  386.74 1380.99  387.18 1380.99  387.73 1380.99   388.3 1380.99
  388.86 1380.99  389.38 1380.98  389.69 1380.98  389.83 1380.98  390.34 1380.98
  391.16 1380.98  391.27 1380.98  393.17 1380.97  393.35 1380.97   394.3 1380.97
  396.04 1380.96  396.57 1380.97   396.9 1380.95   400.2  1380.9  417.26 1380.59
  423.97 1380.67  423.97 1380.55  423.98 1380.43  431.36 1380.03  455.79 1378.55
  456.49  1378.5  463.08 1378.01  463.09 1378.35  463.09 1378.68   463.1 1378.68
  471.48 1378.51  476.39 1378.21  487.34 1378.27  497.41 1377.73     500 1377.72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .032   214.9    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.46   338.5                 46      46      46              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2654.00*

INPUT
Description: Begin Flow Contraction at 2:1
Station Elevation Data    num=     101
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   86.36 1373.25   97.92  1373.3  119.31 1373.57  120.14 1373.61  121.29 1373.61
  122.47 1373.63  123.76 1373.67  124.12 1373.67  124.51 1373.67   125.6 1373.67
  125.68 1373.68  125.78 1373.68  126.13 1373.71  129.15  1373.9  133.98 1374.21
  135.12 1374.28  135.79 1374.32  136.04 1374.29  136.51 1374.23  136.74 1374.21
  139.55 1373.86  139.95 1373.81  140.88 1373.71  141.36 1373.65  142.56  1373.5
  144.48 1373.44  145.87  1373.4  146.62 1373.37  146.92 1373.36   147.3 1373.34
  147.74 1373.32  148.46  1373.3  149.82 1373.25   150.9 1373.21  150.99 1373.21
  151.17  1373.2  151.36 1373.19  151.46 1373.19  154.12 1372.96   154.8  1372.9
  158.21 1372.71  158.23 1372.71  158.25 1372.71  158.27 1372.71  158.66 1372.68
  159.74  1372.6   160.2 1372.58  160.43 1372.56  161.17 1372.54  162.51 1372.49
  162.84 1372.52  168.04 1372.69  168.59 1372.71  168.65 1372.71     169 1372.72
  171.34  1372.8  171.59  1372.8  214.38 1362.09   215.4 1361.95     250 1361.27
   282.1 1361.91  288.73  1362.2  294.81  1363.1  330.92 1372.13  341.35 1372.35
  362.05 1376.44  362.32 1376.39  362.38 1376.39  362.67 1376.39  363.03 1376.39
   363.4  1376.4  363.76  1376.4   364.1 1376.39   364.3  1376.4   364.4  1376.4
  364.73  1376.4  365.26  1376.4  365.33  1376.4  365.94  1376.4  366.57 1376.44
  366.69 1376.44  367.31 1376.48  368.45 1376.54  368.79 1376.57  369.01 1376.57
  371.16 1376.67  382.28 1377.16  386.66 1377.46  386.66  1377.4  386.67 1377.34
  391.48 1377.42  407.41 1377.61  407.87 1377.61  412.17 1377.62  412.17 1377.79
  412.17 1377.95  417.65 1378.19  420.85 1378.22  427.99 1378.67  434.56 1378.78
```

```
  436.24 1378.88

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
   86.36    .032  214.38    .028   282.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        171.59  330.92                46      46      46              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth           RS: 2608.01

INPUT
Description: Begin Channel Bottom Transition & 10' Riprap Apron
Station Elevation Data     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  172.72 1372.41  214.89 1361.86     250 1361.16   285.1 1361.86  323.34 1371.42
  339.68 1371.83  372.49 1380.03

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  172.72    .032  214.89     .04   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        172.72  323.34                10      10      10              .3       .5
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
  172.72     214    1372       F
     286  372.49    1372       F

CROSS SECTION


RIVER: River
REACH: Ellsworth           RS: 2598.02

INPUT
Description: Upstream End of Wing Wall (Approx Channel Station 59300)
Station Elevation Data     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  171.98 1372.56  214.88 1361.84     250 1361.14  285.11 1361.85  328.11 1372.56
  344.11 1372.92  372.48 1380.01

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  171.98    .032  214.88    .015  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        171.98  328.11                17      17      17              .3       .5
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
  171.98     219    1372       F
     281  372.48    1372       F

CROSS SECTION


RIVER: River
REACH: Ellsworth           RS: 2581.04

INPUT
Description: Upstream Face of C12
Station Elevation Data     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************
   227.7    1372   227.7  1361.1   272.3  1361.1   272.3    1372

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
**********************************************
   227.7          227.7    .015   272.3

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          227.7  272.3               24      24      24            .3        .5

CULVERT


RIVER: River
REACH: Ellsworth          RS: 2569

INPUT
Description:
Distance from Upstream XS =       4
Deck/Roadway Width        =      16
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0    1372             500    1372

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
   227.7    1372   227.7  1361.1   272.3  1361.1   272.3    1372

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   227.7          227.7    .015   272.3

Bank Sta: Left   Right    Coeff Contr.   Expan.
          227.7  272.3            .3        .5

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************
       0  1371.2             500  1371.2

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
   227.7 1371.15   227.7 1361.08   272.3 1361.08   272.3 1371.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
   227.7          227.7    .015   272.3

Bank Sta: Left   Right    Coeff Contr.   Expan.
          227.7  272.3            .3        .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
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 #12        Box        6      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 0      24     .015     .015         0                 .4                 1
Number of Barrels =  4
Upstream   Elevation =  1361.1
Centerline Stations
```

```
    Sta.    Sta.    Sta.    Sta.
  233.62  244.54  255.46  266.38
Downstream Elevation =  1361
Centerline Stations
    Sta.    Sta.    Sta.    Sta.
  233.62  244.54  255.46  266.38

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2557.04

INPUT
Description: Downstream Face of C12
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
   227.7 1371.15   227.7 1361.08   272.3 1361.08   272.3 1371.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
   227.7           227.7    .015   272.3

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          227.7   272.3             15.03   15.03   15.03              .3       .5

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2542.01

INPUT
Description: Downstream End of Wing  Wall
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
  177.24 1371.15  214.89 1361.73     250 1361.03   285.1 1361.73  308.46 1367.57
  324.46 1367.89  366.25 1378.34

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  177.24    .032  214.89     .04   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        177.24  308.46               10      10      10              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  177.24     220    1371       F
     280  366.25    1371       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 2532.01

INPUT
Description: End Channel Bottom Transition, End Riprap
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
  176.97  1371.2  214.89 1361.72     250 1361.01   285.1 1361.72  318.71 1370.12
  334.71 1370.44  364.31 1377.84

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
  176.97    .032  214.89    .028   285.1    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        176.97  318.71               19      19      19              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
```

176.97	215	1371	F
285	364.31	1371	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2513.15*

INPUT
Description: Fully Expanded Section at 2:1
Station Elevation Data num= 120

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
151.69	1371.46	158.83	1371.55	160.82	1371.58	162.26	1371.57	163.23	1371.57
163.6	1371.57	163.99	1371.59	164.17	1371.6	164.27	1371.6	165.5	1371.65
166.24	1371.68	166.7	1371.65	167.6	1371.6	167.89	1371.58	168.41	1371.56
169.28	1371.52	169.65	1371.51	170.02	1371.46	170.1	1371.46	170.33	1371.43
170.45	1371.42	171.44	1371.32	171.46	1371.32	171.62	1371.32	171.7	1371.31
171.86	1371.31	171.88	1371.31	172.6	1371.3	172.98	1371.29	173.1	1371.29
173.14	1371.29	173.18	1371.29	174.83	1371.25	175.39	1371.23	175.47	1371.23
175.51	1371.22	175.88	1371.21	175.92	1371.2	175.95	1371.2	175.97	1371.2
176.09	1371.2	176.11	1371.2	176.12	1371.2	176.14	1371.19	176.15	1371.19
176.16	1371.19	176.23	1371.19	176.25	1371.19	176.27	1371.19	176.29	1371.19
176.3	1371.19	176.4	1371.18	176.43	1371.19	176.63	1371.24	176.71	1371.26
177.53	1371.01	214.77	1361.7	215.62	1361.66	250	1360.96	283.83	1361.65
295.27	1364.21	316.23	1369.45	320.94	1369.63	325.36	1370.15	330.8	1370.26
332.17	1370.42	332.59	1370.44	334.93	1370.51	335.78	1370.53	336.8	1370.61
337.01	1370.63	337.04	1370.63	337.05	1370.63	337.91	1370.69	338.07	1370.7
338.25	1370.71	338.43	1370.72	338.67	1370.74	338.79	1370.74	339.24	1370.77
339.31	1370.77	339.84	1370.8	339.9	1370.81	340.06	1370.84	340.13	1370.85
340.85	1370.99	341.16	1371.05	341.49	1371.11	342.08	1371.23	342.18	1371.25
342.8	1371.36	342.85	1371.37	342.89	1371.38	342.95	1371.39	342.96	1371.4
343.37	1371.46	343.66	1371.51	344.62	1371.65	345.06	1371.72	345.69	1371.81
346.15	1371.89	346.47	1371.93	346.73	1371.98	346.96	1372.01	347.66	1372.12
348	1372.17	348.32	1372.22	348.62	1372.27	349.14	1372.35	349.82	1372.45
350.14	1372.5	350.19	1372.51	351.8	1372.74	352.47	1372.84	360.27	1373.7
361.53	1373.89	364.6	1374.29	371.21	1375.15	371.64	1375.22	383.69	1376.99

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
151.69	.032	214.77	.028	283.83	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
176.71	316.23	113.16	113.16	113.16	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2400

INPUT
Description: Channel Station 59499.16
Station Elevation Data num= 126

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1373.01	49.96	1373.64	63.9	1373.83	74.03	1373.81	80.82	1373.79
83.39	1373.79	86.12	1373.92	87.36	1373.97	88.08	1374	96.7	1374.34
101.86	1374.54	105.09	1374.35	111.41	1374	113.39	1373.89	117.05	1373.69
123.15	1373.45	125.74	1373.34	128.33	1373.05	128.85	1373	130.46	1372.82
131.35	1372.73	138.24	1372.03	138.39	1372.01	139.55	1372.01	140.1	1372
141.22	1371.98	141.34	1371.98	146.39	1371.89	149.05	1371.85	149.87	1371.84
150.18	1371.84	150.23	1371.84	150.26	1371.83	150.28	1371.83	150.32	1371.83
150.42	1371.83	162	1371.54	165.93	1371.42	166.48	1371.38	166.76	1371.36
169.36	1371.25	169.62	1371.23	169.86	1371.22	169.98	1371.21	170.8	1371.18
170.92	1371.17	171.03	1371.17	171.14	1371.16	171.22	1371.16	171.3	1371.16
171.81	1371.13	171.86	1371.13	171.96	1371.13	172.1	1371.12	172.22	1371.12
172.31	1371.11	173.01	1371.09	173.04	1371.09	173.08	1371.09	173.14	1371.09
173.22	1371.14	174.57	1371.48	175.17	1371.63	176	1371.11	214.9	1361.39
250	1360.68	285.11	1361.39	301.37	1365.45	315.22	1366.33	328.25	1369.59
344.25	1369.91	348.29	1370.92	349.52	1371.04	356.41	1371.32	358.91	1371.4
361.93	1371.89	362.55	1372	362.63	1372	362.67	1372	365.19	1372.36
365.66	1372.42	366.2	1372.48	366.72	1372.54	367.43	1372.61	367.8	1372.66
369.12	1372.81	369.32	1372.83	370.88	1373	371.53	1373.07	371.72	1373.09
373.86	1373.34	374.75	1373.44	375.75	1373.55	377.46	1373.75	377.78	1373.78

379.59	1373.98	379.6	1373.99	379.73	1374	379.86	1374.01	380.02	1374.03
380.07	1374.03	381.28	1374.07	382.13	1374.09	384.96	1374.13	386.25	1374.15
388.09	1374.19	389.45	1374.23	390.39	1374.25	391.17	1374.28	391.83	1374.29
393.91	1374.34	394.89	1374.35	395.84	1374.37	396.74	1374.4	398.27	1374.47
400.27	1374.47	401.21	1374.47	401.35	1374.47	406.08	1374.47	408.06	1374.47
431.04	1372.63	434.74	1372.67	443.79	1372.36	463.24	1371.69	464.5	1371.7
500	1371.91								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.17	328.25	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2300

INPUT
Description: Channel Station 59599.16
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1372.71	18.49	1372.94	31.3	1373.12	40.62	1373.1	46.86	1373.08
64.75	1373.08	83.68	1373.26	83.76	1373.26	83.78	1373.26	83.81	1373.26
83.83	1373.27	83.86	1373.27	83.89	1373.27	83.94	1373.27	84.02	1373.28
84.17	1373.28	84.57	1373.3	88.18	1373.47	99.19	1374	101.98	1374.13
102.8	1374.17	103.01	1374.18	103.22	1374.17	104.23	1374.11	106.04	1374
106.5	1373.97	109.11	1373.8	116.23	1373.37	120.25	1373.35	122.33	1373.35
126.73	1373.1	128.59	1373	131.8	1372.82	132.65	1372.77	133.02	1372.8
133.53	1372.84	135.64	1373	136.65	1373.08	138	1373.18	142.91	1373.55
147.26	1373.25	148.05	1373.17	149.42	1373.29	151.47	1373.41	153.47	1373.25
155.22	1373.1	156.38	1373	156.63	1372.98	159.44	1372.74	160.98	1372.72
169.88	1372.39	214.9	1361.13	250	1360.43	285.11	1361.13	317.89	1369.33
333.89	1369.65	336.45	1370.29	339.95	1371.18	340.83	1371	341.72	1370.64
342.77	1370.27	350.89	1370.35	357.04	1370.44	367.27	1370.75	375.81	1371
377.45	1371.05	380.19	1371.13	381.95	1371.19	382.69	1371.19	383.99	1371.2
393.72	1371.14	394.99	1371.14	395.3	1371.13	395.66	1371.12	399.29	1371
400.16	1371	402.25	1371	402.5	1371.01	402.8	1371.19	406.37	1371.07
406.45	1371.07	465.29	1371.42	500	1371.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.88	317.89	100	100	100.06	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2200

INPUT
Description: Channel Station 59699.16
Station Elevation Data num= 104

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1372.4	7.21	1372.39	12.9	1372.37	29.22	1372.37	46.55	1372.53
66.58	1372.95	85.27	1373.17	95.93	1373.62	100.13	1373.81	103.9	1373.97
116.87	1373.03	117.34	1373	118	1372.95	118.12	1372.94	119.29	1372.93
131.65	1372.8	132.59	1372.85	133.42	1372.91	134.94	1373	136.59	1373.1
139.69	1373.29	141	1373.37	145.23	1373.63	149.52	1373.54	150.25	1373.53
150.75	1373.53	152.68	1373.52	156.1	1373.41	157.57	1373.35	159.18	1373.29
163.52	1373.12	166.34	1373.02	214.89	1360.88	250	1360.18	285.1	1360.88
318.25	1369.17	334.25	1369.49	337.1	1370.2	339.37	1371	339.72	1370.84
339.98	1370.73	342.65	1370.92	343.53	1371	343.62	1371	343.69	1371
343.72	1371	343.76	1371	343.82	1371	343.91	1371	344.31	1371.04
344.32	1371.04	344.33	1371.04	344.41	1371.05	345.87	1371.2	346.4	1371.26
348.39	1371.47	350.2	1371.66	352.59	1371.92	352.92	1371.96	353.32	1372
353.34	1372	353.46	1372	353.82	1372	354.51	1372	354.7	1371.99

355.07	1371.96	355.33	1371.94	355.49	1371.93	355.99	1371.88	356.2	1371.86
356.38	1371.84	356.55	1371.82	358.31	1371.62	360.02	1371.42	363.59	1371
365.88	1371	366.95	1371	369.89	1371	377.2	1371.95	377.65	1371.98
377.75	1372.03	378.97	1372.71	378.98	1372.63	379.3	1372.69	379.72	1372.68
382.7	1372	383.28	1372	384.73	1371.62	386.44	1371.16	387.86	1371.47
390.82	1372	393.3	1371.54	393.39	1371.56	393.77	1372	393.81	1371.95
395.39	1372.58	395.45	1372.52	397.6	1371.51	397.61	1371.51	399.54	1370.74
413.35	1370.82	461.52	1371.22	465.03	1371.29	500	1371.43		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
166.34	318.25	99.24	100	100.82	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2100

INPUT
Description: Channel Station 59799.16
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1371.72	10.83	1371.82	28.92	1372.2	53.24	1372.48	67.61	1372.65
81.61	1372.8	86.8	1372.84	89.05	1372.95	89.82	1372.99	90.05	1373
104.82	1373.72	105.89	1373.78	106.56	1373.75	115.42	1373.34	120.73	1373.14
123.86	1373.09	126.04	1373.08	137.58	1373.07	138.7	1373.06	140.88	1373.04
145.13	1373	145.33	1373	157.07	1372.9	157.24	1372.9	157.29	1372.9
157.31	1372.9	157.38	1372.9	157.48	1372.89	167.3	1372.44	167.66	1372.44
214.9	1360.63	250	1359.93	285.11	1360.63	319.54	1369.24	335.54	1369.56
353	1373.92	353.23	1373.69	353.68	1373.53	353.96	1373.42	354.96	1373
355.81	1372.65	357.3	1372	358.24	1371.6	359.62	1371	360.5	1370.62
361.15	1370.34	363.24	1370.72	364.45	1371	365.1	1371.25	365.6	1371.37
366.71	1371.65	367.69	1371.74	368.17	1371.79	368.39	1371.79	369.58	1371.79
369.81	1371.78	370.87	1371.81	371	1371.81	372.02	1371.89	372.11	1371.89
372.89	1372	373.1	1372.04	373.16	1372.05	373.92	1372.15	374.61	1372.13
374.75	1372.14	375.34	1372.11	376.32	1372.11	376.39	1372.1	376.43	1372.09
376.47	1372.09	376.49	1372.09	377.84	1372.11	377.87	1372.1	377.88	1372.1
379.01	1372.02	379.05	1372	379.09	1372	379.88	1371.86	380.04	1371.84
380.06	1371.84	381.42	1371.41	382.95	1371.7	383	1371.7	383.28	1371.72
383.74	1371.82	383.97	1371.81	384.39	1371.9	384.84	1371.93	384.98	1371.92
385.43	1371.89	385.68	1371.79	386.04	1371.65	386.88	1371	387.23	1370.68
387.92	1370.36	389.88	1370.73	391.37	1371	392.71	1371.24	394.08	1371.51
394.54	1371.61	394.79	1371.68	394.94	1371.72	395.03	1371.75	395.1	1371.77
395.16	1371.79	395.25	1371.81	395.89	1371.87	395.94	1371.88	398.5	1370.86
399.42	1370.49	400.06	1370.54	414.16	1370.66	414.94	1370.67	458.98	1370.85
468.13	1370.88	500	1371.08						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.66	319.54	98.48	100	101.57	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 2000

INPUT
Description: Channel Station 59899.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1371.54	15.72	1371.72	28.54	1371.87	41.02	1372.01	66.95	1372.19
90.13	1372.71	91.53	1372.76	91.6	1372.76	91.68	1372.76	91.77	1372.77
91.87	1372.77	91.98	1372.77	92.34	1372.78	92.77	1372.79	93.7	1372.83
95.08	1372.87	96.84	1372.92	98.18	1372.96	99.56	1373	100.21	1373.02
108.66	1373.25	114.26	1373.02	114.72	1373	115.34	1372.97	117.52	1372.88

118.69	1372.83	122.49	1372.67	127.02	1372.64	136.83	1372.58	156.24	1372.56
160.3	1372.51	161.56	1372.41	161.96	1372.37	162.73	1372.3	164.69	1372.14
166.24	1372	169.52	1371.72	214.9	1360.38	250	1359.67	285.1	1360.38
316.23	1368.16	332.23	1368.48	352.46	1373.53	353.34	1373.37	354.81	1373.25
357.08	1373	357.2	1372.96	359.01	1372	360.09	1371.26	360.56	1371
363.06	1371	364.06	1371	364.09	1371	365.22	1371.45	365.98	1371.71
366.28	1371.81	366.83	1372	367.64	1372.37	368.14	1372.58	368.65	1372.81
369.07	1372.97	369.26	1372.96	369.43	1372.95	369.64	1372.94	369.86	1372.93
370.67	1372.88	376.33	1372.39	377.55	1372.35	378.01	1372.34	379.75	1372
383.33	1371.09	383.7	1371	384	1370.92	384.16	1370.9	387.59	1370.3
388.77	1370.12	388.91	1370.1	389.51	1370	389.74	1369.96	390.12	1369.89
392.19	1369.88	396.33	1370	397.57	1370.04	399.47	1370.05	400.55	1370.13
400.91	1370.06	401.4	1369.97	402.26	1370.07	403.33	1370.2	413.83	1370.24
415.45	1370.24	476.62	1370.64	500	1370.65				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.52	316.23	100.03	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1900

INPUT
Description: Channel Station 59999.16
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1371.19	22.32	1371.35	45.04	1371.85	85.59	1372.37	92.75	1372.45
97.27	1372.68	97.45	1372.69	97.65	1372.7	97.88	1372.71	98.13	1372.72
98.41	1372.73	98.72	1372.74	99.07	1372.75	99.46	1372.77	99.91	1372.79
100.69	1372.82	100.91	1372.83	101.37	1372.84	102.13	1372.87	103.69	1372.93
103.99	1372.95	104.61	1372.97	105.32	1373	106.22	1373.04	108.11	1373.12
110.96	1373.24	113.53	1373.08	114.81	1373	117.35	1372.84	119.56	1372.7
120.76	1372.63	125.62	1372.35	128.57	1372.46	136.89	1372.68	146.94	1372.19
152.31	1372	153.56	1371.98	153.93	1371.97	156.25	1372	157.17	1372
157.85	1372.03	160.53	1372.15	161.4	1372.07	162.17	1372	170.55	1371.21
214.89	1360.12	250	1359.42	285.11	1360.12	317.71	1368.27	333.71	1368.58
353.57	1373.55	354.13	1373.3	355.18	1373.02	355.26	1373	357.6	1372.39
358.12	1372.26	359.14	1372	360.49	1371.66	363.08	1371	363.56	1370.88
366.42	1370.15	366.86	1370.03	366.98	1370	367.15	1369.99	369.79	1369.91
370.16	1369.99	370.24	1370	371.44	1370	373.42	1370.26	375.16	1370.21
375.24	1370.22	376.68	1370.15	376.76	1370.15	378.03	1370	378.2	1370
378.8	1369.89	379.24	1369.81	379.7	1369.79	380.72	1370	380.85	1370.02
380.89	1370.01	382.71	1370.18	383.59	1370.27	386.89	1370.69	389.02	1370.66
390.82	1370.66	391.21	1370.73	395.31	1370.85	395.45	1370.87	401.37	1370.72
401.7	1370.76	406.38	1370.04	407.23	1369.91	430.48	1370.06	479.99	1370.08
500	1370.04								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
170.55	317.71	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1800

INPUT
Description: Channel Station 60099.16
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1370.98	32.57	1371.39	69.65	1371.84	93.42	1372.33	99.42	1372.61
100.3	1372.65	101.28	1372.69	102.31	1372.72	103.65	1372.77	105.45	1372.84
108.02	1372.93	109.8	1373	111.86	1373.08	112.89	1373.11	113.16	1373.1

114.3	1373.03	114.77	1373	119.35	1372.73	121.45	1372.6	126.45	1372.3
128.83	1372.34	138.69	1372.4	152.58	1372.31	154.17	1372.29	155.38	1372.22
158.21	1372	159.63	1371.88	161.74	1371.71	167.27	1371.78	214.9	1359.87
250	1359.17	285.11	1359.87	315.77	1367.54	331.77	1367.86	347.78	1371.86
348.66	1371.09	348.82	1371.08	349.63	1371.18	349.98	1371.19	350.38	1371.23
351.14	1371.36	354.15	1372	355.51	1372.07	355.87	1372.07	356.01	1372.03
356.1	1372	356.46	1371.89	357.15	1371.67	358.65	1371.2	359.31	1371
361.13	1370.49	361.9	1370.28	362.91	1370	362.94	1369.99	363	1369.98
363.04	1369.98	363.18	1370	364.28	1370.2	364.36	1370.22	364.44	1370.23
365.75	1370.46	365.87	1370.48	366.6	1370.6	366.75	1370.62	367.08	1370.67
367.26	1370.69	367.44	1370.7	369.21	1370.74	369.36	1370.75	369.51	1370.75
369.93	1370.73	370.77	1370.69	371.68	1370.66	373.3	1371	373.94	1371
374.91	1371	376.88	1370.66	378.1	1370.72	378.61	1370.88	379.14	1371
380.35	1371.36	381.22	1371.57	381.69	1371.65	381.98	1371.68	382.48	1371.62
383.03	1371.5	384.92	1371	384.97	1370.99	384.98	1370.99	385	1370.98
386.81	1370.53	387.57	1370.38	388.07	1370.27	388.63	1370.23	389.2	1370.13
389.72	1370.09	390.01	1370.12	390.83	1370.21	391.76	1370.91	392.23	1371.27
394.02	1370.71	396.94	1369.8	406.41	1369.56	410.7	1369.49	437.06	1369.5
500	1369.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.27	315.77	100	100	100	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1700

INPUT
Description: Channel Station 60199.16
Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1370.66	10.97	1370.79	36.48	1371.32	38.69	1371.44	61.3	1371.49
67.07	1371.5	95.71	1371.63	96.59	1371.68	97.74	1371.73	99.85	1371.83
102.95	1371.98	103.31	1372	107.23	1372.19	115.12	1372.59	117.58	1372.47
117.85	1372.46	118.19	1372.44	118.66	1372.42	119.33	1372.39	120.39	1372.34
122.3	1372.25	126.76	1372.04	127.64	1372	128.2	1371.97	128.59	1371.96
128.84	1371.94	130.03	1371.89	131.65	1371.92	141.56	1371.95	141.83	1371.95
142.32	1371.96	143.39	1372	146.03	1372.09	147.08	1372.13	147.69	1372.16
149.67	1372.12	156.09	1372	156.91	1371.98	164.46	1371.71	168	1371.34
214.9	1359.62	250	1358.92	285.11	1359.62	314.57	1366.98	330.57	1367.3
338.73	1369.34	341.51	1370	344.34	1370.64	345.92	1371	349.43	1371.8
350.33	1372	353.27	1372.67	354.82	1373	357.35	1373.44	360.26	1374
360.28	1374	360.34	1374.01	360.4	1374.02	360.41	1374.02	360.73	1373.84
362.23	1373	363.68	1372.2	364.03	1372	365.72	1371.1	365.91	1371
366.28	1370.81	367.85	1370	368.87	1370	369.31	1370	370.91	1369.76
370.98	1369.74	371.03	1369.74	371.35	1369.73	372.34	1369.69	373.02	1369.78
373.21	1369.77	373.37	1369.76	374.14	1369.81	374.28	1369.8	374.5	1369.78
375.38	1369.77	375.63	1369.75	376.57	1369.68	377.05	1369.65	377.67	1369.6
377.96	1369.58	378.34	1369.56	378.51	1369.55	378.52	1369.55	378.63	1369.54
378.86	1369.53	379.23	1369.51	379.59	1369.48	380.1	1369.45	380.22	1369.44
380.41	1369.43	380.98	1369.39	385.39	1369.09	385.44	1369.09	385.45	1369.09
385.46	1369.09	385.47	1369.09	389.91	1369.37	390.11	1369.39	390.38	1369.43
390.76	1369.46	391.82	1369.53	392.29	1369.55	392.77	1369.55	396.19	1369.52
396.45	1369.52	396.63	1369.53	396.73	1369.53	396.88	1369.52	397.04	1369.51
397.21	1369.5	399.76	1369.25	400.24	1369.27	400.7	1370	401.28	1370.47
401.58	1370.82	404.58	1369.8	412.55	1368.95	412.81	1369.1	413.44	1369.47
413.95	1369.76	414.16	1369.41	414.34	1369.12	414.49	1368.88	470.96	1368.77
475.77	1368.74	482.76	1367.89	489.65	1367.05	491.3	1366.85	496.12	1366.81
500	1367.42								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
168	314.57	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent

```
  360.4     500 1374.02       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 1600

INPUT
Description: Channel Station 60299.16
Station Elevation Data    num=     152
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1370.49    1.04 1370.49   29.18 1370.62   65.66 1370.96   96.62 1371.09
   98.29 1371.11  100.33 1371.22   100.6 1371.23  100.96 1371.25  101.44 1371.27
  102.16 1371.31  103.39 1371.38  106.07 1371.52  115.11    1372  115.19    1372
  117.13 1372.11  120.93 1372.01  121.44    1372  129.42 1371.81   132.3 1371.75
  138.58 1371.98  139.35    1372   139.9 1372.01     140 1372.02  140.39 1372.01
  140.81    1372  141.23    1372  143.58 1371.96  144.39 1371.94  145.96 1371.83
  146.75 1371.79  147.64 1371.74  148.64 1371.69  149.49 1371.65  153.08 1371.46
  155.68 1371.34  156.08 1371.33  156.83 1371.29  158.03 1371.24  161.41 1371.16
   162.1  1371.1  162.75 1371.06  162.95 1371.03  163.28 1371.03  163.62 1371.02
  163.76 1371.01  164.28 1371.02  166.51 1371.09  166.62 1371.09  166.89 1371.11
  167.88 1371.12  214.89 1359.37     250 1358.66  285.11 1359.37  315.44 1366.95
  331.44 1367.27  334.64 1368.07  337.07 1369.47  339.29    1369  340.01 1368.65
   340.1 1368.61  340.56 1368.62  340.99 1368.63  351.98 1368.62  352.98 1368.72
  353.82 1368.82  354.71 1368.93  355.34    1369  355.62 1369.03  356.32 1369.12
  356.97 1369.22  360.04 1369.84  362.35 1369.29  363.63    1369   363.7 1368.98
     364 1368.91  364.03 1368.92  364.37    1369  364.93 1369.16   365.1 1369.21
  365.35 1369.28   365.7 1369.37  367.07 1369.74  367.47 1369.83   367.7 1369.89
  368.03 1369.94  368.09 1369.95  368.67    1370  368.69    1370   370.8    1370
  370.81    1370  378.45 1369.91  379.32    1370  380.08 1370.34  380.79 1370.67
  382.63 1370.23  383.42 1370.02  383.56 1369.98  384.15    1370  386.43    1370
  386.94 1370.08  387.55 1370.18   387.8 1370.23  388.83 1370.22  390.23 1370.13
  391.45 1370.01  392.96    1370  393.05    1370  393.38    1370   394.3    1370
  394.72    1370   394.8 1370.01   395.3 1370.08  395.61 1370.15  397.08 1370.42
  398.97 1370.69  400.05 1370.54  400.38 1370.43  400.41  1370.4  401.23 1370.17
  401.87    1370  402.13 1369.93  404.14 1369.95  404.14 1369.96  404.25    1370
  404.33 1370.03  405.17 1370.13  407.99 1370.53  411.36 1370.97  411.59 1370.99
  411.67 1370.99  413.06 1371.11  413.24 1371.13  413.92 1371.16  414.35    1371
  417.55 1370.16     418 1370.07  418.16 1370.03  418.19 1370.02  418.21 1370.01
  418.28 1370.03   418.3    1370   418.9 1369.02  419.39  1368.2  432.46 1368.18
  433.57 1368.17  440.94 1367.28   448.2 1366.39  449.94 1366.18  451.81 1366.16
  489.36 1372.09     500 1372.04

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .032  214.89    .028  285.11    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        167.88  315.44             98.37     100  101.72              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  318.19     500    1370       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 1500

INPUT
Description: Channel Station 60395.16
Station Elevation Data    num=     164
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1369.95   13.24    1370   38.69 1370.27   48.33  1370.4   76.48 1370.86
     97.5 1371.02  103.63 1371.32  106.21 1371.45  112.53 1371.76  116.23 1371.94
  124.64 1371.44     133    1371  133.97    1371  134.29 1370.96  136.03 1370.74
   140.1 1370.23  140.28 1370.21  141.55 1370.06  142.08    1370  146.33 1369.48
  148.14 1369.26  148.93 1369.17  149.17 1369.15  150.36    1369  150.37    1369
  150.41    1369  150.63    1369  151.11 1368.95  151.81 1368.89  152.45 1368.83
     153 1368.77  153.34 1368.74  153.59 1368.71   153.9 1368.69   154.4 1368.65
  155.67 1368.59  156.46 1368.53  156.89 1368.51  157.43 1368.49  157.95 1368.45
  158.37 1368.43  158.49 1368.42  159.19 1368.39  159.31 1368.38  159.44 1368.38
  159.58 1368.37  160.14 1368.35  160.29 1368.34  160.68 1368.32  160.83 1368.32
```

161.03	1368.31	161.14	1368.3	161.21	1368.3	161.34	1368.29	161.4	1368.29
161.66	1368.28	162	1368.27	163.07	1368.22	163.13	1368.22	163.29	1368.21
163.36	1368.21	165.32	1368.08	165.4	1368.08	165.42	1368.07	166.37	1368
168.03	1367.89	169.63	1367.78	170.31	1367.74	170.7	1367.85	171.27	1368
174.11	1368.84	174.32	1368.9	174.65	1369	175.01	1369.08	179.34	1370
181.26	1370	181.63	1370	182.09	1367.34	191.02	1364.61	192.9	1364.61
214.89	1359.11	250	1358.41	285.1	1359.11	307.1	1364.61	323.1	1364.93
336.11	1368.19	340.71	1369	341.5	1368.55	342.14	1368.18	342.45	1368
342.69	1367.89	342.7	1367.88	342.7	1367.89	342.73	1368	342.99	1368.01
343.58	1368.01	345.24	1368.02	348.39	1368.04	348.49	1368.04	348.57	1368.04
348.74	1368.04	348.79	1368.04	348.83	1368.04	348.88	1368.04	348.92	1368.04
349.8	1368.04	349.82	1368.04	349.83	1368.04	349.84	1368.04	349.85	1368.04
349.87	1368.04	350.59	1368.1	353.99	1368.21	354.5	1368.2	354.63	1368.2
355.72	1368.2	360.41	1368.04	360.62	1368.03	361.4	1368	361.45	1368
361.53	1368	361.59	1367.99	362.27	1367.99	362.76	1367.99	363.85	1367.99
364.4	1367.99	364.54	1367.99	364.98	1368	365.85	1368.03	367.67	1368.09
368.96	1368.14	369.27	1368.15	370.12	1368.18	370.63	1368.19	370.74	1368.2
371.03	1368.22	372	1368.28	372.84	1368.31	376.19	1368.36	382.93	1368.72
382.98	1368.72	385.21	1368.7	387.93	1368.69	389.05	1368.68	390.52	1368.67
391.68	1368.66	392.21	1368.66	397.63	1368.63	399.8	1368.61	402.07	1368.6
403.65	1368.59	403.87	1368.59	405.47	1368.59	410.95	1368.56	415.92	1368.57
416.77	1368.56	420.67	1368.5	423.57	1369.81	423.8	1369.3	424.01	1368.85
424.2	1368.45	424.24	1368.36	445.43	1371.73	500	1371.48		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
192.9	307.1	85.9	100	115.25	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1400

INPUT
Description: Channel Station 60499.16
Station Elevation Data num= 126

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1369.7	9.3	1369.83	30.02	1370.17	48.37	1370.3	93.95	1370.06
94.02	1370.06	94.57	1370.12	98.61	1370.65	98.64	1370.65	98.69	1370.65
107.22	1371	111.42	1371.17	119.55	1371.51	123.17	1371.53	127.52	1371.55
130.84	1371.14	132.02	1371	132.25	1370.97	133.12	1370.86	142.92	1370.86
145.56	1370.86	149.24	1370.87	153.52	1370.88	154.8	1370.85	162.51	1370.82
167.43	1370.73	214.9	1358.86	250	1358.16	285.1	1358.86	307.1	1364.36
323.1	1364.68	340.86	1369.12	344.9	1369	345.94	1369	346.04	1369
347.46	1369.36	347.56	1369.38	347.91	1369.35	351.5	1369.03	355.14	1369.52
356.13	1369.57	359.68	1370	360.25	1370	361.88	1370	364.55	1369.02
364.58	1369.03	364.63	1369.04	364.66	1369.04	365.76	1369.11	366.2	1369.1
366.27	1369.1	367.48	1369.15	367.74	1369.16	368.68	1369.19	368.81	1369.18
369.51	1369.19	370.02	1369.18	370.11	1369.18	370.88	1369.11	370.95	1369.11
371.91	1369	372.02	1368.99	372.15	1368.97	372.79	1368.89	373.72	1368.77
373.98	1368.78	374.07	1368.78	375.36	1368.81	375.62	1368.82	375.71	1368.83
375.93	1368.81	377.22	1368.64	377.35	1368.62	377.44	1368.61	377.88	1368.55
380.45	1368.52	380.55	1368.52	380.81	1368.5	381.15	1368.5	383.7	1368.79
385.51	1368.8	389.53	1368.93	390.21	1368.93	390.72	1368.94	391.08	1368.95
391.21	1369	391.28	1369.02	394.04	1370	394.53	1370.17	394.82	1370.27
396.38	1370.83	396.79	1370.97	396.87	1371	398.06	1371.42	398.29	1371.49
398.39	1371.52	398.44	1371.54	398.47	1371.54	398.5	1371.55	398.52	1371.55
398.55	1371.56	398.69	1371.55	398.8	1371.53	399.04	1371.48	400.64	1371.18
401.56	1371.02	401.67	1371	403.17	1370.72	404.19	1370.53	406.84	1370.05
406.91	1370.03	406.93	1370.05	407.02	1370.05	407.55	1370.06	409.61	1370.31
410.03	1370.36	410.54	1370.29	413.17	1370.72	434.39	1370.72	445.76	1369.74
446.46	1369.73	446.47	1369.74	447.95	1370.58	448.77	1371.04	449.31	1371.05
500	1370.78								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
167.43	340.86	85.31	100	114.26	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1300

INPUT
Description: Channel Station 60599.16
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1369.58	2.06	1369.62	15.86	1369.69	51.54	1369.42	70.3	1368.79
92.38	1368.05	92.58	1368.07	92.76	1368.1	93.09	1368.14	93.77	1368.22
99.02	1368.9	99.82	1369	100.02	1369.04	104.62	1370	105.01	1370.08
106.08	1370.31	119.33	1370.82	123.28	1370.97	123.96	1371	124.15	1371.01
124.33	1371.01	124.4	1371.02	126.56	1371.03	130.24	1371.05	132.37	1371.07
133.97	1371.08	134.09	1371.07	134.73	1371	135.23	1370.93	139.5	1370.42
145.07	1370.37	154.23	1370.28	158.23	1370.06	159.31	1370	160.75	1369.92
161.75	1369.87	162.98	1369.79	166.8	1369.66	171.53	1369.45	214.9	1358.61
250	1357.91	285.11	1358.61	312.45	1365.44	328.45	1365.76	337.49	1368.02
337.77	1368.25	338.54	1368.06	340.17	1368.1	340.81	1368.12	341.89	1368.14
343.44	1368.06	344.69	1368	346.87	1367.89	354.17	1367.51	363.72	1367.05
366.46	1367.01	368.09	1367	369.13	1367	379.6	1366.86	380.11	1366.85
382.97	1366.83	386.67	1366.71	391.03	1366.61	392.45	1366.79	394.54	1366.93
396.63	1367	398.52	1367.11	402.14	1367.16	402.28	1367.17	402.95	1367.22
405.11	1367.27	406.28	1367.11	406.29	1367.11	406.31	1367.09	406.32	1367.05
406.75	1367	409.49	1366.68	425.54	1367.07	430.59	1367.2	432.69	1367.21
439.61	1368.02	446.92	1368.87	453.71	1369.66	456.32	1369.97	496.49	1369.92
500	1369.64								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.53	312.45	94.31	100	105.05	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1200

INPUT
Description: Channel Station 60699.16
Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1368.8	10.71	1368.71	23.48	1368.26	39.23	1367.7	50.35	1367.34
54.25	1367.32	68.76	1366.76	93.91	1366.27	95.6	1366.11	96.7	1366.08
100.53	1366.04	100.69	1366.03	100.93	1366.03	101.13	1366.03	101.14	1366.03
102.15	1366.3	104.78	1367	106.55	1367.47	108.54	1368	110.39	1368.49
112.3	1369	115.09	1369.74	116.07	1370	116.13	1370.02	116.25	1370.05
120.72	1370.27	134.33	1370.97	140.42	1370.75	144.04	1370.62	145.05	1370.49
146.23	1370.34	149.06	1369.99	149.24	1369.97	152.71	1369.87	165.29	1369.47
171.06	1369.31	214.89	1358.35	250	1357.65	285.1	1358.35	311.64	1364.99
327.64	1365.31	334.51	1367.03	337.73	1368	339.63	1367.52	341.73	1367
342.06	1366.92	342.19	1366.89	348.34	1366.87	355.52	1366.86	361.96	1366.83
363.36	1366.86	365.1	1366.87	370.74	1366.73	380.89	1366.6	388.7	1366.92
395.74	1366.94	399.27	1366.93	407.14	1366.55	407.45	1366.55	407.49	1366.56
411.01	1367.04	411.09	1367.02	418.67	1368	418.81	1367.94	418.92	1367.89
419.04	1367.83	419.15	1367.78	426.48	1368.55	426.67	1368.46	433.55	1369.15
435.34	1369.14	439.15	1369.5	439.44	1369.64	439.72	1369.77	440.08	1369.91
440.36	1370.05	440.68	1370.19	454.49	1369.6	458.77	1369.42	470.45	1369.46
475.91	1369.41	491.8	1368.64	497.44	1368	498.62	1368	500	1367.85

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.06	311.64	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1100

INPUT
Description: Channel Station 60799.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1366.71	3.37	1366.6	11.7	1366.54	17.65	1366.31	33.57	1366
43.38	1366	45.41	1366	49.22	1366	65.89	1366	67.43	1366
86.01	1366	86.47	1366	90.84	1366.08	100.28	1366.04	102.29	1366.33
103.59	1366.52	104.18	1366.64	105.9	1367	110.87	1368	110.89	1368
110.91	1368	116.21	1369	117.85	1369.3	120.09	1369.72	123.67	1369.95
124.52	1370	129.48	1370.28	138.83	1370.83	143.92	1370.66	148.89	1370.49
152.51	1370.13	153.01	1370.09	153.81	1370.05	154.69	1370	161.91	1369.67
167.42	1369.39	168.59	1369.22	170.1	1369	171.18	1368.84	172.86	1368.61
214.89	1358.1	250	1357.4	285.11	1358.1	311.72	1364.76	327.72	1365.08
333.93	1366.63	337.41	1368	340.57	1367.01	340.6	1367	342.38	1366.54
343.22	1366.33	346.63	1366.33	357.63	1366.52	358.6	1366.7	359.36	1366.83
360.44	1367	362.46	1367.36	366.04	1368	366.92	1368.16	368.49	1368.44
371.69	1369	374.44	1369.48	376.01	1369.73	376.85	1369.86	377.25	1369.91
377.88	1370	378.36	1370	378.72	1370	381.2	1370	383.07	1369.6
385.38	1369	386.42	1368.73	389.26	1368	393.37	1367.17	394.13	1367
394.25	1367	394.77	1367	395.07	1367.07	395.56	1367.18	395.85	1367.25
396.12	1367.32	400.81	1367.08	400.9	1367.08	405.41	1366.85	424.92	1366.99
427.08	1366.77	428.94	1366.54	447.5	1366.62	454.22	1366.3	468.04	1366.28
491.1	1366.7	499.04	1367.2	500	1367.21				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
172.86	311.72	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 1000

INPUT
Description: Channel Station 60899.16
Station Elevation Data num= 158

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1366.25	11.11	1366.16	15.42	1366.13	17.1	1366.12	31.94	1366
35.21	1365.98	35.37	1365.97	45.11	1365.9	46.41	1365.91	47.53	1365.9
48.55	1365.91	49.38	1365.91	50	1365.91	50.54	1365.92	51.01	1365.92
51.8	1365.92	52.48	1365.92	52.88	1365.91	63.1	1365.7	65.51	1365.67
66.65	1365.65	70.56	1365.59	72.15	1365.57	75.35	1365.52	77.4	1365.5
80.12	1365.47	88.1	1365.39	89.06	1365.38	92.09	1365.3	97.26	1365.74
97.69	1365.75	97.85	1365.76	98.06	1365.77	101.12	1365.92	102.97	1366
103.03	1366	104.34	1366.08	105.27	1366.2	105.33	1366.21	106.84	1366.38
106.91	1366.38	106.95	1366.39	107.33	1366.43	108.32	1366.55	109.25	1366.67
109.71	1366.72	111.77	1366.97	111.8	1366.98	111.81	1366.98	111.94	1367
114.65	1367.74	115.38	1368	116.12	1368.26	118.85	1369	119.96	1369.2
120.32	1369.27	122.49	1369.39	123.8	1369.47	129.02	1369.77	133.1	1370
136.27	1370.18	136.49	1370.2	136.69	1370.21	136.93	1370.2	137.05	1370.19
137.57	1370.16	140.78	1370	142.92	1369.89	144.41	1369.82	145.03	1369.78
145.37	1369.77	145.58	1369.76	146.54	1369.71	147.85	1369.53	151.78	1369
152.34	1368.92	152.77	1368.86	153.85	1368.81	162.71	1368.41	167.03	1368.3
173.66	1368.16	214.9	1357.85	250	1357.15	285.1	1357.85	307.11	1363.35
323.1	1363.67	332.33	1365.98	335.33	1368	336.38	1368	336.52	1368
336.84	1368	337.06	1368	337.61	1368	337.78	1368	338.14	1367.88
340.78	1367	341.91	1366.55	343.23	1366.03	358.8	1366.15	359.8	1366.15
360.15	1366.15	360.36	1366.16	360.42	1366.16	360.58	1366.16	360.62	1366.16
373.86	1366.12	378.08	1366.13	380.83	1366.11	387.3	1366.54	389.99	1366.69
392.19	1366.86	394.55	1367	394.92	1367.02	395.67	1367.07	396.7	1367.1
398.33	1367.13	398.81	1367.14	399.07	1367.14	399.17	1367.14	400.28	1367.14
402.3	1367.14	404.28	1367.18	404.65	1367.14	405.97	1367.13	406.24	1367.25
406.52	1367.24	408.17	1367.08	408.27	1367.08	411.75	1367.05	415.31	1367.06
415.97	1367.06	416.91	1367.07	417.92	1367.08	419.72	1367.1	424.61	1367.1
424.92	1367.1	465.25	1367.13	469.54	1367.24	470.34	1367.32	471.2	1367.41

473.1	1367.63	476.23	1368	476.9	1368.04	478.39	1368.14	479.36	1368.23
479.95	1368.26	481.67	1368.37	482.79	1368.43	484.77	1368.56	487.63	1368.78
488.76	1368.84	490.84	1368.94	492.33	1369	493.45	1369.02	497.12	1369.14
497.32	1369.14	497.5	1369.14	500	1369.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	285.1	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.66	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 900

INPUT
Description: Channel Station 60999.16
Station Elevation Data num= 238

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1367.07	.79	1367.08	1.99	1367.1	4.61	1367.14	4.82	1367.14
7.17	1367.2	7.41	1367.2	7.6	1367.21	17.13	1367.39	17.51	1367.4
17.66	1367.4	18.12	1367.41	18.97	1367.43	20.35	1367.45	25.43	1367.56
26.67	1367.58	27.66	1367.6	28.7	1367.62	30.76	1367.66	34.35	1367.72
35.26	1367.74	40.31	1367.84	42.43	1367.87	43.97	1367.9	44.51	1367.91
45.31	1367.93	46.85	1367.96	49.06	1368	49.22	1368	56.02	1368.14
57.23	1368.14	57.48	1368.14	60.96	1368.14	62.67	1368.14	64.68	1368.14
66.07	1368.14	67.85	1368.14	68.22	1368.14	69.55	1368.14	77.53	1368.14
83.45	1368.14	85.38	1368.14	86.98	1368.14	88.67	1368.14	89.49	1368.14
92.63	1368.24	93.11	1368.26	96.45	1368.34	103.38	1368.45	111.63	1368.82
113.55	1368.95	114.09	1369	114.83	1369.05	116.37	1369.14	130.78	1369.61
132.27	1369.66	132.75	1369.67	133.05	1369.66	158.75	1369.47	158.82	1369.47
158.91	1369.47	159.07	1369.46	168.69	1369.15	214.89	1357.6	250	1356.89
285.11	1357.6	307.11	1363.1	323.11	1363.42	341.76	1368.08	341.87	1368
341.91	1368	341.94	1368	341.96	1368	341.98	1368	342.01	1368
342.04	1368	342.09	1368	342.15	1368	342.22	1368	342.29	1368
342.63	1368	342.77	1368	342.89	1368	342.98	1368	343.08	1368
343.17	1368	344.08	1367.89	344.26	1367.88	344.43	1367.88	344.59	1367.87
344.75	1367.87	344.88	1367.86	345.6	1367.84	345.74	1367.83	345.85	1367.83
346	1367.82	346.18	1367.81	346.39	1367.81	346.54	1367.8	346.69	1367.79
346.99	1367.78	347.5	1367.76	347.9	1367.75	348.62	1367.72	348.64	1367.72
349.08	1367.7	350.13	1367.65	350.35	1367.64	350.38	1367.64	350.43	1367.64
350.51	1367.63	350.61	1367.63	350.74	1367.62	350.89	1367.61	351.2	1367.59
351.33	1367.58	353.24	1367.49	353.43	1367.48	353.64	1367.47	353.81	1367.46
353.92	1367.45	354	1367.45	354.08	1367.44	354.16	1367.44	354.25	1367.43
358.9	1367.14	359.35	1367.12	359.51	1367.11	359.68	1367.1	359.77	1367.09
359.85	1367.09	359.92	1367.08	359.97	1367.08	361.17	1367	361.2	1367
362.8	1366.88	363.13	1366.86	365.08	1366.73	365.75	1366.71	365.76	1366.71
366.84	1366.64	367.78	1366.6	367.94	1366.59	369.94	1366.54	372.72	1366.4
372.85	1366.39	372.97	1366.38	373.12	1366.38	377.23	1366.14	382.29	1366.14
383.91	1366.14	389.85	1366.76	391.42	1366.9	392.6	1367	392.84	1367.02
393.6	1367.09	393.98	1367.12	394.04	1367.12	394.22	1367.14	395.88	1367.28
397.01	1367.36	400.65	1367.63	402.17	1367.73	402.24	1367.74	402.36	1367.75
402.52	1367.76	402.74	1367.77	403.06	1367.8	403.5	1367.83	404.57	1367.9
404.95	1367.92	406.11	1367.98	406.49	1368	407.27	1368.04	408	1368.07
409.76	1368.14	412.24	1368.14	414.16	1368.23	414.38	1368.23	414.72	1368.24
422.39	1368.27	422.7	1368.28	422.96	1368.28	423.49	1368.29	424.13	1368.31
430.87	1368.35	431.83	1368.39	432.77	1368.43	435.86	1368.46	436.38	1368.48
438.92	1368.44	438.98	1368.43	439.08	1368.43	439.2	1368.43	443.99	1368.24
444.06	1368.23	444.19	1368.23	444.37	1368.23	444.6	1368.22	446.44	1368.14
447.88	1368.09	448.27	1368.08	448.44	1368.07	448.59	1368.07	448.69	1368.07
448.74	1368.06	449.29	1368.06	450.44	1368.06	452.5	1368.05	454.29	1368.04
456.11	1368.02	456.58	1368.02	457.07	1368	457.94	1367.97	458.84	1367.9
459.2	1367.87	460.95	1367.74	461.93	1367.67	463.76	1367.53	467.48	1367.24
467.97	1367.21	468.79	1367.14	469.81	1367.06	469.89	1367.07	469.96	1367.08
470.46	1367.09	471.12	1367.07	473.11	1367	474.11	1367	475.72	1366.96
475.97	1366.97	476.65	1366.96	477.44	1366.93	478.19	1366.95	479.56	1366.91
480.13	1366.92	481.92	1366.88	500	1366.39				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
168.69	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 800

INPUT
Description: Channel Station 61099.16
Station Elevation Data num= 193

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1365.2	11.06	1365.42	11.35	1365.43	11.63	1365.44	12.93	1365.47
13.33	1365.48	13.73	1365.49	21.77	1365.65	22.16	1365.66	22.58	1365.67
23.05	1365.68	23.56	1365.69	23.93	1365.69	24.24	1365.7	24.39	1365.7
26.39	1365.73	27.2	1365.75	27.99	1365.76	28.96	1365.76	32.76	1365.83
34.05	1365.83	35.1	1365.82	38.54	1365.81	39.38	1365.8	40.71	1365.78
41.32	1365.77	41.78	1365.77	45.05	1365.76	50.04	1365.78	52.72	1365.84
56.19	1365.96	56.29	1365.95	57.53	1366	58.65	1366.04	60.59	1366.1
61.08	1366.12	61.11	1366.12	61.14	1366.12	61.18	1366.12	61.27	1366.12
61.4	1366.12	61.54	1366.13	62.93	1366.14	64.4	1366.14	66.04	1366.17
66.15	1366.17	66.18	1366.18	66.19	1366.18	73.5	1366.25	73.53	1366.25
73.56	1366.25	73.78	1366.25	74.02	1366.25	74.39	1366.26	74.74	1366.27
75.34	1366.29	76.68	1366.35	79.47	1366.42	81.14	1366.51	83.24	1366.63
87.28	1366.72	88.18	1366.81	90.34	1367	90.58	1367	90.85	1367.03
91.94	1367.14	94.29	1367.28	95	1367.32	97.53	1367.47	102.19	1367.75
106.31	1368	107.09	1368.05	107.86	1368.09	108.61	1368.14	113.41	1368.42
123.04	1369	124.08	1369.06	125.42	1369.14	134.02	1369.14	135.16	1369.14
135.74	1369.12	139.49	1369	143.07	1368.88	153.34	1368.55	156.49	1368.45
158.29	1368.4	168.39	1368.14	170.43	1368.14	171.57	1368.11	171.9	1368.09
172.17	1368.08	172.45	1368.07	172.65	1368.06	174.03	1368	174.04	1368
174.05	1368	174.06	1368	175.55	1367.85	177.43	1367.67	177.7	1367.65
178.07	1367.71	179.23	1367.9	179.86	1368	180.21	1368	181.01	1368
182.09	1365.59	189.54	1363.68	214.89	1357.34	250	1356.64	285.11	1357.34
307.11	1362.84	323.1	1363.16	328.05	1364.4	336.49	1367.03	336.93	1367
336.96	1366.99	340.93	1366	341.8	1365.78	344.93	1365	345.46	1364.87
345.72	1364.8	347.22	1364.87	347.8	1364.89	348.45	1364.92	349.03	1364.94
350.07	1365	350.21	1365	350.38	1365	350.48	1365	350.6	1365
350.7	1365	350.89	1365.07	351.24	1365.2	352.08	1366	352.2	1366.5
352.31	1367	352.85	1367.74	352.99	1368	353.12	1368	353.38	1368
353.41	1368	353.44	1367.97	354.12	1367	354.25	1366.11	354.26	1366
354.34	1365.95	355.19	1365.5	355.63	1365.14	356.33	1365.14	359.16	1365.66
360.93	1365.56	365.49	1365.14	367.3	1365.14	373.87	1365.14	375.29	1365.14
376.11	1365.14	376.47	1365.14	376.57	1365.14	377.5	1365.14	377.8	1365.14
377.81	1365.14	379.68	1365.14	380.08	1365.14	380.93	1365.14	386.43	1365.14
390.4	1365.14	398.06	1365.14	400.14	1365.14	404.59	1365.14	421.08	1365.33
423.51	1365.37	424.12	1365.38	424.5	1365.39	429.46	1365.43	431.16	1365.45
432.92	1365.48	438.47	1365.59	439.97	1365.62	440.88	1365.63	443.34	1365.68
445.54	1365.71	450.77	1365.82	459.96	1366	463.29	1366.07	467.13	1366.14
467.92	1366.14	480.9	1366.36	483.16	1366.39	485.02	1366.43	485.87	1366.44
496.72	1366.6	497.51	1366.61	500	1366.66				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
189.54	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 700

INPUT
Description: Channel Station 61199.16
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1364.07	6.44	1364.07	9.47	1364.08	18.02	1364.07	19.96	1364.07
27.69	1364.09	34.66	1364.07	37.93	1364.06	74.42	1364.14	78.1	1364.14
83.71	1364.45	84.11	1364.47	86.76	1364.62	93.51	1365	95.5	1365.13

95.68	1365.14	96.1	1365.24	99.35	1366	99.62	1366.07	99.92	1366.14
102.24	1366.69	103.58	1367	104.02	1367.11	104.18	1367.14	105.78	1367.54
107.6	1368	108.12	1368.13	108.16	1368.14	108.18	1368.14	109.68	1368.14
140.33	1368.14	147.14	1368.05	150.83	1368	154.57	1367.89	173.98	1367.32
214.89	1357.09	250	1356.39	285.11	1357.09	307.11	1362.59	323.1	1362.91
332.03	1365.14	337.01	1367	339.14	1366.47	341.01	1366	343.13	1365.47
345.01	1365	345.12	1364.97	345.13	1365	346.48	1365.22	346.95	1365.29
347.33	1365.35	348.94	1365.62	352.58	1366	358.12	1366.55	358.71	1366.61
361.5	1367	362.82	1367.57	363.85	1368	364.77	1368	365.03	1368
365.21	1367.52	365.4	1367	365.85	1366.57	369.21	1366.5	370.83	1366.29
371.84	1366.16	384.65	1366.06	385.13	1366.04	385.78	1366.02	386.07	1366.02
392.47	1366	403.85	1365.97	406.54	1366	406.81	1366	407.36	1366
409.01	1366	420.74	1366	422.78	1366	425.29	1366	427.58	1366.03
430.72	1366.07	436.55	1366.14	445.25	1366.14	447.96	1366.14	453.08	1366.14
460.58	1366.14	486.58	1366.84	493.05	1367	497.26	1367.1	498.79	1367.14
499.01	1367.14	499.76	1367.14	500	1367.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
173.98	307.11	100	100	100.01	.1	.3

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 600

INPUT
Description: Channel Station 61299.16
Station Elevation Data num= 147

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1363.43	1.4	1363.43	1.63	1363.42	1.84	1363.42	5.76	1363.4
8.66	1363.39	13.84	1363.37	36.02	1363.4	37.92	1363.4	41.65	1363.4
54.55	1363.38	59.37	1363.42	64.42	1363.49	65.24	1363.51	72.1	1363.66
73.13	1363.68	74.68	1363.68	78.06	1363.78	82.54	1363.91	85.45	1364
88.64	1364.1	89.55	1364.12	90.05	1364.14	90.4	1364.23	93.28	1365
93.77	1365.14	93.78	1365.14	93.91	1365.18	94.02	1365.2	95.52	1365.61
96.99	1366	97.43	1366.12	97.47	1366.13	97.51	1366.14	97.73	1366.2
100.81	1367	101.05	1367.06	101.35	1367.14	105.96	1367.85	106.95	1368
107.46	1368.09	107.65	1368.13	107.73	1368.14	109.81	1368.14	129.27	1368.14
131.16	1368.06	132.45	1368	133.47	1367.95	134.55	1367.91	141.19	1367.63
142.29	1367.59	142.9	1367.56	143.17	1367.55	145.59	1367.45	153.33	1367.14
154.62	1367.07	155.74	1367	161.34	1366.67	169.65	1366.14	169.67	1366.14
169.73	1366.14	171.86	1366	173.54	1365.86	173.66	1365.85	173.96	1365.93
174.26	1366	174.44	1366.04	177.17	1366.73	177.93	1366.92	178.26	1367
180.22	1365.51	214.9	1356.84	250	1356.14	285.1	1356.84	294.47	1359.18
312.95	1360.36	320.96	1362.36	405.08	1364.05	419.73	1367.71	420.83	1367.59
422.83	1367.44	424	1367.36	424.48	1367.32	424.72	1367.31	425.03	1367.28
428.59	1367.25	429	1367.22	429.34	1367.2	433.48	1367.24	434.23	1367.22
437.25	1367.14	446.67	1367.14	452.35	1367.14	453.99	1367.14	456.01	1367.14
460.09	1367.03	462.98	1367.02	464.71	1367.04	465.96	1367.1	466.58	1367.08
467.26	1367.05	467.81	1367.01	467.89	1367	468.48	1366.86	470.57	1366.14
471.46	1366.14	472.76	1366.14	477.45	1366.62	478.72	1366.75	479.43	1366.83
481.12	1367	482.54	1367.13	482.68	1367.14	482.87	1367.14	484.47	1367.14
484.81	1367.02	484.87	1367	485.38	1366.8	487.09	1366.14	487.29	1366.07
487.47	1366	489.61	1365.2	489.76	1365.14	489.83	1365.1	490.03	1365
490.44	1364.77	491.57	1364.14	491.69	1364.07	491.81	1364	492.5	1363.6
493.24	1363.17	493.3	1363.14	493.48	1363.04	493.55	1363	494.4	1362.51
495.04	1362.14	495.22	1362.04	495.28	1362	496.48	1361.31	496.78	1361.14
496.94	1361.04	497.02	1361	497.95	1360.46	498.52	1360.14	498.62	1360.08
498.76	1360	500	1359.27						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.9	.028	294.47	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
178.26	419.73	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
327.96	500	1370	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 500

INPUT
Description: Channel Station 61399.16
Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1363.11	35.9	1363.14	48.18	1363.14	59.28	1363.14	80.52	1363.14
81.79	1363.14	82.04	1363.14	83.45	1363.14	87.08	1363.93	87.37	1364
87.83	1364.1	88	1364.14	88.19	1364.19	91.55	1365	91.9	1365.08
92.14	1365.14	95.59	1365.96	95.74	1366	95.76	1366.01	96.33	1366.14
97.38	1366.39	99.89	1367	100.4	1367.12	100.5	1367.14	101.73	1367.25
102.3	1367.3	105.54	1367.55	110.14	1367.92	111.4	1368	112.86	1368.09
113.66	1368.14	113.97	1368.14	117.67	1368.14	117.72	1368.14	117.75	1368.14
117.84	1368.14	122.71	1368	122.94	1368	122.98	1368	129.06	1367.85
129.59	1367.84	148.11	1367.47	162.92	1367.14	165.49	1367.01	165.61	1367
167.44	1366.89	173.71	1366.51	174.91	1366.44	175.16	1366.52	214.89	1356.59
250	1355.88	285.11	1356.59	333.12	1368.59	338.45	1367	340.56	1367.53
342.45	1368	344.81	1368.59	345.31	1368.72	345.54	1368.77	346.06	1368.76
346.25	1368.76	362.03	1368.59	363.15	1368.59	363.93	1368.58	364.47	1368.58
382.05	1369	382.76	1369	384.4	1369	384.42	1369	384.43	1369
384.95	1369	385.24	1369	388.67	1369.07	391.99	1369.07	392.31	1369.06
392.58	1369.05	392.82	1369.04	392.88	1369.04	392.97	1369.04	393.46	1369.04
393.62	1369.04	393.91	1369.04	395.57	1369	395.75	1369	395.87	1369
395.92	1369	395.98	1369	396.13	1369	396.22	1369	396.27	1369
396.29	1369	396.55	1369	396.61	1369	396.67	1369	396.74	1369
400.4	1368.9	401.62	1368.88	403.51	1368.78	404.42	1368.74	405.26	1368.7
414.42	1368.14	414.56	1368.12	414.83	1368.08	415.3	1368	416.94	1367.74
420.45	1367.14	421.15	1367.1	421.85	1367.06	422.54	1367.02	422.89	1367
424.74	1366.89	426.76	1366.78	428.33	1366.69	432	1366.47	434.31	1366.34
437.72	1366.14	441.54	1366.14	447.79	1366.14	452.74	1366.14	454.29	1366.14
454.66	1366.02	454.72	1366	455.04	1365.89	456.37	1365.44	457.02	1365.21
457.23	1365.14	457.25	1365.13	457.55	1365	457.82	1364.87	459.42	1364.14
459.57	1364.05	459.66	1364	460.64	1363.43	461.14	1363.14	461.33	1363.03
461.38	1363	461.76	1362.78	462.85	1362.14	463	1362.05	463.09	1362
463.37	1361.84	464.56	1361.14	464.62	1361.1	464.8	1361	465.1	1360.82
466.51	1360	467.24	1359.58	467.99	1359.14	470.14	1359.14	475.95	1359.14
476.88	1359.14	477.22	1359.14	477.33	1359.2	477.69	1359.4	478.78	1360
479.01	1360.13	479.02	1360.14	479.4	1360.34	480.59	1361	480.69	1361.05
480.79	1361.11	480.84	1361.14	481.97	1361.77	482.37	1362	482.53	1362.09
482.63	1362.14	483.88	1362.85	484.16	1363	484.32	1363.09	484.41	1363.14
485.03	1363.49	485.92	1364	486.03	1364.06	486.17	1364.14	487.84	1364.59
489.4	1365	489.54	1365.05	489.84	1365.14	493.23	1365.34	494.62	1365.42
497.76	1365.6	500	1365.73						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
175.16	333.12	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
345.54	500	1368.77	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 400

INPUT
Description: Channel Station 61499.16
Station Elevation Data num= 204

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1362.75	23.68	1362.63	44.21	1362.74	44.42	1362.74	63.94	1362.86
69.17	1363	70.05	1363	71.4	1363	73.79	1363	78.37	1363
78.76	1363.02	81.64	1363.14	83.93	1363.71	85.09	1364	85.33	1364.06
85.64	1364.14	88.24	1364.78	89.13	1365	89.28	1365.04	89.69	1365.14
92.96	1365.96	93.11	1366	93.52	1366.1	93.67	1366.14	94.57	1366.36

97.15	1367	97.22	1367.02	97.71	1367.14	116.75	1367.14	122.79	1367.14
123.33	1367.11	123.8	1367.09	124.96	1367.03	125.51	1367	130.1	1366.77
133.92	1366.57	135.63	1366.48	136.54	1366.44	137.03	1366.41	137.25	1366.4
139.5	1366.29	142.29	1366.14	142.56	1366.14	142.82	1366.12	143.12	1366.09
144.12	1366	145.08	1365.87	146.95	1365.75	149.31	1365.54	151.26	1365.39
151.41	1365.38	151.54	1365.37	156.19	1365.14	156.62	1365.13	156.69	1365.13
156.87	1365.12	157.81	1365.09	160.57	1365	165.81	1364.81	168.16	1364.72
169.16	1364.68	171.07	1364.6	172.61	1364.99	172.66	1365	172.86	1365.05
176.66	1366	178.42	1366	181.5	1366	182.09	1364.59	191.85	1362.09
214.89	1356.33	250	1355.63	285.11	1356.33	328.34	1367.14	339.65	1367
339.96	1367.08	340.37	1367.18	344.05	1367.01	344.43	1367	344.76	1367
351.35	1367	352.29	1367.05	357.14	1367.1	359.91	1367.13	360.84	1367.14
363.62	1367.08	364.06	1367.07	364.45	1367.07	364.66	1367.06	364.93	1367.06
365.01	1367.05	365.44	1367.05	366.45	1367.03	367.09	1367.01	367.69	1367
368.34	1366.99	369.32	1366.97	370.57	1366.91	371.36	1366.89	371.41	1366.89
371.51	1366.89	371.67	1366.88	371.88	1366.88	372.52	1366.85	373.51	1366.81
375.92	1366.71	377.1	1366.66	380.83	1366.5	381.89	1366.46	382.56	1366.43
383.21	1366.41	383.4	1366.4	383.55	1366.4	384.07	1366.38	384.69	1366.36
389.18	1366.14	390.44	1366.07	391.38	1366.03	391.92	1366	393.11	1365.94
394.45	1365.88	395.28	1365.84	395.73	1365.82	395.85	1365.81	406.6	1365.14
412.21	1365.14	415.15	1365.14	419.19	1365.14	423.79	1365.14	424.07	1365.04
424.19	1365	425.11	1364.66	426.51	1364.14	426.62	1364.09	426.79	1364
427.73	1363.52	428.47	1363.14	428.52	1363.11	428.72	1363	428.95	1362.87
430.16	1362.18	430.2	1362.15	430.22	1362.14	430.28	1362.1	430.47	1362
430.51	1361.98	430.6	1361.93	431.7	1361.3	431.99	1361.14	432.17	1361.03
432.23	1361	433.22	1360.42	433.71	1360.14	433.84	1360.07	433.95	1360
435.07	1359.36	435.46	1359.14	435.69	1359.01	435.71	1359	437.24	1358.17
437.27	1358.15	437.29	1358.14	437.3	1358.14	437.46	1358.14	445.41	1358.14
446.78	1358.92	446.93	1359	447.05	1359.07	447.18	1359.14	447.5	1359.32
448.7	1360	448.93	1360.13	448.95	1360.14	449.02	1360.18	450.45	1361
450.62	1361.09	450.7	1361.14	451.02	1361.31	452.28	1362	452.44	1362.08
452.54	1362.14	452.97	1362.42	453.89	1363	453.97	1363.05	454.11	1363.14
455.15	1363.38	457.4	1364	457.99	1364.09	458.24	1364.07	458.73	1364.11
465.83	1364.07	475.22	1364.14	480.5	1364.14	484.59	1364.14	485.14	1364.14
489.56	1364.14	489.67	1364.14	489.76	1364.14	490.86	1364.14	491.84	1364.14
494.7	1364.14	499.82	1364.14	499.94	1364.14	500	1364.14		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	214.89	.028	285.11	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
181.5	328.34	100	100	100.01	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
340.37	500	1367.18	F

CROSS SECTION

RIVER: River
REACH: Ellsworth . RS: 300

INPUT
Description: Channel Station 61599.16, Begin Full Width Type "B" Bank Protection (n=0.40). Begin 56 foot Transition Zone to Flat Channel Bottom.

Station Elevation Data num= 178

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1362.14	26.62	1362.14	27.11	1362.14	30.52	1362.14	37.55	1362.14
37.97	1362.14	40.34	1362.14	42.68	1362.14	51.07	1362.14	61.1	1362.14
65.53	1362.14	65.99	1362.14	69.03	1362.14	70.77	1362.14	71.02	1362.18
71.32	1362.21	77.31	1363	77.86	1363.07	78.37	1363.14	81.13	1363.82
81.88	1364	82.09	1364.05	82.46	1364.14	85.58	1364.87	86.14	1365
86.18	1365.01	86.74	1365.14	89.02	1365.67	90.47	1366	90.61	1366.03
91.09	1366.14	94.51	1366.66	96.88	1367	97.67	1367.1	97.97	1367.14
113.78	1367.14	114.1	1367.14	114.17	1367.14	114.25	1367.13	114.41	1367.12
114.54	1367.11	114.73	1367.1	115.37	1367.06	116.38	1367	116.39	1367
116.4	1367	124.76	1366.47	126.12	1366.38	126.78	1366.34	128.51	1366.23
129.97	1366.14	131.86	1366.14	136.97	1366.14	140.81	1366.14	141.76	1366.14
147.2	1366.14	168.04	1366.14	168.3	1366.01	168.33	1366	168.73	1365.81
170.12	1365.14	170.18	1365.12	170.52	1365	171.3	1364.76	171.99	1364.53
173.09	1364.81	173.86	1365	176.5	1365.66	177.86	1366	178.67	1366
182.09	1364.34	183.74	1359.79	190.9	1361.58	192.89	1361.58	214.89	1356.08
250	1355.38	285.1	1356.08	318.94	1364.54	326.72	1366	328.67	1366

334.86	1366	336.93	1365.48	338.87	1365	339.27	1364.9	340.84	1364.51
346.16	1364.44	349.51	1364.39	360.3	1364.2	360.95	1364.18	361.89	1364.17
363.39	1364.14	364.11	1364.13	364.47	1364.13	367.53	1364.11	378.4	1364.14
378.55	1364.14	378.84	1364.14	379.92	1364.14	391.76	1364.14	392.13	1364.04
392.3	1364	393.73	1363.62	395.54	1363.14	395.67	1363.07	395.78	1363
396.46	1362.59	397.21	1362.14	397.37	1362.04	397.44	1362	398.17	1361.54
398.82	1361.14	398.89	1361.09	399.03	1361	399.98	1360.39	400.38	1360.14
400.6	1360.01	400.62	1360	401.82	1359.32	402.15	1359.14	402.29	1359.05
402.37	1359	402.65	1358.83	403.8	1358.14	403.88	1358.09	403.89	1358.07
403.94	1358.04	404	1358	404.06	1357.96	404.17	1357.88	404.27	1357.81
405.26	1357.14	408.85	1357.14	414.38	1357.14	415.14	1357.57	415.2	1357.6
415.27	1357.64	415.33	1357.67	415.47	1357.75	415.78	1357.92	415.92	1358
416.06	1358.08	416.16	1358.14	417.13	1358.68	417.69	1359	417.81	1359.07
417.93	1359.14	418.97	1359.72	419.46	1360	419.68	1360.12	419.7	1360.14
420.69	1360.78	421.03	1361	421.1	1361.05	421.24	1361.14	422.4	1361.72
422.94	1362	423.05	1362.05	423.25	1362.14	424.13	1362.5	425.32	1363
425.55	1363.08	425.73	1363.14	432.22	1363.85	433.64	1364	434.44	1364.08
434.98	1364.14	452.85	1364.99	453.12	1365	454.42	1365.07	455.88	1365.14
458.77	1365.14	470.42	1365.85	472.72	1366	474.23	1366.1	474.72	1366.13
474.97	1366.14	493.9	1366.14	500	1366.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	192.89	.04	326.72	.032

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

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
192.89	326.72	56	56	56	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
326.72	500	1366	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 244

INPUT
Description: Channel Station 61655.16, Upstream end of Concrete Cutoff Wall.
Station Elevation Data num= 175

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1359.21	26.62	1359.21	27.11	1359.21	30.52	1359.21	37.55	1359.21
37.97	1359.21	40.34	1359.21	42.68	1359.21	51.07	1359.21	61.1	1359.21
65.53	1359.21	65.99	1359.21	69.03	1359.21	70.77	1359.21	71.02	1359.25
71.32	1359.28	77.31	1360.07	77.86	1360.14	78.37	1360.21	81.13	1360.89
81.88	1361.07	82.09	1361.12	82.46	1361.21	85.58	1361.94	86.14	1362.07
86.18	1362.08	86.74	1362.21	89.02	1362.74	90.47	1363.07	90.61	1363.1
91.09	1363.21	94.51	1363.73	96.88	1364.07	97.67	1364.17	97.97	1364.21
113.78	1364.21	114.1	1364.21	114.17	1364.21	114.25	1364.2	114.41	1364.19
114.54	1364.18	114.73	1364.17	115.37	1364.13	116.38	1364.07	116.39	1364.07
116.4	1364.07	124.76	1363.54	126.12	1363.45	126.78	1363.41	128.51	1363.3
129.97	1363.21	131.86	1363.21	136.97	1363.21	140.81	1363.21	141.76	1363.21
147.2	1363.21	168.04	1363.21	168.3	1363.08	168.33	1363.07	168.73	1362.88
170.12	1362.21	170.18	1362.19	170.52	1362.07	171.3	1361.83	171.99	1361.6
173.09	1361.88	173.86	1362.07	176.5	1362.73	177.86	1363.07	178.67	1363.07
182.09	1364.2	214.9	1355.3	250	1355.3	285.11	1355.3	317.92	1364.2
326.72	1363.07	328.67	1363.07	334.86	1363.07	336.93	1362.55	338.87	1362.07
339.27	1361.97	340.84	1361.58	346.16	1361.51	349.51	1361.46	360.3	1361.27
360.95	1361.25	361.89	1361.24	363.39	1361.21	364.11	1361.2	364.47	1361.2
367.53	1361.18	378.4	1361.21	378.55	1361.21	378.84	1361.21	379.92	1361.21
391.76	1361.21	392.13	1361.11	392.3	1361.07	393.73	1360.69	395.54	1360.21
395.67	1360.14	395.78	1360.07	396.46	1359.66	397.21	1359.21	397.37	1359.11
397.44	1359.07	398.17	1358.61	398.82	1358.21	398.89	1358.16	399.03	1358.07
399.98	1357.46	400.38	1357.21	400.6	1357.08	400.62	1357.07	401.82	1356.39
402.15	1356.21	402.29	1356.12	402.37	1356.07	402.65	1355.9	403.8	1355.21
403.88	1355.16	403.89	1355.14	403.94	1355.11	404	1355.07	404.06	1355.03
404.17	1354.95	404.27	1354.88	405.26	1354.21	408.85	1354.21	414.38	1354.21
415.14	1354.64	415.2	1354.67	415.27	1354.71	415.33	1354.74	415.47	1354.82
415.78	1354.99	415.92	1355.07	416.06	1355.15	416.16	1355.21	417.13	1355.75
417.69	1356.07	417.81	1356.14	417.93	1356.21	418.97	1356.79	419.46	1357.07
419.68	1357.19	419.7	1357.21	420.69	1357.85	421.03	1358.07	421.1	1358.12
421.24	1358.21	422.4	1358.79	422.94	1359.07	423.05	1359.12	423.25	1359.21
424.13	1359.57	425.32	1360.07	425.55	1360.15	425.73	1360.21	432.22	1360.92
433.64	1361.07	434.44	1361.15	434.98	1361.21	452.85	1362.06	453.12	1362.07
454.42	1362.14	455.88	1362.21	458.77	1362.21	470.42	1362.92	472.72	1363.07

```
  474.23 1363.17  474.72  1363.2  474.97 1363.21   493.9 1363.21     500 1363.21

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .032  182.09    .013  317.92    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.92                 1       1       1              .1       .3
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
       0  182.09  1364.2       F
  317.92     500  1364.2       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 243

INPUT
Description: Channel Station 61656.16, Downstream end of Concrete Cutoff Wall.
             Beginning of Grouted Riprap Transition Zone to Tie-in to existing
             2 foot drop structure.
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  182.09 1363.44   214.9 1355.24     250 1355.24   285.1 1355.24  317.91 1363.44

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  182.09          182.09    .013  317.91

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        182.09  317.91                39      39      39              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 204

INPUT
Description: Channel Station 61695.16, Tie in With Existing 2' Drop Structure
Station Elevation Data    num=     175
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1359.13   26.62 1359.13   27.11 1359.13   30.52 1359.13   37.55 1359.13
   37.97 1359.13   40.34 1359.13   42.68 1359.13   51.07 1359.13    61.1 1359.13
   65.53 1359.13   65.99 1359.13   69.03 1359.13   70.77 1359.13   71.02 1359.17
   71.32  1359.2   77.31 1359.99   77.86 1360.06   78.37 1360.13   81.13 1360.81
   81.88 1360.99   82.09 1361.04   82.46 1361.13   85.58 1361.86   86.14 1361.99
   86.18    1362   86.74 1362.13   89.02 1362.66   90.47 1362.99   90.61 1363.02
   91.09 1363.13   94.51 1363.65   96.88 1363.99   97.67 1364.09   97.97 1364.13
  113.78 1364.13   114.1 1364.13  114.17 1364.13  114.25 1364.12  114.41 1364.11
  114.54  1364.1  114.73 1364.09  115.37 1364.05  116.38 1363.99  116.39 1363.99
   116.4 1363.99  124.76 1363.46  126.12 1363.37  126.78 1363.33  128.51 1363.22
  129.97 1363.13  131.86 1363.13  136.97 1363.13  140.81 1363.13  141.76 1363.13
   147.2 1363.13  168.04 1363.13   168.3    1363  168.33 1362.99  168.73  1362.8
  170.12 1362.13  170.18 1362.11  170.52 1361.99   171.3 1361.75  171.99 1361.52
  173.09  1361.8  173.86 1361.99   176.5 1362.65  177.86 1362.99  178.67 1362.99
   200.5 1361.14   212.5 1355.14     250 1355.14   287.5 1355.14   299.5 1361.14
  326.72 1362.99  328.67 1362.99  334.86 1362.99  336.93 1362.47  338.87 1361.99
  339.27 1361.89  340.84  1361.5  346.16 1361.43  349.51 1361.38   360.3 1361.19
  360.95 1361.17  361.89 1361.16  363.39 1361.13  364.11 1361.12  364.47 1361.12
  367.53  1361.1   378.4 1361.13  378.55 1361.13  378.84 1361.13  379.92 1361.13
  391.76 1361.13  392.13 1361.03   392.3 1360.99  393.73 1360.61  395.54 1360.13
  395.67 1360.06  395.78 1359.99  396.46 1359.58  397.21 1359.13  397.37 1359.03
  397.44 1358.99  398.17 1358.53  398.82 1358.13  398.89 1358.08  399.03 1357.99
  399.98 1357.38  400.38 1357.13   400.6    1357  400.62 1356.99  401.82 1356.31
  402.15 1356.13  402.29 1356.04  402.37 1355.99  402.65 1355.82   403.8 1355.13
  403.88 1355.08  403.89 1355.06  403.94 1355.03     404 1354.99  404.06 1354.95
  404.17 1354.87  404.27  1354.8  405.26 1354.13  408.85 1354.13  414.38 1354.13
  415.14 1354.56   415.2 1354.59  415.27 1354.63  415.33 1354.66  415.47 1354.74
  415.78 1354.91  415.92 1354.99  416.06 1355.07  416.16 1355.13  417.13 1355.67
  417.69 1355.99  417.81 1356.06  417.93 1356.13  418.97 1356.71  419.46 1356.99
```

419.68	1357.11	419.7	1357.13	420.69	1357.77	421.03	1357.99	421.1	1358.04
421.24	1358.13	422.4	1358.71	422.94	1358.99	423.05	1359.04	423.25	1359.13
424.13	1359.49	425.32	1359.99	425.55	1360.07	425.73	1360.13	432.22	1360.84
433.64	1360.99	434.44	1361.07	434.98	1361.13	452.85	1361.98	453.12	1361.99
454.42	1362.06	455.88	1362.13	458.77	1362.13	470.42	1362.84	472.72	1362.99
474.23	1363.09	474.72	1363.12	474.97	1363.13	493.9	1363.13	500	1363.13

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	200.5	.013	299.5	.032

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

200.5	299.5	.1	.1	.1	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	178.67	1363.05	F
326.72	500	1363.05	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 203.9

INPUT
Description: Channel Station 61695.16, At D.S. Face of Existing 2' Drop Structure
Station Elevation Data num= 177

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1357.13	26.62	1357.13	27.11	1357.13	30.52	1357.13	37.55	1357.13
37.97	1357.13	40.34	1357.13	42.68	1357.13	51.07	1357.13	61.1	1357.13
65.53	1357.13	65.99	1357.13	69.03	1357.13	70.77	1357.13	71.02	1357.17
71.32	1357.2	77.31	1357.99	77.86	1358.06	78.37	1358.13	81.13	1358.81
81.88	1358.99	82.09	1359.04	82.46	1359.13	85.58	1359.86	86.14	1359.99
86.18	1360	86.74	1360.13	89.02	1360.66	90.47	1360.99	90.61	1361.02
91.09	1361.13	94.51	1361.65	96.88	1361.99	97.67	1362.09	97.97	1362.13
113.78	1362.13	114.1	1362.13	114.17	1362.13	114.25	1362.12	114.41	1362.11
114.54	1362.1	114.73	1362.09	115.37	1362.05	116.38	1361.99	116.39	1361.99
116.4	1361.99	124.76	1361.46	126.12	1361.37	126.78	1361.33	128.51	1361.22
129.97	1361.13	131.86	1361.13	136.97	1361.13	140.81	1361.13	141.76	1361.13
147.2	1361.13	168.04	1361.13	168.3	1361	168.33	1360.99	168.73	1360.8
170.12	1360.13	170.18	1360.11	170.52	1359.99	171.3	1359.75	171.99	1359.52
173.09	1359.8	173.86	1359.99	176.5	1360.65	177.86	1360.99	178.67	1360.99
200.5	1359.14	208.5	1355.14	212.5	1353.14	250	1353.14	287.5	1353.14
291.5	1355.14	299.5	1359.14	326.72	1360.99	328.67	1360.99	334.86	1360.99
336.93	1360.47	338.87	1359.99	339.27	1359.89	340.84	1359.5	346.16	1359.43
349.51	1359.38	360.3	1359.19	360.95	1359.17	361.89	1359.16	363.39	1359.13
364.11	1359.12	364.47	1359.12	367.53	1359.1	378.4	1359.13	378.55	1359.13
378.84	1359.13	379.92	1359.13	391.76	1359.13	392.13	1359.03	392.3	1358.99
393.73	1358.61	395.54	1358.13	395.67	1358.06	395.78	1357.99	396.46	1357.58
397.21	1357.13	397.37	1357.03	397.44	1356.99	398.17	1356.53	398.82	1356.13
398.89	1356.08	399.03	1355.99	399.98	1355.38	400.38	1355.13	400.6	1355
400.62	1354.99	401.82	1354.31	402.15	1354.13	402.29	1354.04	402.37	1353.99
402.65	1353.82	403.8	1353.13	403.88	1353.08	403.89	1353.06	403.94	1353.03
404	1352.99	404.06	1352.95	404.17	1352.87	404.27	1352.8	405.26	1352.13
408.85	1352.13	414.38	1352.13	415.14	1352.56	415.2	1352.59	415.27	1352.63
415.33	1352.66	415.47	1352.74	415.78	1352.91	415.92	1352.99	416.06	1353.07
416.16	1353.13	417.13	1353.67	417.69	1353.99	417.81	1354.06	417.93	1354.13
418.97	1354.71	419.46	1354.99	419.68	1355.11	419.7	1355.13	420.69	1355.77
421.03	1355.99	421.1	1356.04	421.24	1356.13	422.4	1356.71	422.94	1356.99
423.05	1357.04	423.25	1357.13	424.13	1357.49	425.32	1357.99	425.55	1358.07
425.73	1358.13	432.22	1358.84	433.64	1358.99	434.44	1359.07	434.98	1359.13
452.85	1359.98	453.12	1359.99	454.42	1360.06	455.88	1360.13	458.77	1360.13
470.42	1360.84	472.72	1360.99	474.23	1361.09	474.72	1361.12	474.97	1361.13
493.9	1361.13	500	1361.13						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	200.5	.013	299.5	.032

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

200.5	299.5	20	20	20	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
      0  178.67 1361.05       F
  326.72     500 1361.05       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 183.9

INPUT
Description: Channel Station 61715.16, At End of Concrete Apron, Begin Grouted
             Rip-rap protection on channel bottom.
Station Elevation Data    num=     175
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1357.19   26.62 1357.19   27.11 1357.19   30.52 1357.19   37.55 1357.19
   37.97 1357.19   40.34 1357.19   42.68 1357.19   51.07 1357.19    61.1 1357.19
   65.53 1357.19   65.99 1357.19   69.03 1357.19   70.77 1357.19   71.02 1357.23
   71.32 1357.26   77.31 1358.05   77.86 1358.12   78.37 1358.19   81.13 1358.87
   81.88 1359.05   82.09  1359.1   82.46 1359.19   85.58 1359.92   86.14 1360.05
   86.18 1360.06   86.74 1360.19   89.02 1360.72   90.47 1361.05   90.61 1361.08
   91.09 1361.19   94.51 1361.71   96.88 1362.05   97.67 1362.15   97.97 1362.19
  113.78 1362.19   114.1 1362.19  114.17 1362.19  114.25 1362.18  114.41 1362.17
  114.54 1362.16  114.73 1362.15  115.37 1362.11  116.38 1362.05  116.39 1362.05
   116.4 1362.05  124.76 1361.52  126.12 1361.43  126.78 1361.39  128.51 1361.28
  129.97 1361.19  131.86 1361.19  136.97 1361.19  140.81 1361.19  141.76 1361.19
   147.2 1361.19  168.04 1361.19   168.3 1361.06  168.33 1361.05  168.73 1360.86
  170.12 1360.19  170.18 1360.17  170.52 1360.05   171.3 1359.81  171.99 1359.58
  173.09 1359.86  173.86 1360.05   176.5 1360.71  177.86 1361.05  178.67 1361.05
   200.5  1359.2   212.5  1353.2     250  1353.2   287.5  1353.2   299.5  1359.2
  326.72 1361.05  328.67 1361.05  334.86 1361.05  336.93 1360.53  338.87 1360.05
  339.27 1359.95  340.84 1359.56  346.16 1359.49  349.51 1359.44   360.3 1359.25
  360.95 1359.23  361.89 1359.22  363.39 1359.19  364.11 1359.18  364.47 1359.18
  367.53 1359.16   378.4 1359.19  378.55 1359.19  378.84 1359.19  379.92 1359.19
  391.76 1359.19  392.13 1359.09   392.3 1359.05  393.73 1358.67  395.54 1358.19
  395.67 1358.12  395.78 1358.05  396.46 1357.64  397.21 1357.19  397.37 1357.09
  397.44 1357.05  398.17 1356.59  398.82 1356.19  398.89 1356.14  399.03 1356.05
  399.98 1355.44  400.38 1355.19   400.6 1355.06  400.62 1355.05  401.82 1354.37
  402.15 1354.19  402.29  1354.1  402.37 1354.05  402.65 1353.88   403.8 1353.19
  403.88 1353.14  403.89 1353.12  403.94 1353.09     404 1353.05  404.06 1353.01
  404.17 1352.93  404.27 1352.86  405.26 1352.19  408.85 1352.19  414.38 1352.19
  415.14 1352.62   415.2 1352.65  415.27 1352.69  415.33 1352.72  415.47  1352.8
  415.78 1352.97  415.92 1353.05  416.06 1353.13  416.16 1353.19  417.13 1353.73
  417.69 1354.05  417.81 1354.12  417.93 1354.19  418.97 1354.77  419.46 1355.05
  419.68 1355.17   419.7 1355.19  420.69 1355.83  421.03 1356.05   421.1  1356.1
  421.24 1356.19   422.4 1356.77  422.94 1357.05  423.05  1357.1  423.25 1357.19
  424.13 1357.55  425.32 1358.05  425.55 1358.13  425.73 1358.19  432.22  1358.9
  433.64 1359.05  434.44 1359.13  434.98 1359.19  452.85 1360.04  453.12 1360.05
  454.42 1360.12  455.88 1360.19  458.77 1360.19  470.42  1360.9  472.72 1361.05
  474.23 1361.15  474.72 1361.18  474.97 1361.19   493.9 1361.19     500 1361.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .032   200.5     .04   299.5    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         200.5   299.5                 20      20      20              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  178.67 1361.05       F
  326.72     500 1361.05       F

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 163.9

INPUT
Description: Channel Station 61735.26, At End of Grouted Riprap Section.
Station Elevation Data    num=     175
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1357.02   26.62 1357.02   27.11 1357.02   30.52 1357.02   37.55 1357.02
   37.97 1357.02   40.34 1357.02   42.68 1357.02   51.07 1357.02    61.1 1357.02
   65.53 1357.02   65.99 1357.02   69.03 1357.02   70.77 1357.02   71.02 1357.06
```

71.32	1357.09	77.31	1357.88	77.86	1357.95	78.37	1358.02	81.13	1358.7
81.88	1358.88	82.09	1358.93	82.46	1359.02	85.58	1359.75	86.14	1359.88
86.18	1359.89	86.74	1360.02	89.02	1360.55	90.47	1360.88	90.61	1360.91
91.09	1361.02	94.51	1361.54	96.88	1361.88	97.67	1361.98	97.97	1362.02
113.78	1362.02	114.1	1362.02	114.17	1362.02	114.25	1362.01	114.41	1362
114.54	1361.99	114.73	1361.98	115.37	1361.94	116.38	1361.88	116.39	1361.88
116.4	1361.88	124.76	1361.35	126.12	1361.26	126.78	1361.22	128.51	1361.11
129.97	1361.02	131.86	1361.02	136.97	1361.02	140.81	1361.02	141.76	1361.02
147.2	1361.02	168.04	1361.02	168.3	1360.89	168.33	1360.88	168.73	1360.69
170.12	1360.02	170.18	1360	170.52	1359.88	171.3	1359.64	171.99	1359.41
173.09	1359.69	173.86	1359.88	176.5	1360.54	177.86	1360.88	178.67	1360.88
200.5	1359.03	212.5	1353.03	250	1353.03	287.5	1353.03	299.5	1359.03
326.72	1360.88	328.67	1360.88	334.86	1360.88	336.93	1360.36	338.87	1359.88
339.27	1359.78	340.84	1359.39	346.16	1359.32	349.51	1359.27	360.3	1359.08
360.95	1359.06	361.89	1359.05	363.39	1359.02	364.11	1359.01	364.47	1359.01
367.53	1358.99	378.4	1359.02	378.55	1359.02	378.84	1359.02	379.92	1359.02
391.76	1359.02	392.13	1358.92	392.3	1358.88	393.73	1358.5	395.54	1358.02
395.67	1357.95	395.78	1357.88	396.46	1357.47	397.21	1357.02	397.37	1356.92
397.44	1356.88	398.17	1356.42	398.82	1356.02	398.89	1355.97	399.03	1355.88
399.98	1355.27	400.38	1355.02	400.6	1354.89	400.62	1354.88	401.82	1354.2
402.15	1354.02	402.29	1353.93	402.37	1353.88	402.65	1353.71	403.8	1353.02
403.88	1352.97	403.89	1352.95	403.94	1352.92	404	1352.88	404.06	1352.84
404.17	1352.76	404.27	1352.69	405.26	1352.02	408.85	1352.02	414.38	1352.02
415.14	1352.45	415.2	1352.48	415.27	1352.52	415.33	1352.55	415.47	1352.63
415.78	1352.8	415.92	1352.88	416.06	1352.96	416.16	1353.02	417.13	1353.56
417.69	1353.88	417.81	1353.95	417.93	1354.02	418.97	1354.6	419.46	1354.88
419.68	1355	419.7	1355.02	420.69	1355.66	421.03	1355.88	421.1	1355.93
421.24	1356.02	422.4	1356.6	422.94	1356.88	423.05	1356.93	423.25	1357.02
424.13	1357.38	425.32	1357.88	425.55	1357.96	425.73	1358.02	432.22	1358.73
433.64	1358.88	434.44	1358.96	434.98	1359.02	452.85	1359.87	453.12	1359.88
454.42	1359.95	455.88	1360.02	458.77	1360.02	470.42	1360.73	472.72	1360.88
474.23	1360.98	474.72	1361.01	474.97	1361.02	493.9	1361.02	500	1361.02

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.032	200.5	.028	299.5	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
200.5	299.5	63.9	63.9	63.9	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	178.67	1360.88	F
326.72	500	1360.88	F

CROSS SECTION

RIVER: River
REACH: Ellsworth RS: 100

INPUT
Description: Channel Station 61799.16
Station Elevation Data num= 256

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1360.14	10.37	1360.14	11.08	1360.14	13.3	1360.14	13.49	1360.14
16.57	1360.14	20.74	1360.14	26.76	1360.3	28.87	1360.34	32.11	1360.41
32.92	1360.43	33.9	1360.45	56.66	1361	56.73	1361	61.44	1361.12
62.39	1361.14	64.15	1361.36	69.24	1362	70.27	1362.12	70.43	1362.14
72.15	1362.6	73.68	1363	73.71	1363.01	74.19	1363.14	74.71	1363.27
77.29	1363.94	77.54	1364	78.06	1364.14	79.88	1364.59	81.49	1365
82.03	1365.14	85.27	1365.81	86.14	1366	86.38	1366.05	86.81	1366.14
88.47	1366.14	95.38	1366.14	108.15	1366.14	120.89	1366.14	136.15	1366.14
138.4	1366.48	139.13	1366.56	140.89	1366.75	143.24	1367	144.33	1367.12
144.46	1367.13	144.57	1367.14	145.4	1367.14	146.22	1367.14	154.8	1367.14
160.4	1367.14	162.74	1367.14	164.38	1367.14	165.15	1367.14	165.52	1367.01
165.55	1367	166.08	1366.79	167.8	1366.14	167.98	1366.06	168.11	1366
169.04	1365.68	170.02	1365.31	170.48	1365.14	170.72	1365	170.73	1365
172.73	1364.14	172.85	1364.09	173.09	1364	174.51	1363.44	175.26	1363.14
175.32	1363.11	175.48	1363.03	175.53	1363	175.64	1362.95	177.25	1362.14
177.74	1362	177.75	1362	178.35	1361.77	178.75	1361.61	179.78	1361.14
180.33	1361.09	181.41	1361	190.06	1360.26	191.51	1360.14	191.56	1360.12
191.66	1360.09	191.9	1360	193.28	1359.53	194.46	1359.14	194.6	1359.09
194.87	1359	196.38	1358.5	197.5	1358.14	197.75	1358.05	197.9	1358
200.38	1357.15	200.42	1357.14	200.5	1357.11	200.84	1357	201.23	1356.87
203.43	1356.14	203.56	1356.09	203.84	1356	205.5	1355.45	206.44	1355.14

```
  206.79 1355.02  206.84    1355  208.74 1354.34  209.33 1354.14  209.72 1354.01
  209.74    1354  209.85 1353.96  211.08 1353.54  212.27 1353.14  216.68 1353.01
  217.02    1353  221.93 1352.86  227.68 1352.71  245.58 1352.47  253.03 1352.51
  260.72 1352.53  274.12 1352.73  279.23 1352.88  281.27 1352.95  282.91    1353
  284.93 1353.05  286.85  1353.1  287.25 1353.11  287.57 1353.12  287.68 1353.12
  287.75 1353.12  288.74 1353.14  290.16 1353.22  290.25 1353.22  290.33 1353.22
  290.39 1353.22  290.43 1353.22   293.4 1353.35  293.54 1353.35  293.74 1353.36
   293.9 1353.36  294.08 1353.36   294.3 1353.37  297.85 1353.48  298.36 1353.49
  299.12  1353.5  299.69 1353.51  301.69 1353.56  302.03 1353.56  302.12 1353.56
  302.23 1353.56  302.37 1353.56  302.55 1353.56  306.66 1353.54  306.89 1353.53
  307.15 1353.53  307.46 1353.52  307.71 1353.52  307.89 1353.51  308.02 1353.51
  313.52 1353.28  313.64 1353.28  313.79 1353.27  313.97 1353.26  314.11 1353.26
  314.21 1353.25  315.76 1353.14  316.75 1353.08   318.1    1353  322.15 1352.75
  322.36 1352.74  326.13 1352.52  329.88 1352.33  330.77 1352.28  333.32 1352.14
  334.85 1352.14  340.83 1352.14  348.77 1352.14  350.03  1352.2  350.11 1352.21
  350.47 1352.23  351.66  1352.3  362.93    1353  364.47 1353.09  365.13 1353.14
  365.96 1353.37  366.77 1353.54  368.99    1354  369.34 1354.06  369.85 1354.14
   370.9 1354.57  371.94    1355  372.09 1355.06  372.27 1355.14  373.66  1355.8
  374.06    1356  374.33 1356.11   374.4 1356.14  375.59  1356.7  376.25    1357
  376.37 1357.05  376.57 1357.14  378.05 1357.81  378.47    1358  378.75 1358.13
  378.78 1358.14   378.8 1358.15  379.01 1358.24  380.48  1358.9  380.72    1359
  380.79 1359.03  381.03 1359.14     382 1359.58  382.91    1360  383.03 1360.05
  383.21 1360.14  384.35 1360.64  385.16    1361   385.2 1361.02  385.48 1361.14
  385.97 1361.36  387.41    1362  387.55 1362.06   387.7 1362.13  387.73 1362.14
  389.64    1363  389.65    1363  389.97 1363.14  391.16 1363.67  391.89    1364
  392.08 1364.08   392.2 1364.14  393.31 1364.62  394.17    1365  394.34 1365.08
   394.5 1365.14  396.39 1365.14  400.77 1365.14  402.49 1365.14  403.71 1365.14
  404.17 1365.14  405.41 1365.14   406.3 1365.14  413.98 1365.32  414.14 1365.32
  414.16 1365.32  438.83 1365.55   460.2 1365.37  478.23 1365.49  481.91 1365.51
  484.14  1365.5  488.64 1365.22  489.55 1365.44   489.6 1365.62  489.62 1365.66
  489.71 1365.61

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .032  165.15    .028   394.5    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        165.15   394.5               100     100     100              .1       .3

CROSS SECTION


RIVER: River
REACH: Ellsworth          RS: 0

INPUT
Description: confluence with Powerline Floodway
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
3149.606 1365.293156.923 1365.293161.975 1365.293166.175 1365.293171.851 1366.14
3172.638 1366.273176.509 1366.863179.364 1367.253182.185 1367.253187.795 1367.16
3189.567 1366.963193.012 1366.793196.358 1366.273198.622 1365.123200.427 1364.27
3200.656 1364.143202.395 1363.283202.526 1363.183203.839 1362.633204.396 1362.27
3205.479 1361.74 3206.43 1361.283207.972 1360.853211.581 1360.273215.519 1359.77
3216.601 1359.673218.373 1359.583221.096 1359.253222.047 1358.953223.983 1358.26
3226.936 1357.383227.264 1357.283228.084 1357.023230.381 1356.263231.923 1355.74
3233.301 1355.283235.138 1354.663236.352 1354.263239.469 1353.283239.534 1353.28
3240.322 1353.243263.681 1352.26 3280.84 1352.263281.168 1352.263292.421 1352.26
3313.517 1352.263315.518 1352.263320.669 1352.263338.287 1352.723359.022 1353.21
3360.203 1353.243361.286 1353.283361.942 1353.513363.878 1354.263364.239 1354.42
3365.453 1354.893366.371 1355.283367.388 1355.673368.897 1356.263369.652 1356.59
 3371.26 1357.283372.113 1357.643373.163 1358.263375.295 1359.213375.361 1359.25
3377.493 1360.233377.559 1360.273377.756 1360.36 3379.79 1361.283380.708 1361.68
3381.988 1362.273384.088 1363.253384.121 1363.283384.186 1363.283386.385 1364.27
3399.967 1364.273400.591 1364.273404.396 1364.273412.106 1364.53

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
3149.606    .0323198.622    .0283386.385    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      3198.6223386.385                 0       0       0              .1       .3

*******************************************************************************
```

SUMMARY OF MANNING'S N VALUES

River:River

Reach	River Sta.	n1	n2	n3	n4	n5
Ellsworth	17100	.025	.032	.028	.032	.025
Ellsworth	17000	.025	.032	.028	.032	.025
Ellsworth	16900	.025	.032	.028	.032	.025
Ellsworth	16800	.025	.032	.028	.032	.025
Ellsworth	16700	.025	.032	.028	.032	.025
Ellsworth	16600	.025	.032	.028	.032	.025
Ellsworth	16500	.025	.032	.028	.032	.025
Ellsworth	16400	.025	.032	.028	.032	.025
Ellsworth	16300	.025	.032	.028	.032	.025
Ellsworth	16200	.025	.032	.028	.032	.025
Ellsworth	16100	.025	.032	.028	.032	.025
Ellsworth	16000	.025	.032	.028	.032	.025
Ellsworth	15966.5	.025	.04	.028	.04	.025
Ellsworth	15947.5	.025	.04	.025	.035	
Ellsworth	15937.5	.025	.015	.025		
Ellsworth	15920.67		.015			
Ellsworth	15895	Culvert				
Ellsworth	15870.67		.015			
Ellsworth	15855.5	.025	.04	.025		
Ellsworth	15845.5	.025	.04	.028	.04	.025
Ellsworth	15826.6	.025	.032	.028	.032	.025
Ellsworth	15809	.025	.032	.028	.032	.025
Ellsworth	15800	.025	.032	.028	.032	.025
Ellsworth	15700	.025	.032	.028	.032	.025
Ellsworth	15600	.025	.032	.028	.032	.025
Ellsworth	15550	.025	.04	.025		
Ellsworth	15460	.025	.015	.025		
Ellsworth	15450	.025	.015	.025		
Ellsworth	15350	Culvert				
Ellsworth	15192	.025	.04	.025		
Ellsworth	15100	.025	.04	.025		
Ellsworth	15000	.025	.032	.028	.032	.025
Ellsworth	14900	.025	.032	.028	.032	.025
Ellsworth	14800	.025	.032	.028	.032	.025
Ellsworth	14700	.025	.032	.028	.032	.025
Ellsworth	14600	.025	.032	.028	.032	.025
Ellsworth	14579	.025	.032	.028	.032	.025
Ellsworth	14569	.025	.032	.028	.032	.025
Ellsworth	14501	.025	.032	.028	.032	.025
Ellsworth	14491	.025	.032	.028	.032	.025
Ellsworth	14490	Lat Struct				
Ellsworth	14451	.025	.032	.028	.032	.025
Ellsworth	14400	.025	.032	.028	.032	.025
Ellsworth	14300	.025	.032	.028	.032	.025
Ellsworth	14200	.025	.032	.028	.032	.025
Ellsworth	14100	.025	.032	.028	.032	.025
Ellsworth	14000	.025	.04	.04	.032	.025
Ellsworth	13900	.025	.032	.028	.032	.025
Ellsworth	13800	.025	.032	.028	.032	.025
Ellsworth	13700	.025	.032	.028	.032	.025
Ellsworth	13600	.025	.032	.028	.032	.025
Ellsworth	13500	.025	.032	.028	.032	.025
Ellsworth	13400	.025	.032	.028	.032	.025
Ellsworth	13300	.025	.032	.028	.032	.025
Ellsworth	13200	.025	.032	.028	.032	.025
Ellsworth	13100	.025	.032	.028	.032	.025
Ellsworth	13000	.025	.032	.028	.032	.025
Ellsworth	12900	.025	.032	.028	.032	.025
Ellsworth	12800	.025	.032	.028	.032	.025
Ellsworth	12700	.025	.032	.028	.032	.025
Ellsworth	12600	.025	.032	.028	.032	.025
Ellsworth	12500	.025	.032	.028	.032	.025
Ellsworth	12400	.025	.032	.028	.032	.025
Ellsworth	12300	.025	.032	.028	.032	.025
Ellsworth	12200	.025	.032	.028	.032	.025
Ellsworth	12100	.025	.032	.028	.032	.025
Ellsworth	12000	.025	.032	.028	.032	.025
Ellsworth	11900	.025	.032	.028	.032	.025
Ellsworth	11800	.025	.032	.028	.032	.025
Ellsworth	11700	.025	.032	.028	.032	.025

*Ellsworth	*	11600	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	11500	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	11400	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	11300	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	11200	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	11100	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	11000	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10900	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10800	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10700	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10650.9	*	.04*	.028*	.04*	.025*	*
*Ellsworth	*	10623.7	*	.04*	.025*	.032*	*	*
*Ellsworth	*	10613.7	*	*	.015*	.025*	*	*
*Ellsworth	*	10600.87	*	*	.015*	*	*	*
*Ellsworth	*	10570	*Culvert	*	*	*	*	*
*Ellsworth	*	10539.74	*	*	.015*	*	*	*
*Ellsworth	*	10528.5	*	.04*	.025*	*	*	*
*Ellsworth	*	10518.5	*	.04*	.028*	.04*	.025*	.032*
*Ellsworth	*	10490.7	*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	10400	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10300	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10200	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10100	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	10000	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	9900	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	9800	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	9700	*	.025*	.04*	.025*	*	*
*Ellsworth	*	9600	*	.025*	.04*	.025*	*	*
*Ellsworth	*	9500	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	9400	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	9340.54	*	.04*	.028*	.04*	.025*	*
*Ellsworth	*	9314.67	*	.04*	.025*	.035*	*	*
*Ellsworth	*	9304.67	*	*	.015*	.025*	*	*
*Ellsworth	*	9288.82	*	*	.015*	*	*	*
*Ellsworth	*	9248	*Culvert	*	*	*	*	*
*Ellsworth	*	9207.65	*	*	.015*	*	*	*
*Ellsworth	*	9193.48	*	.04*	.025*	*	*	*
*Ellsworth	*	9183.48	*	.04*	.028*	.04*	.025*	.032*
*Ellsworth	*	9154.01	*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	9143	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	9100	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	9000	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8900	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8800	*	.025*	.04*	.025*	*	*
*Ellsworth	*	8700	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8600	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8500	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8400	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8300	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8200	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8100	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	8000	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7900	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7800	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7700	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7600	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7500	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7400	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7300	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7200	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7100	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	7000	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	6900	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	6800	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	6700	*	.025*	.032*	.028*	.032*	.025*
*Ellsworth	*	6687.62	*	.04*	.028*	.04*	.025*	*
*Ellsworth	*	6675.17*	*	.04*	.025*	*	*	*
*Ellsworth	*	6662.73	*	*	.015*	.025*	*	*
*Ellsworth	*	6646.88	*	*	.015*	*	*	*
*Ellsworth	*	6615	*Culvert	*	*	*	*	*
*Ellsworth	*	6585.95	*	*	.015*	*	*	*
*Ellsworth	*	6571.49	*	*	.04*	.025*	*	*
*Ellsworth	*	6559.04*	*	.04*	.028*	.04*	.025*	*
*Ellsworth	*	6546.60	*	.032*	.028*	.032*	.025*	*
*Ellsworth	*	6527	*	.032*	.028*	.032*	*	*
*Ellsworth	*	6500	*	.032*	.028*	.032*	*	*
*Ellsworth	*	6400	*	.032*	.028*	.032*	*	*

*Ellsworth	*	6300	*	.032*	.028*	.032*	*	*
*Ellsworth	*	6200	*	.032*	.028*	.032*	*	*
*Ellsworth	*	6100	*	.032*	.028*	.032*	*	*
*Ellsworth	*	6000	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5900	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5800	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5700	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5600	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5500	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5400	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5300	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5200	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5100	*	.032*	.028*	.032*	*	*
*Ellsworth	*	5000	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4900	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4800	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4700	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4674	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4664	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4600	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4500	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4400	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4300	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4200	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4100	*	.032*	.028*	.032*	*	*
*Ellsworth	*	4000	*	.032*	.028*	.032*	*	*
*Ellsworth	*	3900	*	.032*	.028*	.032*	*	*
*Ellsworth	*	3800	*	.032*	.028*	.032*	*	*
*Ellsworth	*	3700	*	.032*	.028*	.032*	*	*
*Ellsworth	*	3600	*	.032*	.028*	.032*	*	*
*Ellsworth	*	3505.64	*	.032*	.013*	.032*	*	*
*Ellsworth	*	3473.65	*	.032*	.013*	.032*	*	*
*Ellsworth	*	3473.64	*	.032*	.013*	.032*	*	*
*Ellsworth	*	3461.64	*	.032*	.032*	.013*	.032*	*
*Ellsworth	*	3461.63	*	.032*	.013*	.032*	*	*
*Ellsworth	*	3460.63	*	.032*	.013*	.032*	*	*
*Ellsworth	*	3444.63	*	.032*	.04*	.013*	.04*	.032*
*Ellsworth	*	3444.62	*	.032*	.04*	.032*	*	*
*Ellsworth	*	3432.91	*	.032*	.04*	.032*	*	*
*Ellsworth	*	3425.08	*	.032*	.04*	.032*	*	*
*Ellsworth	*	3400	*	.032*	.04*	.028*	.032*	*
*Ellsworth	*	3300	*	.032*	.04*	.028*	.032*	*
*Ellsworth	*	3200	*	.032*	.04*	.028*	.032*	*
*Ellsworth	*	3100	*	.032*	.04*	.032*	*	*
*Ellsworth	*	3000	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2900	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2800	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2700	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2654.00*	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2608.01	*	.032*	.04*	.032*	*	*
*Ellsworth	*	2598.02	*	.032*	.015*	.032*	*	*
*Ellsworth	*	2581.04	*	*	.015*	*	*	*
*Ellsworth	*	2569	*Culvert	*	*	*	*	*
*Ellsworth	*	2557.04	*	*	.015*	*	*	*
*Ellsworth	*	2542.01	*	.032*	.04*	.032*	*	*
*Ellsworth	*	2532.01	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2513.15*	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2400	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2300	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2200	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2100	*	.032*	.028*	.032*	*	*
*Ellsworth	*	2000	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1900	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1800	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1700	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1600	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1500	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1400	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1300	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1200	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1100	*	.032*	.028*	.032*	*	*
*Ellsworth	*	1000	*	.032*	.028*	.032*	*	*
*Ellsworth	*	900	*	.032*	.028*	.032*	*	*
*Ellsworth	*	800	*	.032*	.028*	.032*	*	*
*Ellsworth	*	700	*	.032*	.028*	.032*	*	*
*Ellsworth	*	600	*	.032*	.028*	.032*	*	*
*Ellsworth	*	500	*	.032*	.028*	.032*	*	*

*Ellsworth	*	400	*	.032*	.028*	.032*	*	*
*Ellsworth	*	300	*	.032*	.04*	.032*	*	*
*Ellsworth	*	244	*	.032*	.013*	.032*	*	*
*Ellsworth	*	243	*	*	.013*	*	*	*
*Ellsworth	*	204	*	.032*	.013*	.032*	*	*
*Ellsworth	*	203.9	*	.032*	.013*	.032*	*	*
*Ellsworth	*	183.9	*	.032*	.04*	.032*	*	*
*Ellsworth	*	163.9	*	.032*	.028*	.032*	*	*
*Ellsworth	*	100	*	.032*	.028*	.032*	*	*
*Ellsworth	*	0	*	.032*	.028*	.032*	*	*

SUMMARY OF REACH LENGTHS

River: River

Reach	River Sta.	Left	Channel	Right
*Ellsworth	17100	100	100	100
*Ellsworth	17000	100	100	100
*Ellsworth	16900	100	100	100
*Ellsworth	16800	100	100	100
*Ellsworth	16700	100	100	100
*Ellsworth	16600	100	100	100
*Ellsworth	16500	100	100	100
*Ellsworth	16400	100	100	100
*Ellsworth	16300	100	100	100
*Ellsworth	16200	100	100	100
*Ellsworth	16100	100	100	100
*Ellsworth	16000	33.5	33.5	33.5
*Ellsworth	15966.5	19.34	19.34	19.34
*Ellsworth	15947.5	10	10	10
*Ellsworth	15937.5	16.83	16.83	16.83
*Ellsworth	15920.67	50	50	50
*Ellsworth	15895	Culvert		
*Ellsworth	15870.67	15.17	15.17	15.17
*Ellsworth	15855.5	10	10	10
*Ellsworth	15845.5	19.28	19.28	19.28
*Ellsworth	15826.6	17.6	17.6	17.6
*Ellsworth	15809	9	9	9
*Ellsworth	15800	100	100	100
*Ellsworth	15700	100	100	100
*Ellsworth	15600	50	50	50
*Ellsworth	15550	64	90	120
*Ellsworth	15460	10	10	10
*Ellsworth	15450	258	258	258
*Ellsworth	15350	Culvert		
*Ellsworth	15192	92	92	92
*Ellsworth	15100	102.51	100	97.56
*Ellsworth	15000	100	100	100
*Ellsworth	14900	100	100	100
*Ellsworth	14800	100	100	100
*Ellsworth	14700	100	100	100
*Ellsworth	14600	21	21	21
*Ellsworth	14579	10	10	10
*Ellsworth	14569	68	68	68
*Ellsworth	14501	10	10	10
*Ellsworth	14491	40	40	40
*Ellsworth	14490	Lat Struct		
*Ellsworth	14451	51	51	51
*Ellsworth	14400	100	100	100
*Ellsworth	14300	100	100	100
*Ellsworth	14200	100	100	100
*Ellsworth	14100	100	100	100
*Ellsworth	14000	100	100	100
*Ellsworth	13900	100	100	100
*Ellsworth	13800	98.87	100	101.06
*Ellsworth	13700	98.65	100	101.34
*Ellsworth	13600	99.78	100	100.25
*Ellsworth	13500	100.01	100	100
*Ellsworth	13400	102.36	100	97.83
*Ellsworth	13300	103.02	100	97.3
*Ellsworth	13200	103.09	100	97.23
*Ellsworth	13100	95.48	100	104.29
*Ellsworth	13000	96.55	100	103.25

*Ellsworth	*	12900	* 101.64*	100*	98.37*
*Ellsworth	*	12800	* 103.54*	100*	96.09*
*Ellsworth	*	12700	* 100.41*	100*	99.62*
*Ellsworth	*	12600	* 94.09*	100*	105.5*
*Ellsworth	*	12500	* 100.08*	100*	100*
*Ellsworth	*	12400	* 102.09*	100*	97.8*
*Ellsworth	*	12300	* 103.82*	100*	96.25*
*Ellsworth	*	12200	* 92.68*	100*	106.55*
*Ellsworth	*	12100	* 99.46*	100*	100.61*
*Ellsworth	*	12000	* 100.05*	100*	100.03*
*Ellsworth	*	11900	* 105.72*	100*	94.44*
*Ellsworth	*	11800	* 99.31*	100*	100.6*
*Ellsworth	*	11700	* 95.66*	100*	104.2*
*Ellsworth	*	11600	* 100.01*	100*	100.01*
*Ellsworth	*	11500	* 103.72*	100*	96.19*
*Ellsworth	*	11400	* 105.19*	100*	94.8*
*Ellsworth	*	11300	* 95.44*	100*	104.32*
*Ellsworth	*	11200	* 96.62*	100*	103.41*
*Ellsworth	*	11100	* 100.08*	100*	100.04*
*Ellsworth	*	11000	* 104.31*	100*	94.91*
*Ellsworth	*	10900	* 102.12*	100*	97.9*
*Ellsworth	*	10800	* 95.49*	100*	104.3*
*Ellsworth	*	10700	* 49.1*	49.1*	49.1*
*Ellsworth	*	10650.9	* 27.9*	27.9*	27.9*
*Ellsworth	*	10623.7	* 10*	10*	10*
*Ellsworth	*	10613.7	* 12.83*	12.83*	12.83*
*Ellsworth	*	10600.87	* 61*	61*	61*
*Ellsworth	*	10570	*Culvert *	*	*
*Ellsworth	*	10539.74	* 11.24*	11.24*	11.24*
*Ellsworth	*	10528.5	* 10*	10*	10*
*Ellsworth	*	10518.5	* 28.35*	28.35*	28.35*
*Ellsworth	*	10490.7	* 90.7*	90.7*	90.7*
*Ellsworth	*	10400	* 99.61*	100*	100.39*
*Ellsworth	*	10300	* 99.63*	100*	100.39*
*Ellsworth	*	10200	* 103.09*	100*	96.83*
*Ellsworth	*	10100	* 94.34*	100*	105.4*
*Ellsworth	*	10000	* 97.24*	100*	102.97*
*Ellsworth	*	9900	* 100.03*	100*	100.09*
*Ellsworth	*	9800	* 105.55*	100*	93.83*
*Ellsworth	*	9700	* 99.48*	100*	100.56*
*Ellsworth	*	9600	* 96.99*	100*	104.86*
*Ellsworth	*	9500	* 100.07*	100*	100*
*Ellsworth	*	9400	* 59.46*	59.46*	59.46*
*Ellsworth	*	9340.54	* 25.88*	25.88*	25.88*
*Ellsworth	*	9314.67	* 10*	10*	10*
*Ellsworth	*	9304.67	* 15.85*	15.85*	15.85*
*Ellsworth	*	9288.82	* 81*	81*	81*
*Ellsworth	*	9248	*Culvert *	*	*
*Ellsworth	*	9207.65	* 14.17*	14.17*	14.17*
*Ellsworth	*	9193.48	* 10*	10*	10*
*Ellsworth	*	9183.48	* 29.74*	29.74*	29.74*
*Ellsworth	*	9154.01	* 11.01*	11.01*	11.01*
*Ellsworth	*	9143	* 43*	43*	43*
*Ellsworth	*	9100	* 100.01*	100*	100.01*
*Ellsworth	*	9000	* 100.08*	100*	100.06*
*Ellsworth	*	8900	* 105.14*	100*	94.38*
*Ellsworth	*	8800	* 105.5*	100*	95.16*
*Ellsworth	*	8700	* 90.15*	100*	108.77*
*Ellsworth	*	8600	* 100.12*	100*	100.04*
*Ellsworth	*	8500	* 101.68*	100*	98.5*
*Ellsworth	*	8400	* 108.13*	100*	92.32*
*Ellsworth	*	8300	* 91.63*	100*	109.15*
*Ellsworth	*	8200	* 96*	100*	103.91*
*Ellsworth	*	8100	* 100.26*	100*	100.05*
*Ellsworth	*	8000	* 105.08*	100*	94.7*
*Ellsworth	*	7900	* 100.63*	100*	99.55*
*Ellsworth	*	7800	* 92.33*	100*	107.1*
*Ellsworth	*	7700	* 100.03*	100*	100.01*
*Ellsworth	*	7600	* 102.51*	100*	99.47*
*Ellsworth	*	7500	* 109.18*	100*	89.79*
*Ellsworth	*	7400	* 96.46*	100*	105.69*
*Ellsworth	*	7300	* 97.94*	100*	102.45*
*Ellsworth	*	7200	* 100.01*	100*	100.03*
*Ellsworth	*	7100	* 95.01*	100*	105.49*
*Ellsworth	*	7000	* 103.4*	100*	95.97*
*Ellsworth	*	6900	* 100.01*	100*	100.11*
*Ellsworth	*	6800	* 103.39*	100*	95.64*

*Ellsworth	*	6700	* 12.38*	12.38*	12.38*
*Ellsworth	*	6687.62	* 14.9*	14.9*	14.9*
*Ellsworth	*	6675.17*	* 10*	10*	10*
*Ellsworth	*	6662.73	* 15.93*	15.93*	15.93*
*Ellsworth	*	6646.88	* 61*	61*	61*
*Ellsworth	*	6615	*Culvert *	*	*
*Ellsworth	*	6585.95	* 14.26*	14.26*	14.26*
*Ellsworth	*	6571.49	* 10*	10*	10*
*Ellsworth	*	6559.04*	* 14.9*	14.9*	14.9*
*Ellsworth	*	6546.60	* 19.6*	19.6*	19.6*
*Ellsworth	*	6527	* 27*	27*	27*
*Ellsworth	*	6500	* 92.36*	100*	109.95*
*Ellsworth	*	6400	* 89.93*	100*	111.65*
*Ellsworth	*	6300	* 95.01*	100*	105.75*
*Ellsworth	*	6200	* 89.55*	100*	112.01*
*Ellsworth	*	6100	* 89.86*	100*	110.57*
*Ellsworth	*	6000	* 93.44*	100*	106.76*
*Ellsworth	*	5900	* 93.19*	100*	106.49*
*Ellsworth	*	5800	* 88.19*	100*	110.63*
*Ellsworth	*	5700	* 93.95*	100*	105.17*
*Ellsworth	*	5600	* 93.4*	100*	105.25*
*Ellsworth	*	5500	* 91.63*	100*	106.73*
*Ellsworth	*	5400	* 100.13*	100*	100.03*
*Ellsworth	*	5300	* 92.52*	100*	106.5*
*Ellsworth	*	5200	* 96.11*	100*	103.33*
*Ellsworth	*	5100	* 95.3*	100*	103.78*
*Ellsworth	*	5000	* 95.36*	100*	103.76*
*Ellsworth	*	4900	* 95.44*	100*	104.05*
*Ellsworth	*	4800	* 90.21*	100*	108.18*
*Ellsworth	*	4700	* 26*	26*	26*
*Ellsworth	*	4674	* 10*	10*	10*
*Ellsworth	*	4664	* 64*	64*	64*
*Ellsworth	*	4600	* 94.44*	100*	105.1*
*Ellsworth	*	4500	* 95.83*	100*	103.83*
*Ellsworth	*	4400	* 92.56*	100*	107.14*
*Ellsworth	*	4300	* 95.8*	100*	103.64*
*Ellsworth	*	4200	* 96.42*	100*	103.62*
*Ellsworth	*	4100	* 95.47*	100*	103.98*
*Ellsworth	*	4000	* 94.83*	100*	104.71*
*Ellsworth	*	3900	* 95.3*	100*	104.2*
*Ellsworth	*	3800	* 92.84*	100*	106.52*
*Ellsworth	*	3700	* 94.33*	100*	105.12*
*Ellsworth	*	3600	* 94*	95.35*	97.2*
*Ellsworth	*	3505.64	* 31.99*	31.99*	31.99*
*Ellsworth	*	3473.65	* .01*	.01*	.01*
*Ellsworth	*	3473.64	* 12*	12*	12*
*Ellsworth	*	3461.64	* .01*	.01*	.01*
*Ellsworth	*	3461.63	* 1*	1*	1*
*Ellsworth	*	3460.63	* 16*	16*	16*
*Ellsworth	*	3444.63	* .1*	.1*	.1*
*Ellsworth	*	3444.62	* 11.71*	11.71*	11.71*
*Ellsworth	*	3432.91	* 7.83*	7.83*	7.83*
*Ellsworth	*	3425.08	* 25.08*	25.08*	25.08*
*Ellsworth	*	3400	* 127.83*	100*	65.35*
*Ellsworth	*	3300	* 113.64*	100*	82.22*
*Ellsworth	*	3200	* 120.07*	100*	75.53*
*Ellsworth	*	3100	* 134.22*	100*	55.34*
*Ellsworth	*	3000	* 100.02*	100*	100.15*
*Ellsworth	*	2900	* 100.01*	100*	100.06*
*Ellsworth	*	2800	* 100.01*	100*	100.06*
*Ellsworth	*	2700	* 46*	46*	46*
*Ellsworth	*	2654.00*	* 46*	46*	46*
*Ellsworth	*	2608.01	* 10*	10*	10*
*Ellsworth	*	2598.02	* 17*	17*	17*
*Ellsworth	*	2581.04	* 24*	24*	24*
*Ellsworth	*	2569	*Culvert *	*	*
*Ellsworth	*	2557.04	* 15.03*	15.03*	15.03*
*Ellsworth	*	2542.01	* 10*	10*	10*
*Ellsworth	*	2532.01	* 19*	19*	19*
*Ellsworth	*	2513.15*	* 113.16*	113.16*	113.16*
*Ellsworth	*	2400	* 100*	100*	100*
*Ellsworth	*	2300	* 100*	100*	100.06*
*Ellsworth	*	2200	* 99.24*	100*	100.82*
*Ellsworth	*	2100	* 98.48*	100*	101.57*
*Ellsworth	*	2000	* 100.03*	100*	100*
*Ellsworth	*	1900	* 100*	100*	100*
*Ellsworth	*	1800	* 100*	100*	100*

*Ellsworth	1700	100*	100*	100.01*
*Ellsworth	1600	98.37*	100*	101.72*
*Ellsworth	1500	85.9*	100*	115.25*
*Ellsworth	1400	85.31*	100*	114.26*
*Ellsworth	1300	94.31*	100*	105.05*
*Ellsworth	1200	100*	100*	100.01*
*Ellsworth	1100	100*	100*	100.01*
*Ellsworth	1000	100*	100*	100.01*
*Ellsworth	900	100*	100*	100.01*
*Ellsworth	800	100*	100*	100.01*
*Ellsworth	700	100*	100*	100.01*
*Ellsworth	600	100*	100*	100.01*
*Ellsworth	500	100*	100*	100.01*
*Ellsworth	400	100*	100*	100.01*
*Ellsworth	300	56*	56*	56*
*Ellsworth	244	1*	1*	1*
*Ellsworth	243	39*	39*	39*
*Ellsworth	204	.1*	.1*	.1*
*Ellsworth	203.9	20*	20*	20*
*Ellsworth	183.9	20*	20*	20*
*Ellsworth	163.9	63.9*	63.9*	63.9*
*Ellsworth	100	100*	100*	100*
*Ellsworth	0	0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River

Reach	River Sta.	Contr.	Expan.
*Ellsworth	17100	.1*	.3*
*Ellsworth	17000	.1*	.3*
*Ellsworth	16900	.1*	.3*
*Ellsworth	16800	.1*	.3*
*Ellsworth	16700	.1*	.3*
*Ellsworth	16600	.1*	.3*
*Ellsworth	16500	.1*	.3*
*Ellsworth	16400	.1*	.3*
*Ellsworth	16300	.1*	.3*
*Ellsworth	16200	.1*	.3*
*Ellsworth	16100	.3*	.5*
*Ellsworth	16000	.1*	.3*
*Ellsworth	15966.5	.1*	.3*
*Ellsworth	15947.5	.1*	.3*
*Ellsworth	15937.5	.1*	.3*
*Ellsworth	15920.67	.1*	.3*
*Ellsworth	15895	Culvert	
*Ellsworth	15870.67	.1*	.3*
*Ellsworth	15855.5	.1*	.3*
*Ellsworth	15845.5	.1*	.3*
*Ellsworth	15826.6	.1*	.3*
*Ellsworth	15809	.1*	.3*
*Ellsworth	15800	.1*	.3*
*Ellsworth	15700	.1*	.3*
*Ellsworth	15600	.1*	.3*
*Ellsworth	15550	.3*	.5*
*Ellsworth	15460	.3*	.5*
*Ellsworth	15450	.3*	.5*
*Ellsworth	15350	Culvert	
*Ellsworth	15192	.3*	.5*
*Ellsworth	15100	.1*	.3*
*Ellsworth	15000	.1*	.3*
*Ellsworth	14900	.1*	.3*
*Ellsworth	14800	.1*	.3*
*Ellsworth	14700	.1*	.3*
*Ellsworth	14600	.1*	.3*
*Ellsworth	14579	.3*	.5*
*Ellsworth	14569	.3*	.5*
*Ellsworth	14501	.3*	.5*
*Ellsworth	14491	.1*	.3*
*Ellsworth	14490	Lat Struct	
*Ellsworth	14451	.1*	.3*
*Ellsworth	14400	.1*	.3*
*Ellsworth	14300	.1*	.3*

*Ellsworth	*	14200	*	.1*	.3*
*Ellsworth	*	14100	*	.1*	.3*
*Ellsworth	*	14000	*	.1*	.3*
*Ellsworth	*	13900	*	.1*	.3*
*Ellsworth	*	13800	*	.1*	.3*
*Ellsworth	*	13700	*	.1*	.3*
*Ellsworth	*	13600	*	.1*	.3*
*Ellsworth	*	13500	*	.1*	.3*
*Ellsworth	*	13400	*	.1*	.3*
*Ellsworth	*	13300	*	.1*	.3*
*Ellsworth	*	13200	*	.1*	.3*
*Ellsworth	*	13100	*	.1*	.3*
*Ellsworth	*	13000	*	.1*	.3*
*Ellsworth	*	12900	*	.1*	.3*
*Ellsworth	*	12800	*	.1*	.3*
*Ellsworth	*	12700	*	.1*	.3*
*Ellsworth	*	12600	*	.1*	.3*
*Ellsworth	*	12500	*	.1*	.3*
*Ellsworth	*	12400	*	.1*	.3*
*Ellsworth	*	12300	*	.1*	.3*
*Ellsworth	*	12200	*	.1*	.3*
*Ellsworth	*	12100	*	.1*	.3*
*Ellsworth	*	12000	*	.1*	.3*
*Ellsworth	*	11900	*	.1*	.3*
*Ellsworth	*	11800	*	.1*	.3*
*Ellsworth	*	11700	*	.1*	.3*
*Ellsworth	*	11600	*	.1*	.3*
*Ellsworth	*	11500	*	.1*	.3*
*Ellsworth	*	11400	*	.1*	.3*
*Ellsworth	*	11300	*	.1*	.3*
*Ellsworth	*	11200	*	.1*	.3*
*Ellsworth	*	11100	*	.1*	.3*
*Ellsworth	*	11000	*	.1*	.3*
*Ellsworth	*	10900	*	.1*	.3*
*Ellsworth	*	10800	*	.3*	.5*
*Ellsworth	*	10700	*	.3*	.5*
*Ellsworth	*	10650.9	*	.3*	.5*
*Ellsworth	*	10623.7	*	.1*	.3*
*Ellsworth	*	10613.7	*	.1*	.3*
*Ellsworth	*	10600.87	*	.1*	.3*
*Ellsworth	*	10570	*Culvert	*	*
*Ellsworth	*	10539.74	*	.1*	.3*
*Ellsworth	*	10528.5	*	.1*	.3*
*Ellsworth	*	10518.5	*	.1*	.3*
*Ellsworth	*	10490.7	*	.1*	.3*
*Ellsworth	*	10400	*	.1*	.3*
*Ellsworth	*	10300	*	.1*	.3*
*Ellsworth	*	10200	*	.1*	.3*
*Ellsworth	*	10100	*	.1*	.3*
*Ellsworth	*	10000	*	.1*	.3*
*Ellsworth	*	9900	*	.1*	.3*
*Ellsworth	*	9800	*	.1*	.3*
*Ellsworth	*	9700	*	.1*	.3*
*Ellsworth	*	9600	*	.3*	.5*
*Ellsworth	*	9500	*	.3*	.5*
*Ellsworth	*	9400	*	.3*	.5*
*Ellsworth	*	9340.54	*	.3*	.5*
*Ellsworth	*	9314.67	*	.3*	.5*
*Ellsworth	*	9304.67	*	.3*	.5*
*Ellsworth	*	9288.82	*	.3*	.5*
*Ellsworth	*	9248	*Culvert	*	*
*Ellsworth	*	9207.65	*	.3*	.5*
*Ellsworth	*	9193.48	*	.3*	.5*
*Ellsworth	*	9183.48	*	.3*	.5*
*Ellsworth	*	9154.01	*	.1*	.3*
*Ellsworth	*	9143	*	.1*	.3*
*Ellsworth	*	9100	*	.1*	.3*
*Ellsworth	*	9000	*	.1*	.3*
*Ellsworth	*	8900	*	.1*	.3*
*Ellsworth	*	8800	*	.1*	.3*
*Ellsworth	*	8700	*	.1*	.3*
*Ellsworth	*	8600	*	.1*	.3*
*Ellsworth	*	8500	*	.1*	.3*
*Ellsworth	*	8400	*	.1*	.3*
*Ellsworth	*	8300	*	.1*	.3*
*Ellsworth	*	8200	*	.1*	.3*
*Ellsworth	*	8100	*	.1*	.3*

*Ellsworth	*	8000	*	.1*	.3*
*Ellsworth	*	7900	*	.1*	.3*
*Ellsworth	*	7800	*	.1*	.3*
*Ellsworth	*	7700	*	.1*	.3*
*Ellsworth	*	7600	*	.1*	.3*
*Ellsworth	*	7500	*	.1*	.3*
*Ellsworth	*	7400	*	.1*	.3*
*Ellsworth	*	7300	*	.1*	.3*
*Ellsworth	*	7200	*	.1*	.3*
*Ellsworth	*	7100	*	.1*	.3*
*Ellsworth	*	7000	*	.1*	.3*
*Ellsworth	*	6900	*	.3*	.5*
*Ellsworth	*	6800	*	.3*	.5*
*Ellsworth	*	6700	*	.1*	.3*
*Ellsworth	*	6687.62	*	.3*	.5*
*Ellsworth	*	6675.17	**	.1*	.3*
*Ellsworth	*	6662.73	*	.1*	.3*
*Ellsworth	*	6646.88	*	.3*	.5*
*Ellsworth	*	6615	*Culvert	*	*
*Ellsworth	*	6585.95	*	.3*	.5*
*Ellsworth	*	6571.49	*	.3*	.5*
*Ellsworth	*	6559.04	**	.3*	.5*
*Ellsworth	*	6546.60	*	.1*	.3*
*Ellsworth	*	6527	*	.1*	.3*
*Ellsworth	*	6500	*	.1*	.3*
*Ellsworth	*	6400	*	.1*	.3*
*Ellsworth	*	6300	*	.1*	.3*
*Ellsworth	*	6200	*	.1*	.3*
*Ellsworth	*	6100	*	.1*	.3*
*Ellsworth	*	6000	*	.1*	.3*
*Ellsworth	*	5900	*	.1*	.3*
*Ellsworth	*	5800	*	.1*	.3*
*Ellsworth	*	5700	*	.1*	.3*
*Ellsworth	*	5600	*	.1*	.3*
*Ellsworth	*	5500	*	.1*	.3*
*Ellsworth	*	5400	*	.1*	.3*
*Ellsworth	*	5300	*	.1*	.3*
*Ellsworth	*	5200	*	.1*	.3*
*Ellsworth	*	5100	*	.1*	.3*
*Ellsworth	*	5000	*	.1*	.3*
*Ellsworth	*	4900	*	.1*	.3*
*Ellsworth	*	4800	*	.1*	.3*
*Ellsworth	*	4700	*	.1*	.3*
*Ellsworth	*	4674	*	.1*	.3*
*Ellsworth	*	4664	*	.1*	.3*
*Ellsworth	*	4600	*	.1*	.3*
*Ellsworth	*	4500	*	.1*	.3*
*Ellsworth	*	4400	*	.1*	.3*
*Ellsworth	*	4300	*	.1*	.3*
*Ellsworth	*	4200	*	.1*	.3*
*Ellsworth	*	4100	*	.1*	.3*
*Ellsworth	*	4000	*	.1*	.3*
*Ellsworth	*	3900	*	.1*	.3*
*Ellsworth	*	3800	*	.1*	.3*
*Ellsworth	*	3700	*	.1*	.3*
*Ellsworth	*	3600	*	.1*	.3*
*Ellsworth	*	3505.64	*	.3*	.5*
*Ellsworth	*	3473.65	*	.3*	.5*
*Ellsworth	*	3473.64	*	.3*	.5*
*Ellsworth	*	3461.64	*	.3*	.5*
*Ellsworth	*	3461.63	*	.3*	.5*
*Ellsworth	*	3460.63	*	.3*	.5*
*Ellsworth	*	3444.63	*	.1*	.3*
*Ellsworth	*	3444.62	*	.1*	.3*
*Ellsworth	*	3432.91	*	.1*	.3*
*Ellsworth	*	3425.08	*	.1*	.3*
*Ellsworth	*	3400	*	.1*	.3*
*Ellsworth	*	3300	*	.1*	.3*
*Ellsworth	*	3200	*	.1*	.3*
*Ellsworth	*	3100	*	.1*	.3*
*Ellsworth	*	3000	*	.1*	.3*
*Ellsworth	*	2900	*	.1*	.3*
*Ellsworth	*	2800	*	.3*	.5*
*Ellsworth	*	2700	*	.1*	.3*
*Ellsworth	*	2654.00	**	.3*	.5*
*Ellsworth	*	2608.01	*	.3*	.5*
*Ellsworth	*	2598.02	*	.3*	.5*

```
*Ellsworth      *    2581.04 *       .3*       .5*
*Ellsworth      *    2569    *Culvert  *         *
*Ellsworth      *    2557.04 *       .3*       .5*
*Ellsworth      *    2542.01 *       .3*       .5*
*Ellsworth      *    2532.01 *       .3*       .5*
*Ellsworth      *    2513.15**       .1*       .3*
*Ellsworth      *    2400    *       .1*       .3*
*Ellsworth      *    2300    *       .1*       .3*
*Ellsworth      *    2200    *       .1*       .3*
*Ellsworth      *    2100    *       .1*       .3*
*Ellsworth      *    2000    *       .1*       .3*
*Ellsworth      *    1900    *       .1*       .3*
*Ellsworth      *    1800    *       .1*       .3*
*Ellsworth      *    1700    *       .1*       .3*
*Ellsworth      *    1600    *       .1*       .3*
*Ellsworth      *    1500    *       .1*       .3*
*Ellsworth      *    1400    *       .1*       .3*
*Ellsworth      *    1300    *       .1*       .3*
*Ellsworth      *    1200    *       .1*       .3*
*Ellsworth      *    1100    *       .1*       .3*
*Ellsworth      *    1000    *       .1*       .3*
*Ellsworth      *    900     *       .1*       .3*
*Ellsworth      *    800     *       .1*       .3*
*Ellsworth      *    700     *       .1*       .3*
*Ellsworth      *    600     *       .1*       .3*
*Ellsworth      *    500     *       .1*       .3*
*Ellsworth      *    400     *       .1*       .3*
*Ellsworth      *    300     *       .1*       .3*
*Ellsworth      *    244     *       .1*       .3*
*Ellsworth      *    243     *       .1*       .3*
*Ellsworth      *    204     *       .1*       .3*
*Ellsworth      *    203.9   *       .1*       .3*
*Ellsworth      *    183.9   *       .1*       .3*
*Ellsworth      *    163.9   *       .1*       .3*
*Ellsworth      *    100     *       .1*       .3*
*Ellsworth      *    0       *       .1*       .3*
*****************************************************
```

Profile Output Table - Standard Table 1

Reach	River Sta	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
Ellsworth	17100	349.00	1384.17	1389.05	1386.70	1389.15	0.000686	2.49	140.05	48.40	0.26
Ellsworth	17000	349.00	1384.11	1388.98	1386.64	1389.08	0.000691	2.50	139.65	48.35	0.26
Ellsworth	16900	349.00	1384.05	1388.91	1386.59	1389.01	0.000698	2.51	139.16	48.27	0.26
Ellsworth	16800	349.00	1383.99	1388.84	1386.51	1388.94	0.000705	2.52	138.62	48.18	0.26
Ellsworth	16700	349.00	1383.93	1388.77	1386.46	1388.87	0.000713	2.53	138.05	48.08	0.26
Ellsworth	16600	349.00	1383.87	1388.70	1386.39	1388.80	0.000721	2.54	137.44	47.98	0.26
Ellsworth	16500	349.00	1383.81	1388.62	1386.34	1388.72	0.000730	2.55	136.81	47.88	0.27
Ellsworth	16400	349.00	1383.75	1388.55	1386.28	1388.65	0.000740	2.56	136.13	47.77	0.27
Ellsworth	16300	349.00	1383.69	1388.47	1386.22	1388.58	0.000751	2.58	135.36	47.64	0.27
Ellsworth	16200	349.00	1383.63	1388.40	1386.15	1388.50	0.000763	2.59	134.56	47.51	0.27
Ellsworth	16100	349.00	1383.57	1388.32	1386.09	1388.42	0.000777	2.61	133.69	47.36	0.27
Ellsworth	16000	349.00	1383.51	1388.24	1386.03	1388.34	0.000793	2.63	132.66	47.17	0.28
Ellsworth	15966.5	349.00	1383.49	1388.20		1388.31	0.001168	2.64	132.13	47.10	0.28
Ellsworth	15947.5	349.00	1383.48	1388.22	1385.46	1388.28	0.000524	2.00	174.24	56.14	0.18
Ellsworth	15937.5	349.00	1383.47	1388.21	1385.13	1388.28	0.000061	2.07	168.81	58.70	0.17
Ellsworth	15920.67	349.00	1383.46	1388.08	1385.45	1388.27	0.000254	3.46	100.88	21.83	0.28
Ellsworth	15895	Culvert									
Ellsworth	15870.67	349.00	1383.42	1387.92		1388.11	0.000275	3.55	98.18	21.83	0.30
Ellsworth	15855.5	349.00	1383.42	1388.00	1385.07	1388.07	0.000497	2.18	159.85	57.63	0.19
Ellsworth	15845.5	349.00	1383.41	1388.00	1385.39	1388.07	0.000347	2.10	166.48	55.13	0.20
Ellsworth	15826.6	349.00	1383.40	1387.93		1388.05	0.000961	2.83	123.40	45.58	0.30
Ellsworth	15809	349.00	1383.43	1387.91		1388.03	0.000997	2.87	121.73	45.28	0.31
Ellsworth	15800	349.00	1383.39	1387.90		1388.02	0.000979	2.85	122.56	45.43	0.31
Ellsworth	15700	349.00	1383.33	1387.79		1387.92	0.001024	2.90	120.53	45.07	0.31
Ellsworth	15600	349.00	1383.27	1387.68		1387.82	0.001078	2.95	118.24	44.66	0.32
Ellsworth	15550	349.00	1383.24	1387.61		1387.75	0.001862	3.00	116.25	44.31	0.33
Ellsworth	15460	349.00	1383.18	1387.49		1387.68	0.000284	3.52	99.07	26.76	0.32
Ellsworth	15450	349.00	1381.86	1387.50	1383.98	1387.66	0.000143	3.12	111.99	106.39	0.24
Ellsworth	15350	Culvert									
Ellsworth	15192	349.00	1380.41	1387.38	1382.94	1387.43	0.000215	1.73	201.93	65.19	0.13
Ellsworth	15100	349.00	1380.33	1387.37	1382.86	1387.40	0.000206	1.32	263.60	65.74	0.12
Ellsworth	15000	349.00	1380.25	1387.36	1382.78	1387.39	0.000121	1.30	267.89	67.13	0.11
Ellsworth	14900	349.00	1380.17	1387.35	1382.70	1387.37	0.000117	1.28	272.47	66.81	0.11
Ellsworth	14800	349.00	1380.09	1387.34	1382.61	1387.36	0.000111	1.26	277.15	67.37	0.11

Ellsworth	14700	349.00	1380.01	1387.33	1382.53	1387.35	0.000106	1.24	281.99	69.42	0.11
Ellsworth	14600	349.00	1379.93	1387.32	1382.45	1387.34	0.000102	1.22	286.77	70.36	0.10
Ellsworth	14579	349.00	1379.90	1387.32	1382.43	1387.34	0.000096	1.19	302.05	89.99	0.10
Ellsworth	14569	349.00	1379.90	1387.32		1387.34	0.000097	1.19	301.96	89.96	0.10
Ellsworth	14501	349.00	1379.85	1387.31		1387.33	0.000097	1.19	297.09	89.00	0.10
Ellsworth	14491	349.00	1379.84	1387.31	1382.37	1387.33	0.000096	1.19	297.91	89.23	0.10
Ellsworth	14490	Lat Struct									
Ellsworth	14451	342.01	1379.81	1387.30	1382.31	1387.33	0.000091	1.16	299.27	107.88	0.10
Ellsworth	14400	309.37	1379.77	1387.30	1382.15	1387.32	0.000073	1.04	297.41	127.92	0.09
Ellsworth	14300	245.87	1379.69	1387.30	1381.79	1387.31	0.000043	0.81	309.22	135.41	0.07
Ellsworth	14200	190.00	1379.61	1387.30	1381.44	1387.31	0.000025	0.62	307.82	100.66	0.05
Ellsworth	14100	140.56	1379.53	1387.30	1381.11	1387.30	0.000013	0.45	316.34	190.78	0.04
Ellsworth	14000	20.58	1379.45	1387.30	1379.84	1387.30	0.000000	0.04	545.92	306.40	0.00
Ellsworth	13900	2330.39	1379.37	1386.80	1384.21	1387.22	0.001460	5.32	469.09	203.75	0.42
Ellsworth	13800	2148.67	1379.29	1386.70	1383.93	1387.07	0.001247	4.91	470.36	209.01	0.39
Ellsworth	13700	1985.61	1379.21	1386.60	1383.66	1386.94	0.001135	4.67	442.99	190.91	0.37
Ellsworth	13600	1876.27	1379.13	1386.53	1383.44	1386.82	0.000998	4.38	452.77	206.13	0.35
Ellsworth	13500	1825.82	1379.05	1386.43	1383.31	1386.72	0.000978	4.33	433.87	185.60	0.34
Ellsworth	13400	1800.59	1378.97	1386.33	1383.18	1386.62	0.000967	4.30	427.47	219.38	0.34
Ellsworth	13300	1789.83	1378.89	1386.24	1383.09	1386.52	0.000967	4.30	421.08	193.44	0.34
Ellsworth	13200	1780.50	1378.81	1386.15	1383.00	1386.43	0.000932	4.27	426.73	206.33	0.34
Ellsworth	13100	1777.05	1378.73	1386.06	1382.92	1386.33	0.000907	4.21	444.79	230.57	0.33
Ellsworth	13000	1777.05	1378.65	1385.99	1382.83	1386.24	0.000856	4.10	470.26	264.05	0.32
Ellsworth	12900	1761.71	1378.57	1385.90	1382.74	1386.15	0.000849	4.08	474.44	293.89	0.32
Ellsworth	12800	1711.40	1378.49	1385.84	1382.59	1386.07	0.000787	3.93	481.33	326.74	0.31
Ellsworth	12700	1691.75	1378.41	1385.78	1382.47	1385.98	0.000695	3.71	517.55	403.80	0.29
Ellsworth	12600	1690.12	1378.33	1385.75	1382.40	1385.91	0.000576	3.40	604.34	365.07	0.27
Ellsworth	12500	1688.50	1378.25	1385.67	1382.31	1385.84	0.000613	3.50	575.09	357.72	0.27
Ellsworth	12400	1688.40	1378.17	1385.59	1382.24	1385.78	0.000669	3.66	534.46	347.98	0.29
Ellsworth	12300	1688.40	1378.09	1385.52	1382.16	1385.71	0.000669	3.66	525.48	350.53	0.29
Ellsworth	12200	1688.40	1378.01	1385.45	1382.08	1385.64	0.000658	3.64	522.57	318.59	0.28
Ellsworth	12100	1688.40	1377.93	1385.37	1382.00	1385.58	0.000693	3.73	503.64	310.13	0.29
Ellsworth	12000	1688.40	1377.85	1385.30	1381.89	1385.51	0.000683	3.70	500.96	294.39	0.29
Ellsworth	11900	1688.40	1377.77	1385.22	1381.84	1385.43	0.000725	3.82	484.67	305.22	0.30
Ellsworth	11800	1688.40	1377.69	1385.13	1381.76	1385.36	0.000753	3.89	458.64	257.26	0.30
Ellsworth	11700	1688.40	1377.61	1385.06	1381.66	1385.28	0.000749	3.89	458.07	233.68	0.30
Ellsworth	11600	1688.40	1377.53	1384.98	1381.56	1385.21	0.000769	3.88	459.22	256.77	0.31
Ellsworth	11500	1688.40	1377.45	1384.94	1381.52	1385.12	0.000659	3.61	545.21	252.72	0.28
Ellsworth	11400	1688.40	1377.37	1384.87	1381.32	1385.06	0.000630	3.50	491.44	163.25	0.28
Ellsworth	11300	1688.40	1377.29	1384.74	1381.36	1384.98	0.000807	3.96	431.82	135.77	0.31
Ellsworth	11200	1688.40	1377.21	1384.66	1381.27	1384.90	0.000802	3.95	439.43	304.72	0.31
Ellsworth	11100	1688.40	1377.13	1384.58	1381.20	1384.82	0.000805	3.96	436.12	290.72	0.31
Ellsworth	11000	1688.40	1377.05	1384.50	1381.12	1384.74	0.000809	3.97	430.89	264.55	0.31
Ellsworth	10900	1688.40	1376.97	1384.42	1381.04	1384.66	0.000798	3.94	439.29	271.46	0.31
Ellsworth	10800	1688.40	1376.89	1384.36	1380.94	1384.57	0.000739	3.80	478.57	268.14	0.30
Ellsworth	10700	1688.40	1376.81	1384.29	1380.88	1384.50	0.000713	3.74	494.37	272.66	0.29
Ellsworth	10650.9	1688.40	1376.77	1384.20		1384.44	0.001115	3.96	434.97	111.92	0.31
Ellsworth	10623.7	1688.40	1376.75	1384.21	1380.06	1384.38	0.000739	3.27	522.85	112.50	0.23
Ellsworth	10613.7	1688.40	1376.74	1384.22	1379.76	1384.37	0.000088	3.10	552.98	114.56	0.22
Ellsworth	10600.87	1688.40	1376.73	1384.09	1379.78	1384.36	0.000166	4.13	408.69	55.50	0.27
Ellsworth	10570	Culvert									
Ellsworth	10539.74	1688.40	1376.68	1383.80		1384.09	0.000184	4.27	395.32	55.50	0.28
Ellsworth	10528.5	1688.40	1376.67	1383.85	1379.73	1384.06	0.000779	3.74	451.84	86.33	0.25
Ellsworth	10518.5	1688.40	1376.66	1383.86	1379.99	1384.05	0.000435	3.53	478.97	86.28	0.25
Ellsworth	10490.7	1688.40	1376.64	1383.74		1384.02	0.001023	4.28	396.01	89.93	0.35
Ellsworth	10400	1688.40	1376.57	1383.64	1380.64	1383.93	0.001041	4.30	392.25	236.23	0.35
Ellsworth	10300	1688.40	1376.49	1383.53	1380.55	1383.82	0.001058	4.33	389.83	204.69	0.35
Ellsworth	10200	1688.40	1376.41	1383.42	1380.47	1383.72	0.001078	4.36	387.24	138.53	0.36
Ellsworth	10100	1688.40	1376.33	1383.31	1380.40	1383.61	0.001099	4.39	384.45	100.34	0.36
Ellsworth	10000	1688.40	1376.25	1383.19	1380.32	1383.50	0.001122	4.43	381.45	97.89	0.36
Ellsworth	9900	1688.40	1376.17	1383.08	1380.24	1383.38	0.001144	4.46	380.13	98.43	0.37
Ellsworth	9800	1688.40	1376.09	1382.96	1380.16	1383.27	0.001178	4.48	377.20	91.11	0.38
Ellsworth	9700	1688.40	1376.01	1382.78	1380.06	1383.11	0.002126	4.60	367.43	123.71	0.38
Ellsworth	9600	2035.40	1375.93	1382.62	1379.64	1382.91	0.001703	4.30	473.21	221.02	0.35
Ellsworth	9500	2035.40	1375.85	1382.58	1379.07	1382.77	0.000556	3.43	593.95	228.96	0.27
Ellsworth	9400	2035.40	1375.77	1382.53	1379.00	1382.71	0.000548	3.41	596.93	205.40	0.27
Ellsworth	9340.54	2035.40	1375.72	1382.49		1382.67	0.000682	3.40	598.58	118.81	0.27
Ellsworth	9314.67	2035.40	1375.70	1382.49	1378.70	1382.65	0.000674	3.20	635.86	127.23	0.23
Ellsworth	9304.67	2035.40	1375.69	1382.45	1378.61	1382.64	0.000104	3.44	591.50	129.63	0.24
Ellsworth	9288.82	2035.40	1375.68	1382.39	1378.41	1382.62	0.000146	3.84	530.28	79.00	0.26
Ellsworth	9248	Culvert									
Ellsworth	9207.65	2035.40	1375.61	1382.19		1382.43	0.000156	3.92	519.75	79.00	0.27
Ellsworth	9193.48	2035.40	1375.60	1382.21	1378.52	1382.40	0.000803	3.53	576.85	129.96	0.25
Ellsworth	9183.48	2035.40	1375.59	1382.21	1378.53	1382.38	0.000356	3.29	619.26	127.97	0.24
Ellsworth	9154.01	2035.40	1375.57	1382.17		1382.36	0.000600	3.52	577.98	117.41	0.28
Ellsworth	9143	2035.40	1375.56	1382.16	1378.77	1382.36	0.000599	3.52	578.40	117.45	0.28
Ellsworth	9100	2035.40	1375.53	1382.14	1378.76	1382.33	0.000598	3.52	578.89	117.48	0.28

Ellsworth	9000		2035.40	1375.45	1382.08	1378.67	1382.27	0.000590	3.50	581.43	117.65	0.28
Ellsworth	8900		2035.40	1375.37	1382.02	1378.59	1382.21	0.000583	3.49	584.03	117.82	0.28
Ellsworth	8800		2035.40	1375.29	1382.00	1378.06	1382.13	0.000646	2.89	704.19	125.16	0.21
Ellsworth	8700		2035.40	1375.21	1381.88	1378.42	1382.06	0.000578	3.47	585.84	117.94	0.27
Ellsworth	8600		2382.40	1375.13	1381.72	1378.66	1381.99	0.000826	4.13	577.03	117.34	0.33
Ellsworth	8500		2382.40	1375.05	1381.64	1378.58	1381.90	0.000827	4.13	576.73	117.33	0.33
Ellsworth	8400		2382.40	1374.97	1381.56	1378.49	1381.82	0.000829	4.13	576.36	117.31	0.33
Ellsworth	8300		2382.40	1374.89	1381.47		1381.74	0.000831	4.14	575.91	117.26	0.33
Ellsworth	8200		2382.40	1374.81	1381.39		1381.66	0.000832	4.14	575.54	117.24	0.33
Ellsworth	8100		2382.40	1374.73	1381.31		1381.57	0.000834	4.14	575.10	117.21	0.33
Ellsworth	8000		2382.40	1374.65	1381.22		1381.49	0.000836	4.15	574.59	117.17	0.33
Ellsworth	7900		2382.40	1374.57	1381.14	1378.09	1381.40	0.000838	4.15	574.09	184.14	0.33
Ellsworth	7800		2382.40	1374.49	1381.05	1378.01	1381.32	0.000840	4.15	573.57	279.95	0.33
Ellsworth	7700		2382.40	1374.41	1380.97	1377.92	1381.24	0.000843	4.16	573.06	208.56	0.33
Ellsworth	7600		2382.40	1374.33	1380.88	1377.85	1381.15	0.000845	4.16	572.55	126.72	0.33
Ellsworth	7500		2382.40	1374.25	1380.80	1377.77	1381.07	0.000847	4.17	571.90	126.31	0.33
Ellsworth	7400		2382.40	1374.17	1380.71		1380.98	0.000850	4.17	571.19	116.94	0.33
Ellsworth	7300		2382.40	1374.09	1380.63		1380.90	0.000853	4.18	570.49	116.89	0.33
Ellsworth	7200		2382.40	1374.01	1380.54		1380.81	0.000856	4.18	569.84	116.86	0.33
Ellsworth	7100		2382.40	1373.93	1380.45		1380.73	0.000859	4.19	569.03	116.79	0.33
Ellsworth	7000		2382.40	1373.85	1380.37		1380.64	0.000863	4.19	568.28	116.76	0.33
Ellsworth	6900		2382.40	1373.77	1380.28		1380.55	0.000866	4.20	567.43	116.70	0.34
Ellsworth	6800		2382.40	1373.69	1380.19		1380.47	0.000870	4.21	566.50	116.63	0.34
Ellsworth	6700		2382.40	1373.61	1380.10		1380.38	0.000875	4.21	565.36	116.55	0.34
Ellsworth	6687.62		2382.40	1373.60	1380.09		1380.37	0.001094	4.22	565.01	116.52	0.34
Ellsworth	6675.17*		2382.40	1373.59	1380.05	1376.94	1380.34	0.001307	4.34	548.38	120.79	0.32
Ellsworth	6662.73		2382.40	1373.58	1379.95	1376.98	1380.33	0.000229	4.93	483.41	124.00	0.36
Ellsworth	6646.88		2382.40	1373.56	1379.79	1376.98	1380.31	0.000376	5.80	411.04	66.00	0.41
Ellsworth	6615		Culvert									
Ellsworth	6585.95		2382.40	1373.47	1379.19		1379.81	0.000492	6.31	377.33	66.00	0.47
Ellsworth	6571.49		2382.40	1373.45	1379.25	1376.86	1379.71	0.002277	5.45	437.01	122.16	0.41
Ellsworth	6559.04*		2382.40	1373.44	1379.28	1376.79	1379.66	0.001173	4.94	482.00	117.69	0.38
Ellsworth	6546.60		2382.40	1373.42	1379.27		1379.63	0.001300	4.84	491.82	111.38	0.41
Ellsworth	6527		2382.40	1373.39	1379.24		1379.61	0.001295	4.84	492.40	111.43	0.41
Ellsworth	6500		2382.40	1373.35	1379.21		1379.57	0.001292	4.83	492.88	111.44	0.41
Ellsworth	6400		2382.40	1373.21	1379.08		1379.44	0.001281	4.82	494.34	111.55	0.40
Ellsworth	6300		2382.40	1373.07	1378.95		1379.31	0.001270	4.81	495.76	111.64	0.40
Ellsworth	6200		2382.40	1372.93	1378.83		1379.18	0.001258	4.79	497.46	111.77	0.40
Ellsworth	6100		2382.40	1372.79	1378.70		1379.06	0.001245	4.77	499.29	111.91	0.40
Ellsworth	6000		2382.40	1372.65	1378.58		1378.93	0.001231	4.75	501.25	112.04	0.40
Ellsworth	5900		2382.40	1372.51	1378.46		1378.81	0.001216	4.73	503.49	112.20	0.39
Ellsworth	5800		2382.40	1372.37	1378.34		1378.69	0.001199	4.71	505.88	112.38	0.39
Ellsworth	5700		2382.40	1372.23	1378.22		1378.57	0.001183	4.69	508.38	112.56	0.39
Ellsworth	5600		2382.40	1372.09	1378.11		1378.45	0.001164	4.66	511.15	112.75	0.39
Ellsworth	5500		2382.40	1371.95	1378.00		1378.33	0.001145	4.63	514.18	112.97	0.38
Ellsworth	5400		2382.40	1371.81	1377.89		1378.21	0.001125	4.60	517.37	113.17	0.38
Ellsworth	5300		2382.40	1371.67	1377.78		1378.10	0.001103	4.57	520.98	113.43	0.38
Ellsworth	5200		2382.40	1371.53	1377.67		1377.99	0.001080	4.54	524.89	113.72	0.37
Ellsworth	5100		2382.40	1371.39	1377.57		1377.88	0.001056	4.50	529.01	113.99	0.37
Ellsworth	5000		2382.40	1371.25	1377.47		1377.78	0.001030	4.46	533.62	114.32	0.36
Ellsworth	4900		2382.40	1371.11	1377.37		1377.67	0.001005	4.42	538.45	114.66	0.36
Ellsworth	4800		2382.40	1370.97	1377.27		1377.57	0.000978	4.38	543.56	115.03	0.36
Ellsworth	4700		2382.40	1370.83	1377.18		1377.47	0.000950	4.34	549.13	115.42	0.35
Ellsworth	4674		2382.40	1370.82	1377.16		1377.45	0.000960	4.35	547.25	115.30	0.35
Ellsworth	4664		2382.40	1370.80	1377.14		1377.44	0.000958	4.35	547.54	115.30	0.35
Ellsworth	4600		2382.40	1370.69	1377.09		1377.38	0.000924	4.30	554.67	115.81	0.35
Ellsworth	4500		2382.40	1370.55	1377.00		1377.28	0.000895	4.25	560.83	116.23	0.34
Ellsworth	4400		2382.40	1370.41	1376.92		1377.19	0.000866	4.20	567.45	116.69	0.34
Ellsworth	4300		2382.40	1370.27	1376.84		1377.11	0.000837	4.15	574.40	117.16	0.33
Ellsworth	4200		2382.40	1370.13	1376.76		1377.02	0.000808	4.10	581.70	117.66	0.32
Ellsworth	4100		2382.40	1369.99	1376.69		1376.94	0.000778	4.04	589.49	118.19	0.32
Ellsworth	4000		2382.40	1369.85	1376.62		1376.86	0.000749	3.99	597.57	118.73	0.31
Ellsworth	3900		2382.40	1369.71	1376.55		1376.79	0.000719	3.93	606.07	119.30	0.31
Ellsworth	3800		2382.40	1369.57	1376.48		1376.71	0.000690	3.87	614.96	119.90	0.30
Ellsworth	3700		2382.40	1369.43	1376.42		1376.64	0.000657	3.80	639.74	184.77	0.29
Ellsworth	3600		2382.40	1369.29	1376.37		1376.58	0.000614	3.70	683.15	231.31	0.29
Ellsworth	3505.64		2382.40	1369.17	1376.33		1376.53	0.000334	3.68	684.46	256.82	0.28
Ellsworth	3473.65		2382.40	1369.13	1376.32		1376.52	0.000328	3.65	692.33	258.83	0.28
Ellsworth	3473.64		2382.40	1369.13	1376.10		1376.47	0.000174	4.87	505.46	194.50	0.33
Ellsworth	3461.64		2382.40	1369.13	1376.10		1376.47	0.000174	4.88	504.97	194.35	0.33
Ellsworth	3461.63		2382.40	1370.13	1375.87		1376.42	0.000320	5.93	401.89	70.00	0.44
Ellsworth	3460.63		2382.40	1371.13	1374.42	1374.42	1376.08	0.001886	10.34	230.34	70.00	1.00
Ellsworth	3444.63		2382.40	1363.13	1370.03	1366.42	1370.41	0.000180	4.93	482.92	70.00	0.33
Ellsworth	3444.62		2382.40	1363.13	1370.03		1370.41	0.001707	4.93	482.92	70.00	0.33
Ellsworth	3432.91		2382.40	1363.13	1370.01		1370.39	0.001724	4.95	481.38	70.00	0.33
Ellsworth	3425.08		2382.40	1363.13	1370.13		1370.32	0.000959	3.55	670.52	121.69	0.27
Ellsworth	3400		2382.40	1363.02	1370.08		1370.30	0.000719	3.76	632.79	121.09	0.29

Ellsworth	3300		2382.40	1362.78	1370.02		1370.23	0.000656	3.64	654.04	122.48	0.28
Ellsworth	3200		2382.40	1362.55	1369.97	1366.06	1370.16	0.000598	3.52	676.54	270.19	0.27
Ellsworth	3100		2382.40	1362.32	1369.90	1365.83	1370.08	0.000873	3.42	697.33	151.46	0.26
Ellsworth	3000		2382.40	1362.06	1369.85		1370.02	0.000437	3.29	723.76	126.96	0.24
Ellsworth	2900		2382.40	1361.83	1369.82	1365.34	1369.98	0.000398	3.18	748.72	128.51	0.23
Ellsworth	2800		2382.40	1361.60	1369.79		1369.93	0.000362	3.08	774.55	130.11	0.22
Ellsworth	2700		2382.40	1361.37	1369.77		1369.89	0.000271	2.72	877.39	142.14	0.19
Ellsworth	2654.00*		2382.40	1361.27	1369.75		1369.87	0.000288	2.80	851.52	137.64	0.20
Ellsworth	2608.01		2382.40	1361.16	1369.55	1364.76	1369.81	0.000760	4.12	577.78	131.68	0.26
Ellsworth	2598.02		2382.40	1361.14	1369.42	1365.03	1369.78	0.000149	4.82	493.87	130.93	0.30
Ellsworth	2581.04		2382.40	1361.10	1368.95	1365.54	1369.67	0.000453	6.81	349.97	44.60	0.43
Ellsworth	2569		Culvert									
Ellsworth	2557.04		2382.40	1361.08	1365.53	1365.53	1367.77	0.002565	12.02	198.27	44.60	1.00
Ellsworth	2542.01		2382.40	1361.03	1364.06	1364.99	1367.35	0.040339	14.56	163.62	88.81	1.55
Ellsworth	2532.01		2382.40	1361.01	1363.69	1364.67	1367.02	0.024782	14.65	162.61	85.95	1.69
Ellsworth	2513.15*		2382.40	1360.96	1365.88	1364.49	1366.46	0.002548	6.12	389.44	103.88	0.56
Ellsworth	2400		2382.40	1360.68	1365.59		1366.17	0.002577	6.10	390.47	105.47	0.56
Ellsworth	2300		2382.40	1360.43	1365.34		1365.91	0.002517	6.10	390.50	103.83	0.55
Ellsworth	2200		2382.40	1360.18	1365.08		1365.66	0.002522	6.10	390.24	103.82	0.55
Ellsworth	2100		2382.40	1359.93	1364.83		1365.41	0.002529	6.11	389.88	103.80	0.56
Ellsworth	2000		2382.40	1359.67	1364.57		1365.15	0.002531	6.11	389.73	103.77	0.56
Ellsworth	1900		2382.40	1359.42	1364.32		1364.90	0.002521	6.10	390.32	103.83	0.55
Ellsworth	1800		2382.40	1359.17	1364.07		1364.65	0.002529	6.11	389.85	103.79	0.56
Ellsworth	1700		2382.40	1358.92	1363.81	1362.44	1364.40	0.002537	6.12	389.47	103.78	0.56
Ellsworth	1600		2382.40	1358.66	1363.56	1362.18	1364.14	0.002540	6.12	389.26	103.74	0.56
Ellsworth	1500		2382.40	1358.41	1363.31		1363.89	0.002535	6.12	389.52	103.77	0.56
Ellsworth	1400		2382.40	1358.16	1363.05		1363.63	0.002548	6.13	388.84	103.71	0.56
Ellsworth	1300		2382.40	1357.91	1362.79		1363.38	0.002562	6.14	388.17	103.68	0.56
Ellsworth	1200		2382.40	1357.65	1362.54		1363.12	0.002553	6.13	388.57	103.68	0.56
Ellsworth	1100		2382.40	1357.40	1362.28		1362.86	0.002570	6.15	387.68	103.62	0.56
Ellsworth	1000		2382.40	1357.15	1362.02		1362.61	0.002595	6.17	386.40	103.53	0.56
Ellsworth	900		2382.40	1356.89	1361.75		1362.35	0.002613	6.18	385.45	103.44	0.56
Ellsworth	800		2382.40	1356.64	1361.49		1362.08	0.002632	6.20	384.53	103.39	0.57
Ellsworth	700		2382.40	1356.39	1361.21		1361.82	0.002678	6.23	382.20	103.21	0.57
Ellsworth	600		2382.40	1356.14	1360.98	1359.69	1361.53	0.002694	5.94	400.89	120.08	0.57
Ellsworth	500		2382.40	1355.88	1360.60	1359.41	1361.24	0.002914	6.42	371.19	116.74	0.59
Ellsworth	400		2382.40	1355.63	1360.27	1359.13	1360.94	0.003094	6.55	363.60	117.46	0.61
Ellsworth	300		2382.40	1355.38	1358.89	1358.89	1360.26	0.016890	9.40	253.58	107.65	1.00
Ellsworth	244		2382.40	1355.30	1358.00	1358.42	1359.88	0.002905	11.00	216.66	111.93	1.25
Ellsworth	243		2382.40	1355.24	1357.82	1358.33	1359.86	0.003356	11.45	208.08	90.88	1.33
Ellsworth	204		2382.40	1355.14	1358.00	1358.21	1359.65	0.002237	10.31	231.15	108.49	1.11
Ellsworth	203.9		2382.40	1353.14	1358.66	1356.21	1359.05	0.000240	5.02	474.78	214.60	0.40
Ellsworth	183.9		2382.40	1353.20	1358.63	1356.27	1359.04	0.002405	5.11	466.31	212.77	0.41
Ellsworth	163.9		2382.40	1353.03	1358.62	1356.10	1359.00	0.001069	4.95	481.52	216.05	0.39
Ellsworth	100		2382.40	1352.14	1358.80		1358.88	0.000202	2.34	1019.09	184.78	0.18
Ellsworth	0		2382.40	1352.26	1358.73	1354.80	1358.86	0.000299	2.84	837.73	151.55	0.21

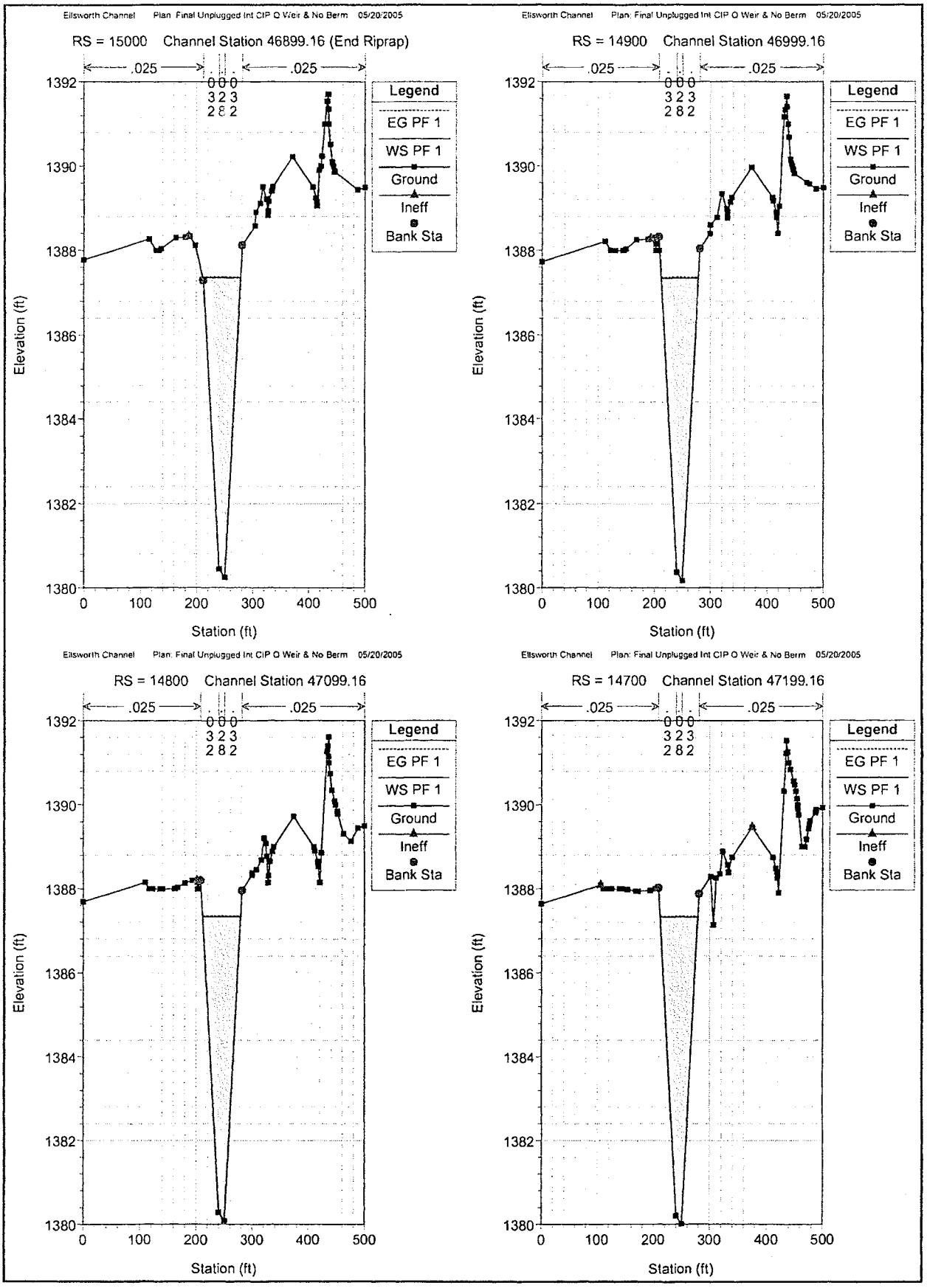
Profile Output Table - Standard Table 2

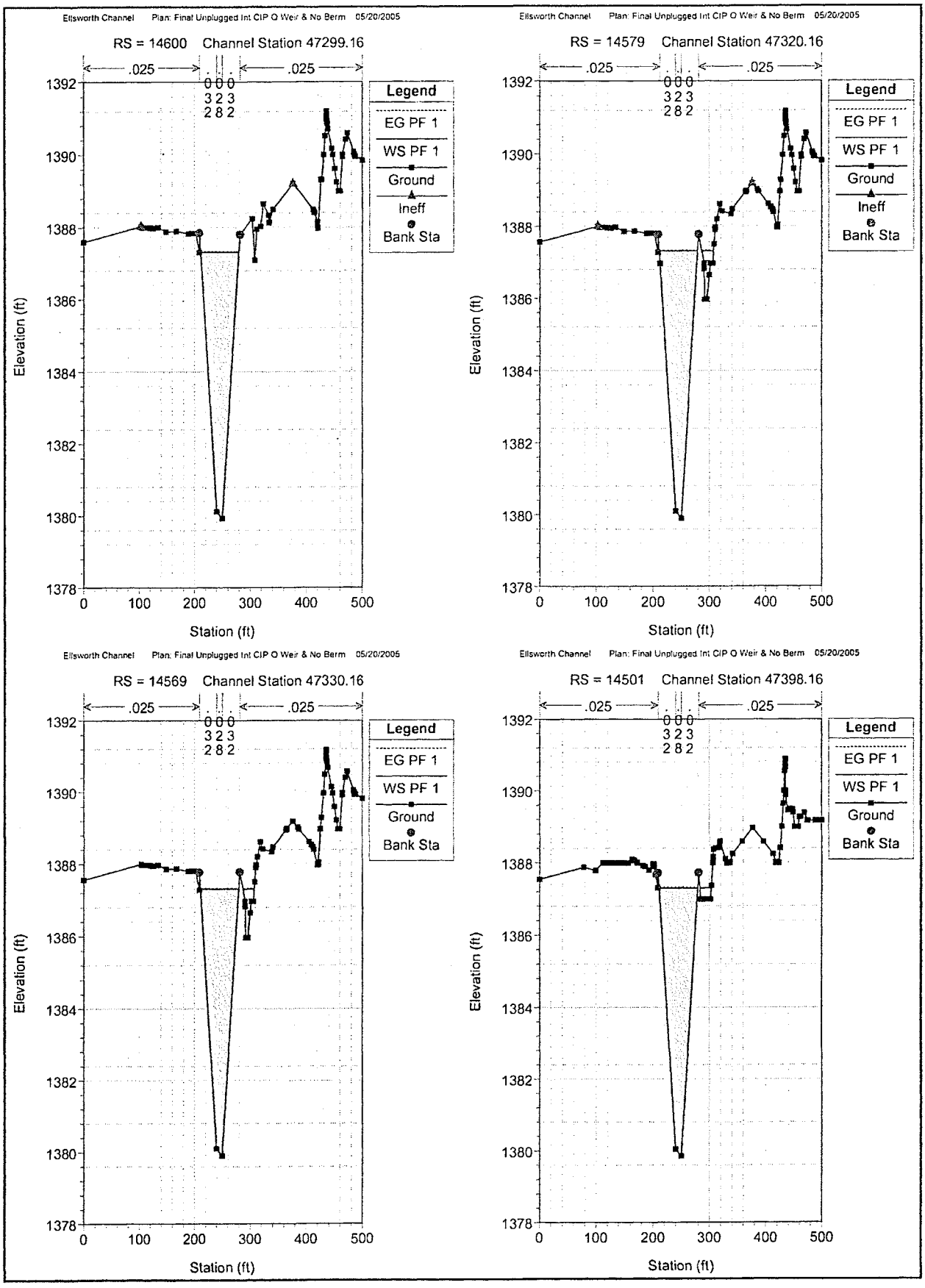
Reach	River Sta		E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Ellsworth	17100		1389.15	1389.05	0.10	0.07	0.00		349.00		48.40
Ellsworth	17000		1389.08	1388.98	0.10	0.07	0.00		349.00		48.35
Ellsworth	16900		1389.01	1388.91	0.10	0.07	0.00		349.00		48.27
Ellsworth	16800		1388.94	1388.84	0.10	0.07	0.00		349.00		48.18
Ellsworth	16700		1388.87	1388.77	0.10	0.07	0.00		349.00		48.08
Ellsworth	16600		1388.80	1388.70	0.10	0.07	0.00		349.00		47.98
Ellsworth	16500		1388.72	1388.62	0.10	0.07	0.00		349.00		47.88
Ellsworth	16400		1388.65	1388.55	0.10	0.07	0.00		349.00		47.77
Ellsworth	16300		1388.58	1388.47	0.10	0.08	0.00		349.00		47.64
Ellsworth	16200		1388.50	1388.40	0.10	0.08	0.00		349.00		47.51
Ellsworth	16100		1388.42	1388.32	0.11	0.08	0.00		349.00		47.36
Ellsworth	16000		1388.34	1388.24	0.11	0.03	0.00		349.00		47.17
Ellsworth	15966.5		1388.31	1388.20	0.11	0.01	0.01		349.00		47.10
Ellsworth	15947.5		1388.28	1388.22	0.06	0.00	0.00		349.00		56.14
Ellsworth	15937.5		1388.28	1388.21	0.07	0.00	0.01		349.00		58.70
Ellsworth	15920.67		1388.27	1388.08	0.19				349.00		21.83
Ellsworth	15895		Culvert								
Ellsworth	15870.67		1388.11	1387.92	0.20	0.01	0.04		349.00		21.83
Ellsworth	15855.5		1388.07	1388.00	0.07	0.00	0.00		349.00		57.63
Ellsworth	15845.5		1388.07	1388.00	0.07	0.01	0.01		349.00		55.13
Ellsworth	15826.6		1388.05	1387.93	0.12	0.02	0.00		349.00		45.58
Ellsworth	15809		1388.03	1387.91	0.13	0.01	0.00		349.00		45.28
Ellsworth	15800		1388.02	1387.90	0.13	0.10	0.00		349.00		45.43
Ellsworth	15700		1387.92	1387.79	0.13	0.11	0.00		349.00		45.07

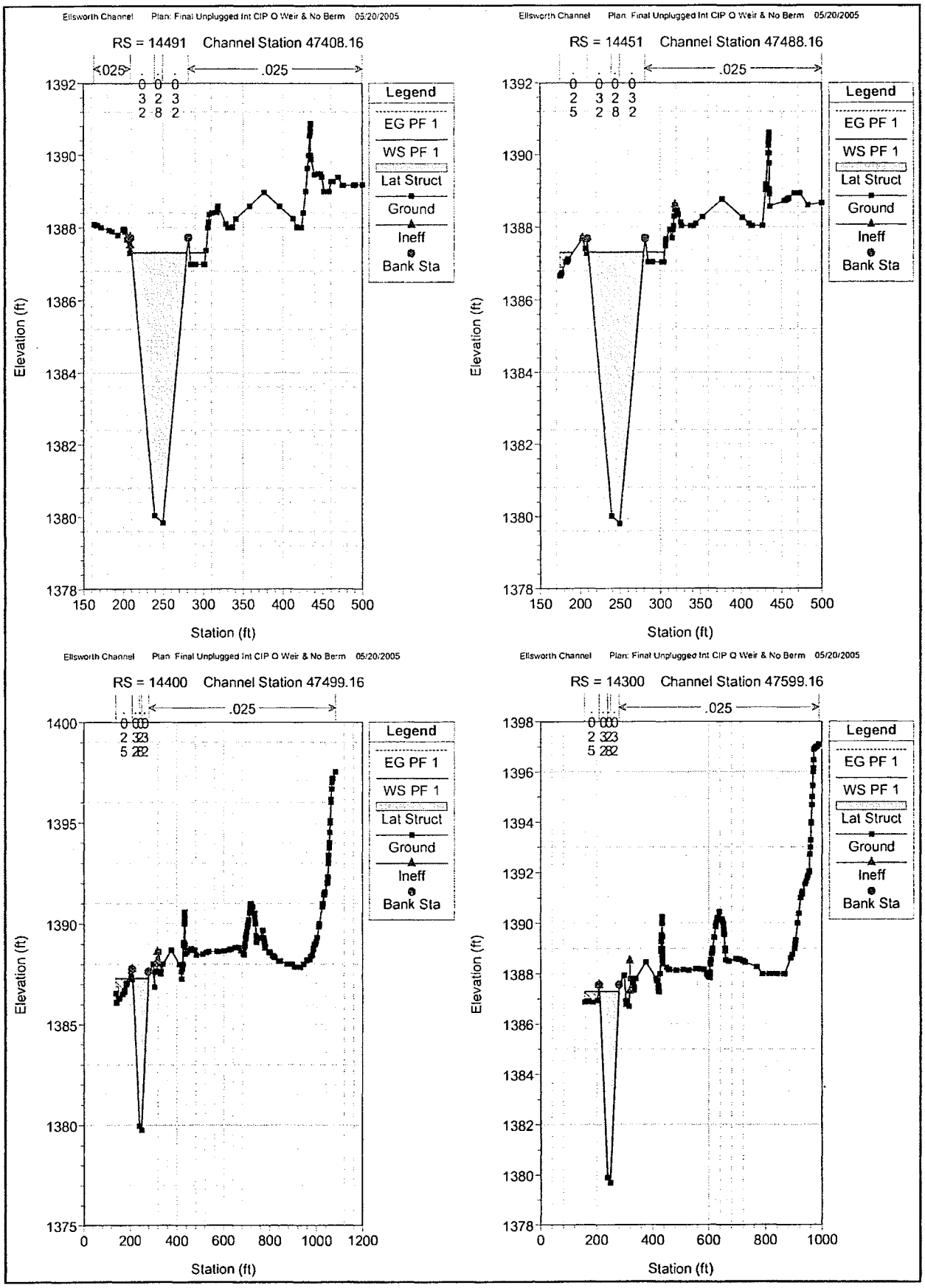
Ellsworth	15600	1387.82	1387.68	0.14	0.07	0.00		349.00		44.66
Ellsworth	15550	1387.75	1387.61	0.14	0.05	0.02		349.00		44.31
Ellsworth	15460	1387.68	1387.49	0.19	0.00	0.02		349.00		26.76
Ellsworth	15450	1387.66	1387.50	0.15				349.00		106.39
Ellsworth	15350	Culvert								
Ellsworth	15192	1387.43	1387.38	0.05	0.02	0.01		349.00		65.19
Ellsworth	15100	1387.40	1387.37	0.03	0.02	0.00		349.00		65.74
Ellsworth	15000	1387.39	1387.36	0.03	0.01	0.00	0.00	349.00		67.13
Ellsworth	14900	1387.37	1387.35	0.03	0.01	0.00		349.00		66.81
Ellsworth	14800	1387.36	1387.34	0.02	0.01	0.00		349.00		67.37
Ellsworth	14700	1387.35	1387.33	0.02	0.01	0.00		348.98	0.02	69.42
Ellsworth	14600	1387.34	1387.32	0.02	0.00	0.00	0.00	348.97	0.03	70.36
Ellsworth	14579	1387.34	1387.32	0.02	0.00	0.00	0.00	343.14	5.86	89.99
Ellsworth	14569	1387.34	1387.32	0.02	0.01	0.00	0.00	343.13	5.87	89.96
Ellsworth	14501	1387.33	1387.31	0.02	0.00	0.00		347.54	1.46	89.00
Ellsworth	14491	1387.33	1387.31	0.02	0.00	0.00		347.47	1.53	89.23
Ellsworth	14490	Lat Struct								
Ellsworth	14451	1387.33	1387.30	0.02	0.00	0.00	0.00	340.79	1.21	107.88
Ellsworth	14400	1387.32	1387.30	0.02	0.01	0.00		309.24	0.13	127.92
Ellsworth	14300	1387.31	1387.30	0.01	0.00	0.00		244.34	1.54	135.41
Ellsworth	14200	1387.31	1387.30	0.01	0.00	0.00		190.00		100.66
Ellsworth	14100	1387.30	1387.30	0.00	0.00	0.00		140.40	0.17	190.78
Ellsworth	14000	1387.30	1387.30	0.00	0.04	0.04	0.60	19.45	0.53	306.40
Ellsworth	13900	1387.22	1386.80	0.43	0.14	0.02	77.44	2246.21	6.74	203.75
Ellsworth	13800	1387.07	1386.70	0.36	0.12	0.01	74.61	2068.16	5.89	209.01
Ellsworth	13700	1386.94	1386.60	0.34	0.11	0.01	20.10	1960.43	5.08	190.91
Ellsworth	13600	1386.82	1386.53	0.29	0.10	0.00	31.34	1840.11	4.82	206.13
Ellsworth	13500	1386.72	1386.43	0.29	0.10	0.00	8.95	1812.47	4.40	185.60
Ellsworth	13400	1386.62	1386.33	0.29	0.10	0.00	2.77	1793.78	4.03	219.38
Ellsworth	13300	1386.52	1386.24	0.29	0.09	0.00	0.40	1785.75	3.68	193.44
Ellsworth	13200	1386.43	1386.15	0.28	0.09	0.00	7.29	1769.84	3.36	206.33
Ellsworth	13100	1386.33	1386.06	0.27	0.09	0.01	23.55	1743.06	10.44	230.57
Ellsworth	13000	1386.24	1385.99	0.25	0.09	0.00	67.77	1696.71	12.57	264.05
Ellsworth	12900	1386.15	1385.90	0.25	0.08	0.01	62.40	1687.79	11.53	293.89
Ellsworth	12800	1386.07	1385.84	0.23	0.07	0.01	53.40	1631.04	26.96	326.74
Ellsworth	12700	1385.98	1385.78	0.20	0.06	0.01	90.52	1546.63	54.59	403.80
Ellsworth	12600	1385.91	1385.75	0.16	0.06	0.00	105.86	1429.78	154.48	365.07
Ellsworth	12500	1385.84	1385.67	0.17	0.06	0.00	102.81	1476.47	109.21	357.72
Ellsworth	12400	1385.78	1385.59	0.19	0.07	0.00	90.32	1539.82	58.26	347.98
Ellsworth	12300	1385.71	1385.52	0.19	0.07	0.00	113.26	1545.39	29.74	350.53
Ellsworth	12200	1385.64	1385.45	0.19	0.07	0.00	125.78	1540.27	22.36	318.59
Ellsworth	12100	1385.58	1385.37	0.20	0.07	0.00	89.49	1579.01	19.90	310.13
Ellsworth	12000	1385.51	1385.30	0.20	0.07	0.00	65.52	1596.28	26.59	294.39
Ellsworth	11900	1385.43	1385.22	0.22	0.07	0.00	45.51	1618.28	24.61	305.22
Ellsworth	11800	1385.36	1385.13	0.23	0.08	0.00	31.35	1646.16	10.89	257.26
Ellsworth	11700	1385.28	1385.06	0.23	0.08	0.00	34.70	1644.52	9.18	233.68
Ellsworth	11600	1385.21	1384.98	0.23	0.07	0.01	14.91	1647.35	26.13	256.77
Ellsworth	11500	1385.12	1384.94	0.19	0.06	0.00	7.30	1541.53	139.56	252.72
Ellsworth	11400	1385.06	1384.87	0.19	0.07	0.01	1.64	1679.35	7.41	163.25
Ellsworth	11300	1384.98	1384.74	0.24	0.08	0.00	1.03	1681.82	5.54	135.77
Ellsworth	11200	1384.90	1384.66	0.24	0.08	0.00	5.88	1676.98	5.55	304.72
Ellsworth	11100	1384.82	1384.58	0.24	0.08	0.00	3.80	1679.07	5.52	290.72
Ellsworth	11000	1384.74	1384.50	0.24	0.08	0.00	0.46	1682.46	5.48	264.55
Ellsworth	10900	1384.66	1384.42	0.24	0.08	0.01		1672.41	15.99	271.46
Ellsworth	10800	1384.57	1384.36	0.22	0.07	0.00	0.11	1618.87	69.42	268.14
Ellsworth	10700	1384.50	1384.29	0.21	0.04	0.01		1595.06	93.34	272.66
Ellsworth	10650.9	1384.44	1384.20	0.24	0.03	0.04		1673.76	14.64	111.92
Ellsworth	10623.7	1384.38	1384.21	0.17	0.00	0.01		1681.04	7.36	112.50
Ellsworth	10613.7	1384.37	1384.22	0.15	0.00	0.01		1686.31	2.08	114.56
Ellsworth	10600.87	1384.36	1384.09	0.27				1688.40		55.50
Ellsworth	10570	Culvert								
Ellsworth	10539.74	1384.09	1383.80	0.28	0.00	0.02		1688.40		55.50
Ellsworth	10528.5	1384.06	1383.85	0.22	0.01	0.01		1688.40		86.33
Ellsworth	10518.5	1384.05	1383.86	0.19	0.02	0.01		1688.40		86.28
Ellsworth	10490.7	1384.02	1383.74	0.28	0.09	0.00		1687.30	1.10	89.93
Ellsworth	10400	1383.93	1383.64	0.29	0.10	0.00		1688.40		236.23
Ellsworth	10300	1383.82	1383.53	0.29	0.11	0.00		1688.40		204.69
Ellsworth	10200	1383.72	1383.42	0.30	0.11	0.00		1688.40		138.53
Ellsworth	10100	1383.61	1383.31	0.30	0.11	0.00		1688.40		100.34
Ellsworth	10000	1383.50	1383.19	0.30	0.11	0.00		1688.40	0.00	97.89
Ellsworth	9900	1383.38	1383.08	0.31	0.12	0.00		1686.33	2.07	98.43
Ellsworth	9800	1383.27	1382.96	0.31	0.15	0.00		1688.40		91.11
Ellsworth	9700	1383.11	1382.78	0.33	0.19	0.01		1688.35	0.05	123.71
Ellsworth	9600	1382.91	1382.62	0.29	0.09	0.05		2035.40		221.02
Ellsworth	9500	1382.77	1382.58	0.18	0.06	0.00		2035.40		228.96
Ellsworth	9400	1382.71	1382.53	0.18	0.04	0.00		2035.40		205.40
Ellsworth	9340.54	1382.67	1382.49	0.18	0.02	0.01		2035.40		118.81

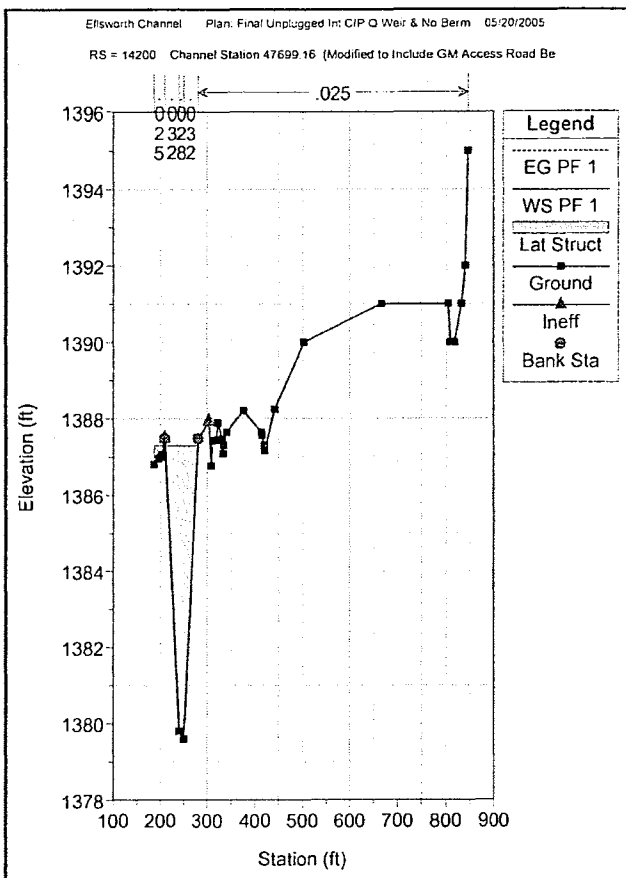
Ellsworth	9314.67		1382.65	1382.49	0.16	0.00	0.01		2035.40		127.23
Ellsworth	9304.67		1382.64	1382.45	0.18	0.00	0.01		2035.40		129.63
Ellsworth	9288.82		1382.62	1382.39	0.23				2035.40		79.00
Ellsworth	9248		Culvert								
Ellsworth	9207.65		1382.43	1382.19	0.24	0.00	0.02		2035.40		79.00
Ellsworth	9193.48		1382.40	1382.21	0.19	0.01	0.01		2035.40		129.96
Ellsworth	9183.48		1382.38	1382.21	0.17	0.01	0.01		2035.40		127.97
Ellsworth	9154.01		1382.36	1382.17	0.19	0.01	0.00		2035.40		117.41
Ellsworth	9143		1382.36	1382.16	0.19	0.03	0.00		2035.40		117.45
Ellsworth	9100		1382.33	1382.14	0.19	0.06	0.00		2035.40		117.48
Ellsworth	9000		1382.27	1382.08	0.19	0.06	0.00		2035.40		117.65
Ellsworth	8900		1382.21	1382.02	0.19	0.06	0.02		2035.40		117.82
Ellsworth	8800		1382.13	1382.00	0.13	0.06	0.01		2035.40		125.16
Ellsworth	8700		1382.06	1381.88	0.19	0.07	0.01		2035.40		117.94
Ellsworth	8600		1381.99	1381.72	0.26	0.08	0.00		2382.40		117.34
Ellsworth	8500		1381.90	1381.64	0.26	0.08	0.00		2382.40		117.33
Ellsworth	8400		1381.82	1381.56	0.27	0.08	0.00		2382.40		117.31
Ellsworth	8300		1381.74	1381.47	0.27	0.08	0.00		2382.40		117.26
Ellsworth	8200		1381.66	1381.39	0.27	0.08	0.00		2382.40		117.24
Ellsworth	8100		1381.57	1381.31	0.27	0.08	0.00		2382.40		117.21
Ellsworth	8000		1381.49	1381.22	0.27	0.08	0.00		2382.40		117.17
Ellsworth	7900		1381.40	1381.14	0.27	0.08	0.00		2382.40		184.14
Ellsworth	7800		1381.32	1381.05	0.27	0.08	0.00		2382.40		279.95
Ellsworth	7700		1381.24	1380.97	0.27	0.08	0.00		2382.40		208.56
Ellsworth	7600		1381.15	1380.88	0.27	0.08	0.00		2382.40		126.72
Ellsworth	7500		1381.07	1380.80	0.27	0.08	0.00		2382.40		126.31
Ellsworth	7400		1380.98	1380.71	0.27	0.09	0.00		2382.40		116.94
Ellsworth	7300		1380.90	1380.63	0.27	0.09	0.00		2382.40		116.89
Ellsworth	7200		1380.81	1380.54	0.27	0.09	0.00		2382.40		116.86
Ellsworth	7100		1380.73	1380.45	0.27	0.09	0.00		2382.40		116.79
Ellsworth	7000		1380.64	1380.37	0.27	0.09	0.00		2382.40		116.76
Ellsworth	6900		1380.55	1380.28	0.27	0.09	0.00		2382.40		116.70
Ellsworth	6800		1380.47	1380.19	0.27	0.09	0.00		2382.40		116.63
Ellsworth	6700		1380.38	1380.10	0.28	0.01	0.00		2382.40		116.55
Ellsworth	6687.62		1380.37	1380.09	0.28	0.02	0.01		2382.40		116.52
Ellsworth	6675.17*		1380.34	1380.05	0.29	0.00	0.01		2382.40		120.79
Ellsworth	6662.73		1380.33	1379.95	0.38	0.00	0.01		2382.40		124.00
Ellsworth	6646.88		1380.31	1379.79	0.52				2382.40		66.00
Ellsworth	6615		Culvert								
Ellsworth	6585.95		1379.81	1379.19	0.62	0.01	0.08		2382.40		66.00
Ellsworth	6571.49		1379.71	1379.25	0.46	0.02	0.04		2382.40		122.16
Ellsworth	6559.04*		1379.66	1379.28	0.38	0.02	0.01		2382.40		117.69
Ellsworth	6546.60		1379.63	1379.27	0.36	0.03	0.00		2382.40		111.38
Ellsworth	6527		1379.61	1379.24	0.36	0.03	0.00		2382.40		111.43
Ellsworth	6500		1379.57	1379.21	0.36	0.13	0.00		2382.40		111.44
Ellsworth	6400		1379.44	1379.08	0.36	0.13	0.00		2382.40		111.55
Ellsworth	6300		1379.31	1378.95	0.36	0.13	0.00		2382.40		111.64
Ellsworth	6200		1379.18	1378.83	0.36	0.13	0.00		2382.40		111.77
Ellsworth	6100		1379.06	1378.70	0.35	0.12	0.00		2382.40		111.91
Ellsworth	6000		1378.93	1378.58	0.35	0.12	0.00		2382.40		112.04
Ellsworth	5900		1378.81	1378.46	0.35	0.12	0.00		2382.40		112.20
Ellsworth	5800		1378.69	1378.34	0.34	0.12	0.00		2382.40		112.38
Ellsworth	5700		1378.57	1378.22	0.34	0.12	0.00		2382.40		112.56
Ellsworth	5600		1378.45	1378.11	0.34	0.12	0.00		2382.40		112.75
Ellsworth	5500		1378.33	1378.00	0.33	0.11	0.00		2382.40		112.97
Ellsworth	5400		1378.21	1377.89	0.33	0.11	0.00		2382.40		113.17
Ellsworth	5300		1378.10	1377.78	0.32	0.11	0.00		2382.40		113.43
Ellsworth	5200		1377.99	1377.67	0.32	0.11	0.00		2382.40		113.72
Ellsworth	5100		1377.88	1377.57	0.31	0.10	0.00		2382.40		113.99
Ellsworth	*5000		1377.78	1377.47	0.31	0.10	0.00		2382.40		114.32
Ellsworth	4900		1377.67	1377.37	0.30	0.10	0.00		2382.40		114.66
Ellsworth	4800		1377.57	1377.27	0.30	0.10	0.00		2382.40		115.03
Ellsworth	4700		1377.47	1377.18	0.29	0.02	0.00		2382.40		115.42
Ellsworth	4674		1377.45	1377.16	0.29	0.01	0.00		2382.40		115.30
Ellsworth	4664		1377.44	1377.14	0.29	0.06	0.00		2382.40		115.30
Ellsworth	4600		1377.38	1377.09	0.29	0.09	0.00		2382.40		115.81
Ellsworth	4500		1377.28	1377.00	0.28	0.09	0.00		2382.40		116.23
Ellsworth	4400		1377.19	1376.92	0.27	0.09	0.00		2382.40		116.69
Ellsworth	4300		1377.11	1376.84	0.27	0.08	0.00		2382.40		117.16
Ellsworth	4200		1377.02	1376.76	0.26	0.08	0.00		2382.40		117.66
Ellsworth	4100		1376.94	1376.69	0.25	0.08	0.00		2382.40		118.19
Ellsworth	4000		1376.86	1376.62	0.25	0.07	0.00		2382.40		118.73
Ellsworth	3900		1376.79	1376.55	0.24	0.07	0.00		2382.40		119.30
Ellsworth	3800		1376.71	1376.48	0.23	0.07	0.00		2382.40		119.90
Ellsworth	3700		1376.64	1376.42	0.22	0.06	0.00		2375.45	6.95	184.77
Ellsworth	3600		1376.58	1376.37	0.21	0.04	0.00		2350.52	31.88	231.31
Ellsworth	3505.64		1376.53	1376.33	0.21	0.01	0.00	0.39	2366.83	15.18	256.82

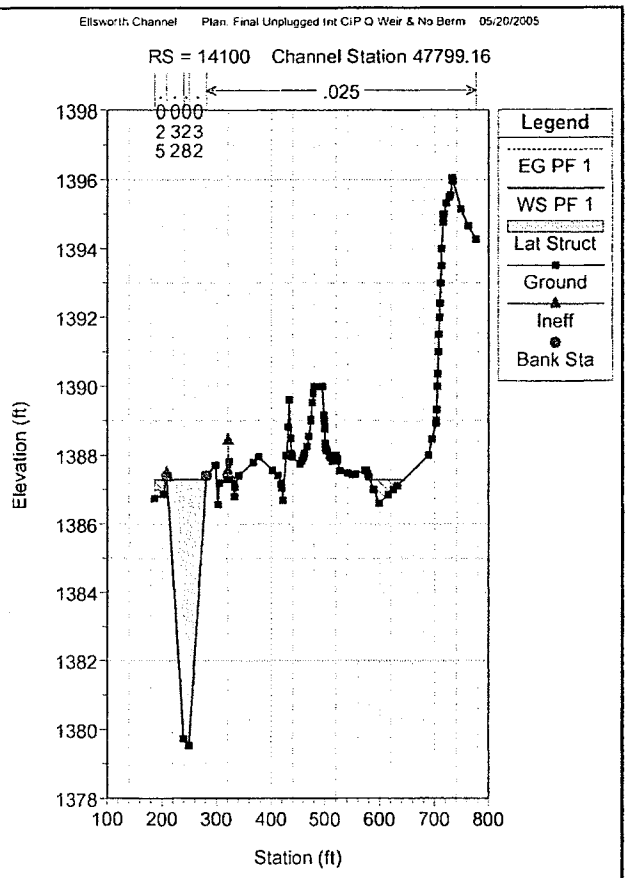
Ellsworth	3473.65	1376.52	1376.32	0.21	0.00	0.05	0.45	2364.41	17.53	258.83
Ellsworth	3473.64	1376.47	1376.10	0.37	0.00	0.00	0.07	2379.56	2.77	194.50
Ellsworth	3461.64	1376.47	1376.10	0.37	0.00	0.05	0.06	2379.64	2.69	194.35
Ellsworth	3461.63	1376.42	1375.87	0.55	0.00	0.33		2382.40		70.00
Ellsworth	3460.63	1376.08	1374.42	1.66	0.01	0.64		2382.40		70.00
Ellsworth	3444.63	1370.41	1370.03	0.38	0.00	0.00		2382.40		70.00
Ellsworth	3444.62	1370.41	1370.03	0.38	0.02	0.00		2382.40		70.00
Ellsworth	3432.91	1370.39	1370.01	0.38	0.01	0.06		2382.40		70.00
Ellsworth	3425.08	1370.32	1370.13	0.20	0.02	0.00		2382.40		121.69
Ellsworth	3400	1370.30	1370.08	0.22	0.07	0.00		2382.40		121.09
Ellsworth	3300	1370.23	1370.02	0.21	0.06	0.00		2382.40		122.48
Ellsworth	3200	1370.16	1369.97	0.19	0.07	0.00		2382.40		270.19
Ellsworth	3100	1370.08	1369.90	0.18	0.06	0.00		2382.40		151.46
Ellsworth	3000	1370.02	1369.85	0.17	0.04	0.00		2382.40		126.96
Ellsworth	2900	1369.98	1369.82	0.16	0.04	0.00		2382.40		128.51
Ellsworth	2800	1369.93	1369.79	0.15	0.03	0.02		2382.40		130.11
Ellsworth	2700	1369.89	1369.77	0.11	0.01	0.00		2382.40		142.14
Ellsworth	2654.00*	1369.87	1369.75	0.12	0.02	0.04		2382.40		137.64
Ellsworth	2608.01	1369.81	1369.55	0.26	0.00	0.03		2382.40		131.68
Ellsworth	2598.02	1369.78	1369.42	0.36	0.00	0.11		2382.40		130.93
Ellsworth	2581.04	1369.67	1368.95	0.72				2382.40		44.60
Ellsworth	2569	Culvert								
Ellsworth	2557.04	1367.77	1365.53	2.24	0.07	0.45		2382.40		44.60
Ellsworth	2542.01	1367.35	1364.06	3.29	0.10	0.32		2382.40		88.81
Ellsworth	2532.01	1367.02	1363.69	3.33	0.31	0.01		2382.40		85.95
Ellsworth	2513.15*	1366.46	1365.88	0.58	0.29	0.00		2382.40		103.88
Ellsworth	2400	1366.17	1365.59	0.58	0.25	0.00		2382.40		105.47
Ellsworth	2300	1365.91	1365.34	0.58	0.25	0.00		2382.40		103.83
Ellsworth	2200	1365.66	1365.08	0.58	0.25	0.00		2382.40		103.82
Ellsworth	2100	1365.41	1364.83	0.58	0.25	0.00		2382.40		103.80
Ellsworth	2000	1365.15	1364.57	0.58	0.25	0.00		2382.40		103.77
Ellsworth	1900	1364.90	1364.32	0.58	0.25	0.00		2382.40		103.83
Ellsworth	1800	1364.65	1364.07	0.58	0.25	0.00		2382.40		103.79
Ellsworth	1700	1364.40	1363.81	0.58	0.25	0.00		2382.40		103.78
Ellsworth	1600	1364.14	1363.56	0.58	0.25	0.00		2382.40		103.74
Ellsworth	1500	1363.89	1363.31	0.58	0.25	0.00		2382.40		103.77
Ellsworth	1400	1363.63	1363.05	0.58	0.26	0.00		2382.40		103.71
Ellsworth	1300	1363.38	1362.79	0.58	0.26	0.00		2382.40		103.68
Ellsworth	1200	1363.12	1362.54	0.58	0.26	0.00		2382.40		103.68
Ellsworth	1100	1362.86	1362.28	0.59	0.26	0.00		2382.40		103.62
Ellsworth	1000	1362.61	1362.02	0.59	0.26	0.00		2382.40		103.53
Ellsworth	900	1362.35	1361.75	0.59	0.26	0.00		2382.40		103.44
Ellsworth	800	1362.08	1361.49	0.60	0.27	0.00		2382.40		103.39
Ellsworth	700	1361.82	1361.21	0.60	0.27	0.02		2382.40		103.21
Ellsworth	600	1361.53	1360.98	0.55	0.28	0.01		2382.40		120.08
Ellsworth	500	1361.24	1360.60	0.64	0.30	0.00		2382.40		116.74
Ellsworth	400	1360.94	1360.27	0.67	0.61	0.07		2382.40		117.46
Ellsworth	300	1360.26	1358.89	1.37	0.21	0.03		2382.40		107.65
Ellsworth	244	1359.88	1358.00	1.88	0.33	0.05		2382.40		111.93
Ellsworth	243	1359.86	1357.82	2.04	0.00	0.02		2382.40		90.88
Ellsworth	204	1359.65	1358.00	1.65	0.09	0.18		2382.40		108.49
Ellsworth	203.9	1359.05	1358.66	0.39	0.01	0.00		2382.40		214.60
Ellsworth	183.9	1359.04	1358.63	0.41	0.03	0.01		2382.40		212.77
Ellsworth	163.9	1359.00	1358.62	0.38	0.03	0.09		2382.40		216.05
Ellsworth	100	1358.88	1358.80	0.08	0.02	0.00		2382.40		184.78
Ellsworth	0	1358.86	1358.73	0.13				2382.40		151.55

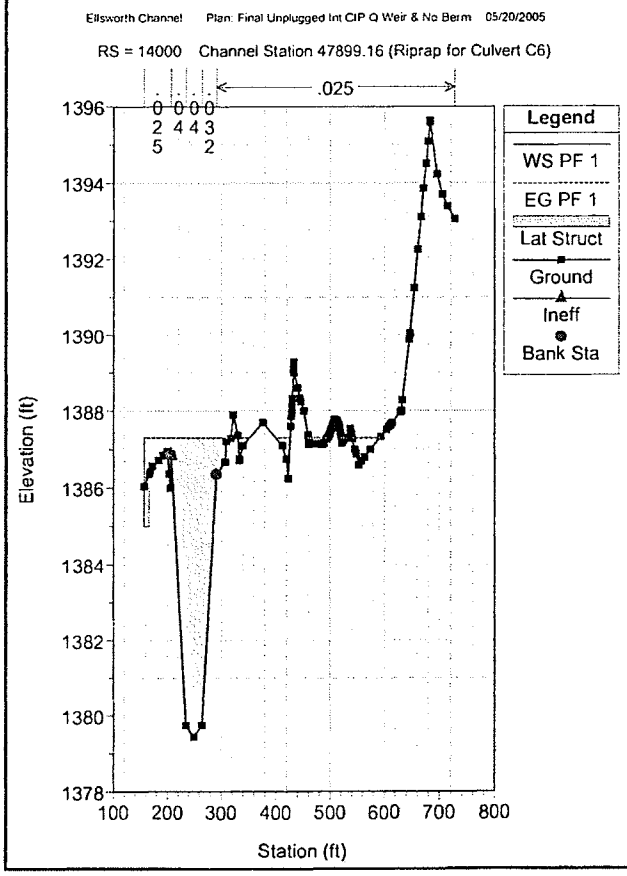

Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 15000 Channel Station 46899.16 (End Riprap)
RS = 14900 Channel Station 46999.16
RS = 14800 Channel Station 47099.16
RS = 14700 Channel Station 47199.16
.025
.025
0 0 0
3 2 3
2 8 2
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1380
1382
1384
1386
1388
1390
1392
0
100
200
300
400
500

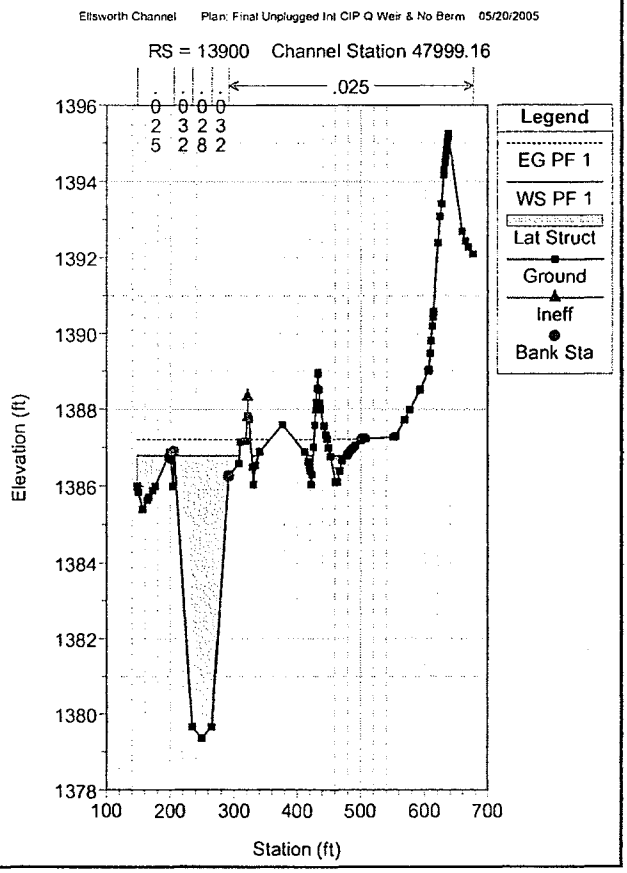

Ellsworth Channel Plan: Final Unplugged Int CIP O Weir & No Berm 05/20/2005
RS = 14600 Channel Station 47299.16
RS = 14579 Channel Station 47320.16
RS = 14569 Channel Station 47330.16
RS = 14501 Channel Station 47398.16
.025
.025
000
323
282
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1392
1390
1388
1386
1384
1382
1380
1378
0
100
200
300
400
500

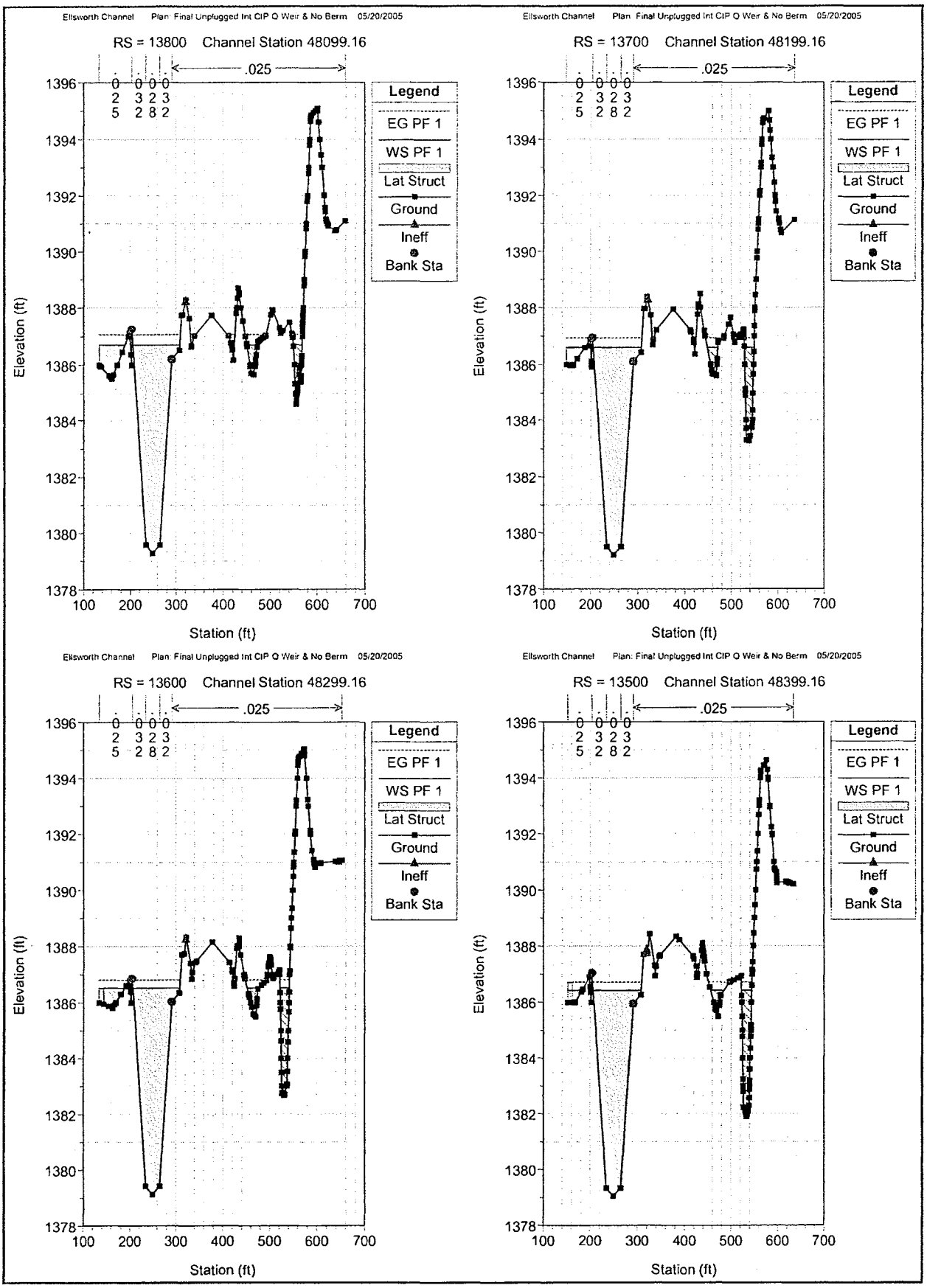

Ellsworth Channel Plan: Final Unplugged Int CIP O Weir & No Berm 05/20/2005
RS = 14491 Channel Station 47408.16
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Unplugged Int CIP O Weir & No Berm 05/20/2005
RS = 14451 Channel Station 47488.16
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Unplugged Int CIP O Weir & No Berm 05/20/2005
RS = 14400 Channel Station 47499.16
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Unplugged Int CIP O Weir & No Berm 05/20/2005
RS = 14300 Channel Station 47599.16
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

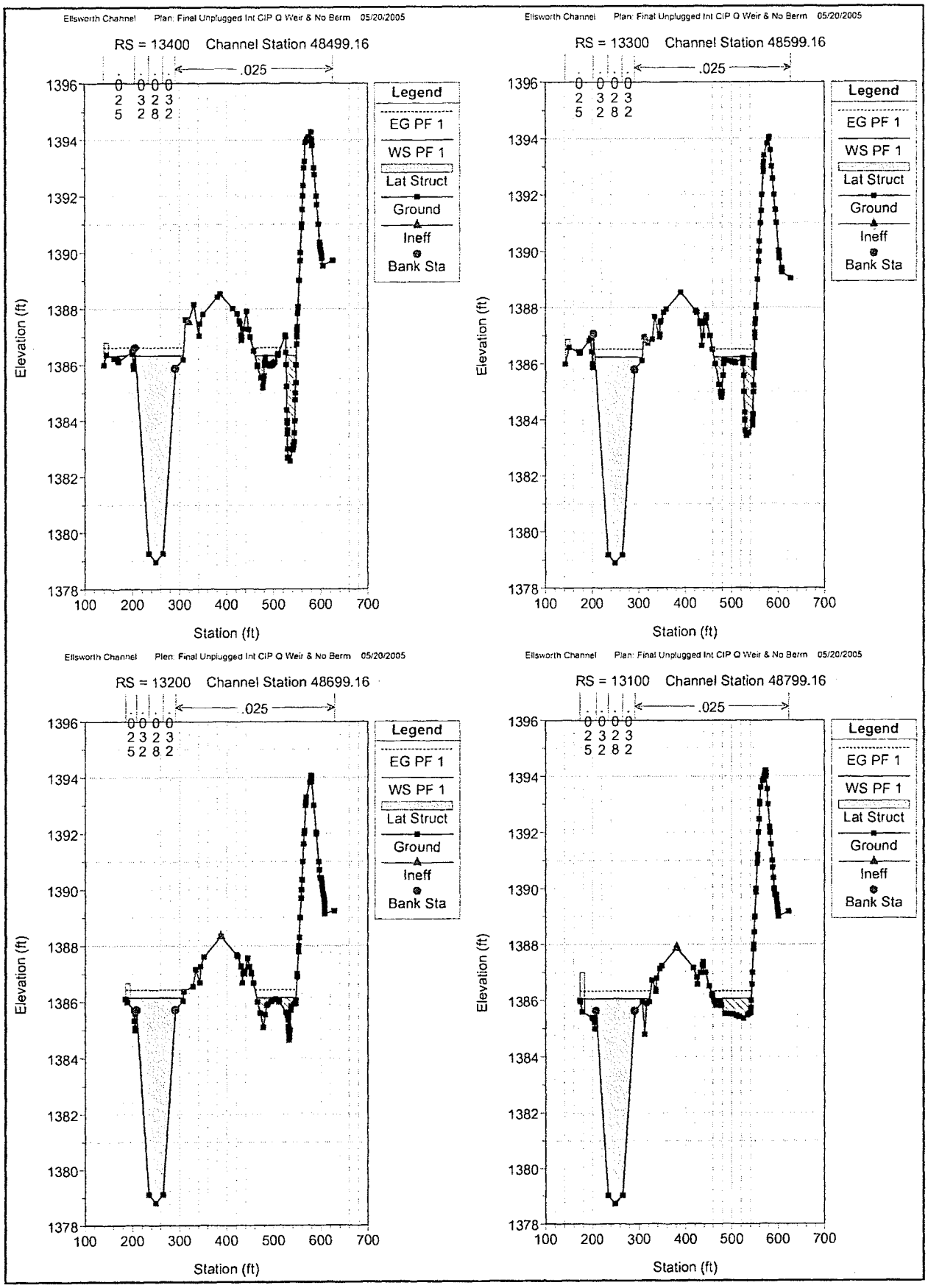

Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 14200 Channel Station 47699.16 (Modified to Include GM Access Road Be
.025
0000
2323
5282
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

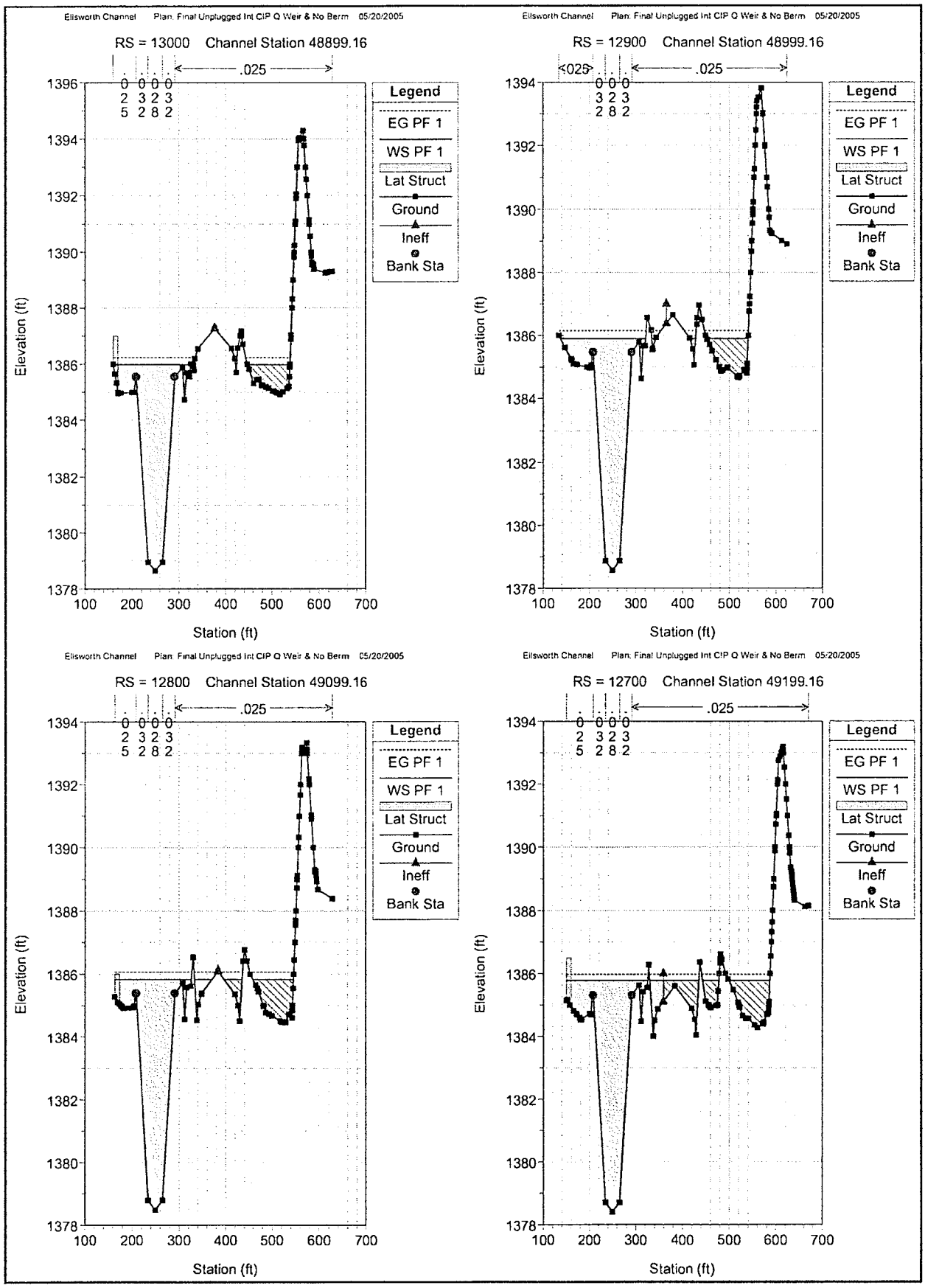

Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 14100 Channel Station 47799.16
.025
0000
2323
5282
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 14000 Channel Station 47899.16 (Riprap for Culvert C6)
.025
0000
2443
52
Legend
WS PF 1
EG PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 13900 Channel Station 47999.16
.025
0000
2323
5282
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

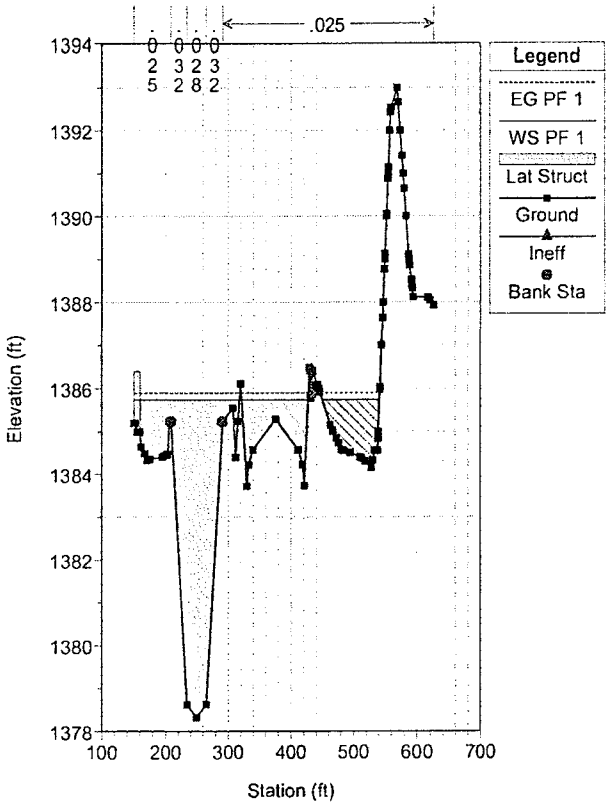

Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 13800 Channel Station 48099.16
RS = 13700 Channel Station 48199.16
RS = 13600 Channel Station 48299.16
RS = 13500 Channel Station 48399.16
.025
0 0 0 0
2 3 2 3
5 2 8 2
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1378
1380
1382
1384
1386
1388
1390
1392
1394
1396
100
200
300
400
500
600
700


Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 13400 Channel Station 48499.16
RS = 13300 Channel Station 48599.16
RS = 13200 Channel Station 48699.16
RS = 13100 Channel Station 48799.16
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 13000 Channel Station 48899.16
.025
0 0 0 0
2 3 2 3
5 2 8 2
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 12900 Channel Station 48999.16
.025
0 0 0
3 2 3
2 8 2
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 12800 Channel Station 49099.16
.025
0 0 0 0
2 3 2 3
5 2 8 2
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 12700 Channel Station 49199.16
.025
0 0 0 0
2 3 2 3
5 2 8 2
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

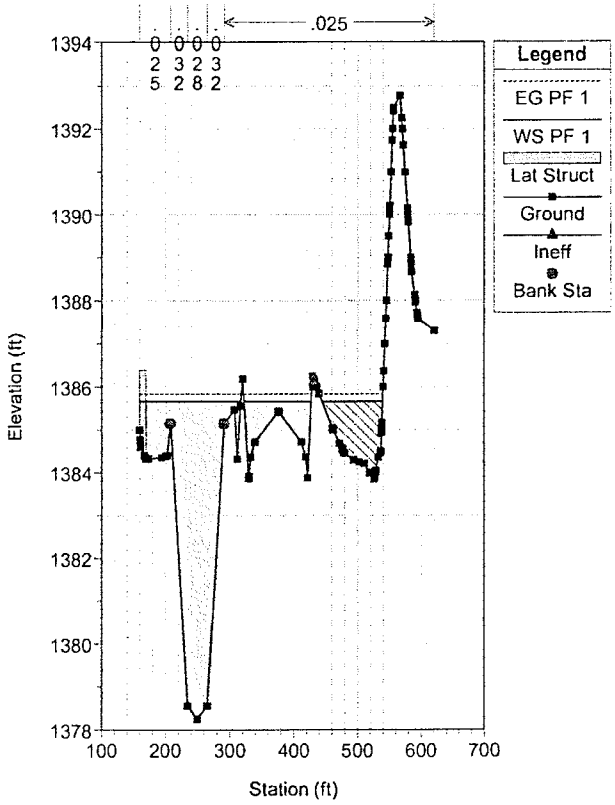
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

RS = 12600 Channel Station 49299.16



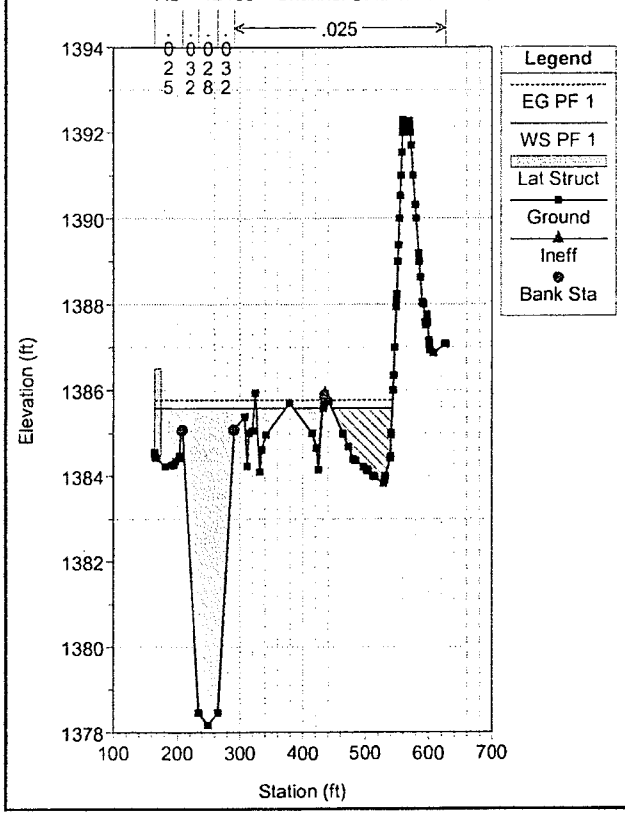
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

RS = 12500 Channel Station 49399.16



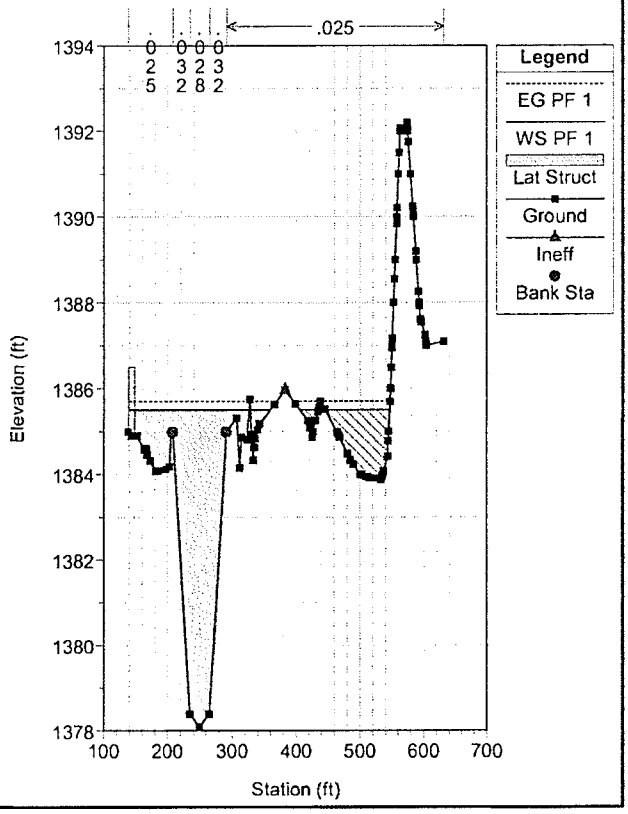
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

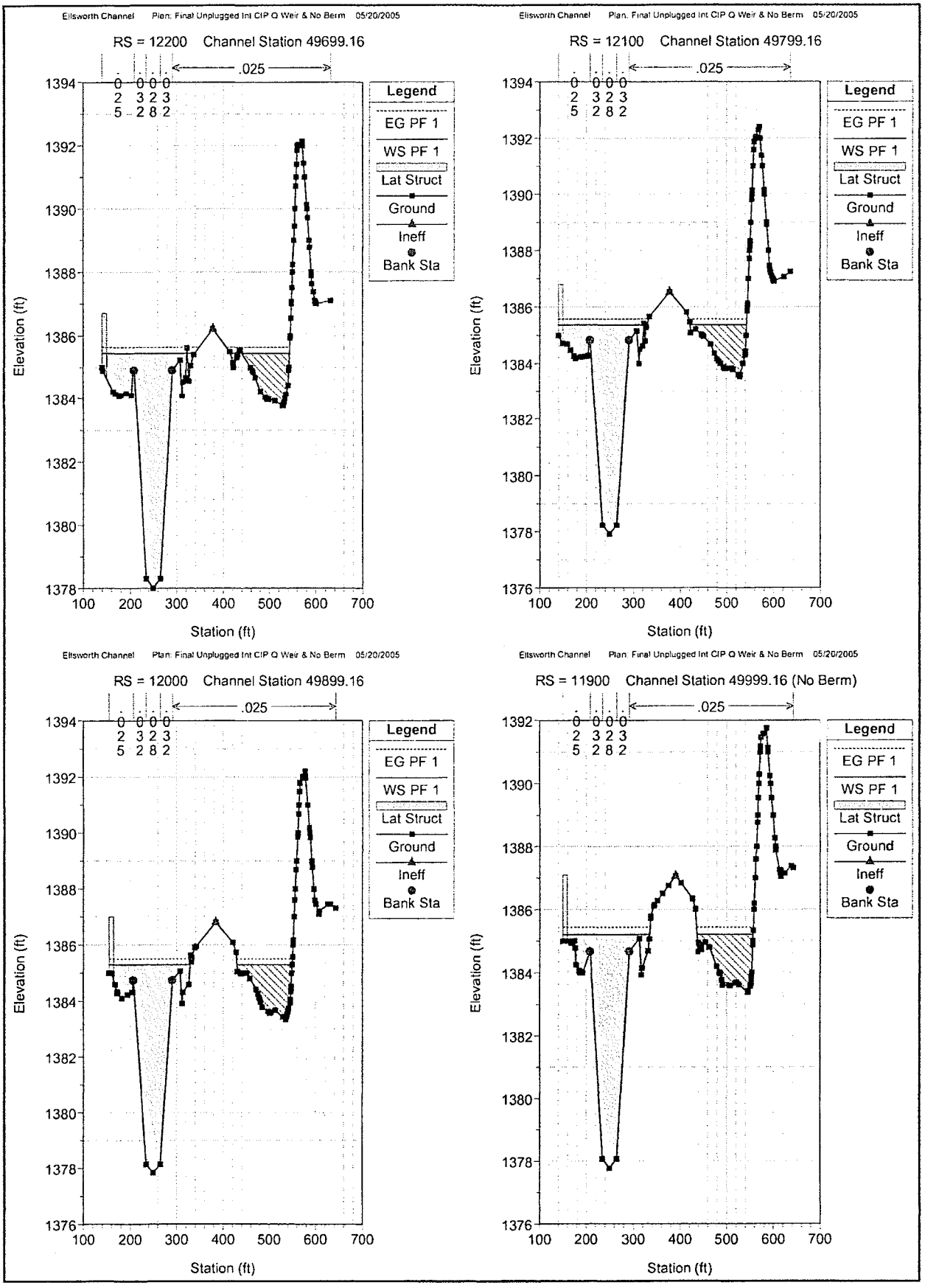
RS = 12400 Channel Station 49499.16



Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

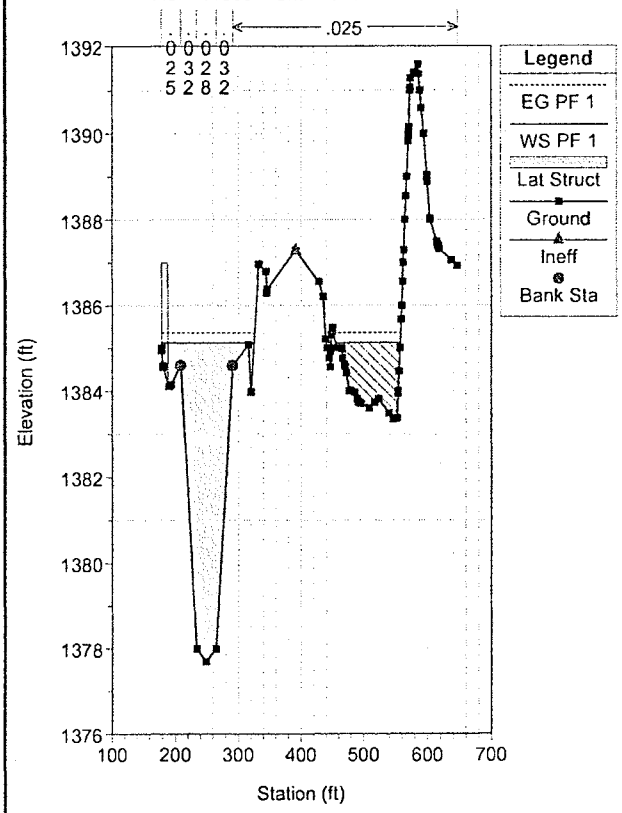
RS = 12300 Channel Station 49599.16




Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 12200 Channel Station 49699.16
.025
0 0 0 0
2 3 2 3
5 2 8 2
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 12100 Channel Station 49799.16
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 12000 Channel Station 49899.16
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 11900 Channel Station 49999.16 (No Berm)

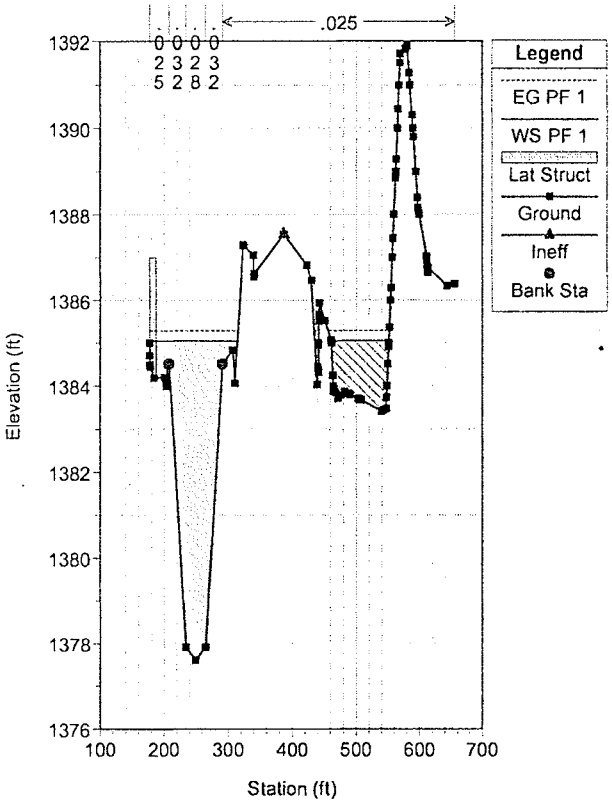
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

RS = 11800 Channel Station 50099.16



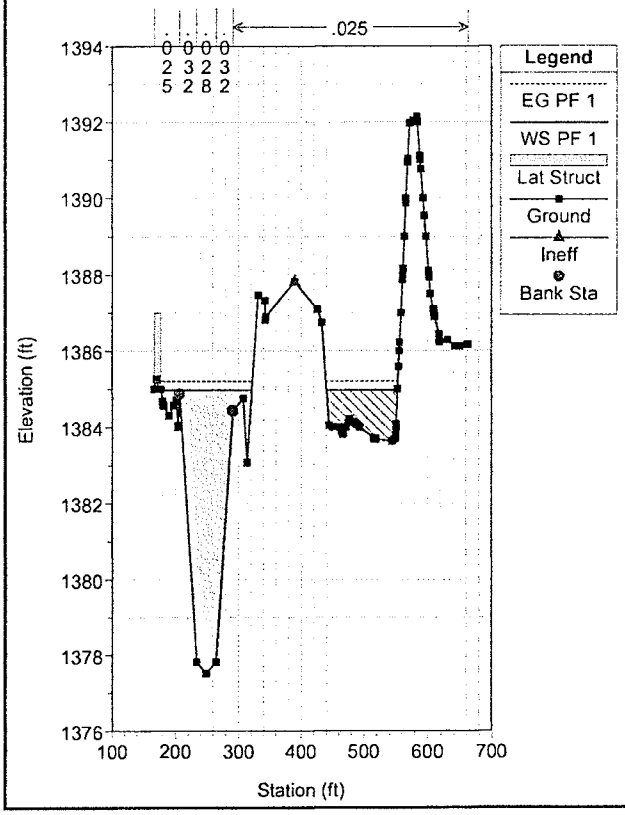
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

RS = 11700 Channel Station 50199.16



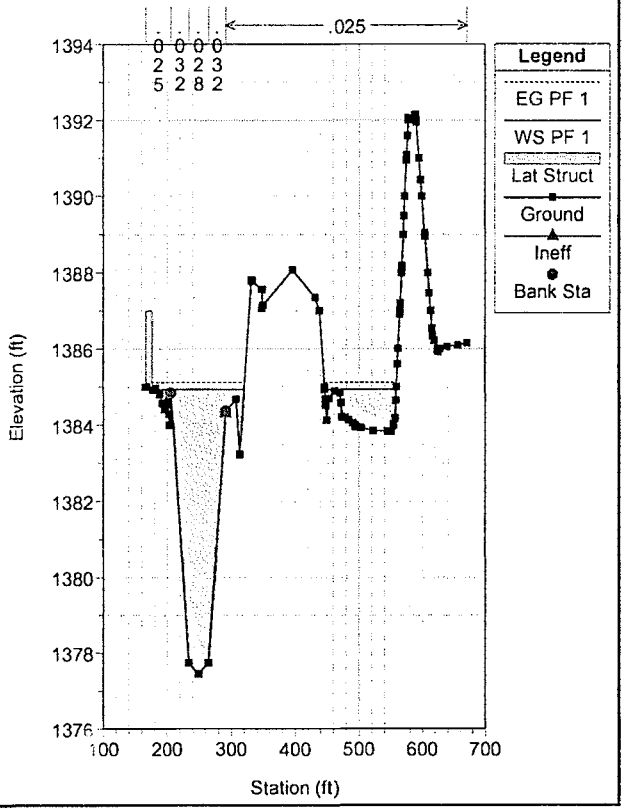
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

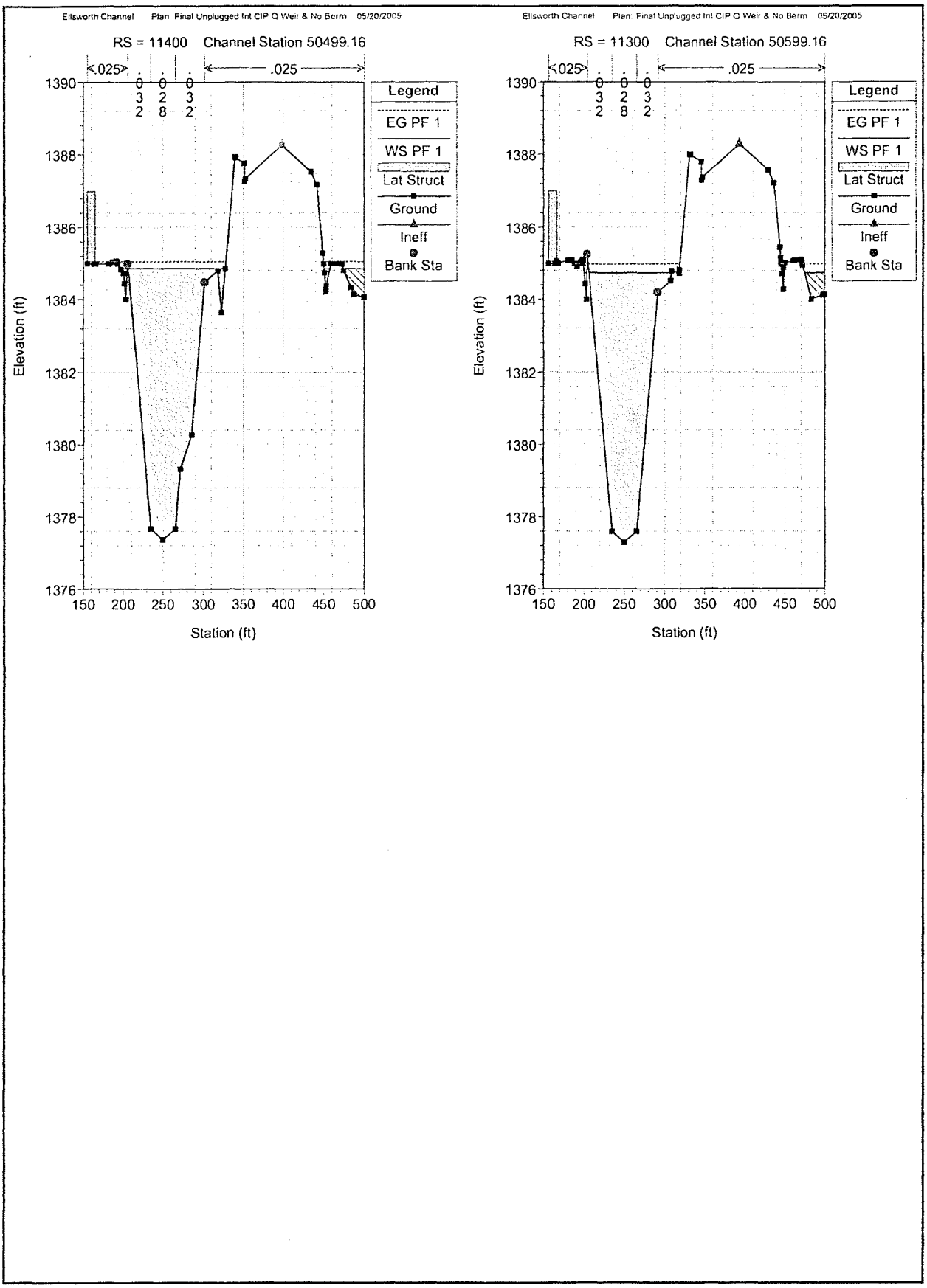
RS = 11600 Channel Station 50299.16



Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005

RS = 11500 Channel Station 50399.16




Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 11400 Channel Station 50499.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1390
1388
1386
1384
1382
1380
1378
1376
150
200
250
300
350
400
450
500
Ellsworth Channel Plan: Final Unplugged Int CIP Q Weir & No Berm 05/20/2005
RS = 11300 Channel Station 50599.16
.025
.032
.028
.032
.025
Legend
EG PF 1
WS PF 1
Lat Struct
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1390
1388
1386
1384
1382
1380
1378
1376
150
200
250
300
350
400
450
500

Design Memorandum
For Off-site Drainage at Germann And Ellsworth Roads

December 2, 2004

PURPOSE: The purpose of this memorandum is to document the evaluation of off-site drainage at Germann and Ellsworth roads to ensure that the improved Ellsworth Road and Germann Road will not make flooding conditions worse during a 100-year storm event compared with existing conditions.

BACKGROUND: The East Mesa ADMP shows the 100-year peak discharge at the corner of Ellsworth Road and Germann Road is 433 cfs. Dibble and Associates estimated the 100-year runoff at the corner of Ellsworth Road and Germann Road to be 67 cfs using Rational Method. AMEC re-valuated the East Mesa ADMP results and found that Germann Road was delineated as a drainage divider in the ADMP study. This is not the real case because along Germann Road there are several lower portions which allow the runoff from south of Germann Road overflow the road to the north. The drainage boundary delineated by Dibble and Associates did not explain how the drainage boundaries were delineated. Therefore the 100-year off-site runoff at Ellsworth Road and Germann road was re-evaluated by AMEC.

DRAINAGE BOUNDARY DELINATIONS: Drainage boundaries were delineated using following information: (1) USGS DEM data, (2) 2-foot topographic mapping along the Gemann and Ellsworth Road, (3) 10-foot topographic mapping between the Germann and Ellsworth roads, (4) area photographs, (5) roadway profiles, and (6) site visit records. Three sub-basins, Basins A, B, and C were delineated (see attached Drainage Area map). Basin C was delineated based on USGS DEM data using WMS software and corrected based on the topographic mapping. Basins A and B were delineated based on the topographic mapping, aerial photographs, and site visit information.

100-YEAR PEAK DISCHARGE ESTIMATIONS: 100-year peak discharges were estimated using Rational Method. 10-year runoff coefficient C of 0.15 was used for all the sub drainage basins. 10-year 6-hour rainfall depth of 1.9 inches was estimated based on the Figure A.4 included in the Draft Drainage Design Manual for Maricopa County. Other parameters such as elevations, water course lengths, and drainage areas were either calculated using WMS or estimated based on the topographic mapping. The purpose of including Basin C was to show that the 100-year runoff from Basin C will not affect the Germann roadway improvement. Drainage area C is a little bit over the recommended maximum area limit of Rational Method (per FCDMC Hydrology Manual) but it still was used to estimate runoff here. 100-year peak discharges for Basin A, B, and C are listed in the Table below:

Sub-basins	Drainage Area (acre)	100-year Peak Discharge (cfs)
A	20	16
B	29	21
C	726	238

EXISTING CONDITION DRAINAGE: Under existing conditions, 100-year runoff from Basin C will cross Germann Road at a location approximately 1350 feet east of the intersection of Germann Road and Ellsworth Road to the north. Runoff from Basin A concentrates at the southeast corner of Germann and Ellsworth road. Most of the runoff from Basin A will overtop Germann Road to the north and Ellsworth Road to the west because the existing 24-inch CMP is partially blocked by debris and sediment. Runoff from Basin B will flow along Ellsworth Road to the south.

PROPOSED CONDITION DRAINAGE: Under proposed condition, Runoff from Basin C will still cross Germann Road at approximately 1350 feet east of the intersection of Germann Road and Ellsworth Road to the north. Runoff from Basin A concentrates at the southeast corner of Geramnn and Ellsworth road and will flow through a proposed 24-inch CMP under Ellsworth Road to the west and discharges into an improved V-ditch. HY-8 was used to estimate the capacity of the proposed 24-inch CMP. The overtopping discharge of the proposed 24-inch CMP is 24.7 cfs which is larger than 100-year peak discharge from Basin A. Runoff from Basin B will still flow along Ellsworth Road to the south because Ellsworth Road profile is the same as that of existing condition. Ellsworth and Germann road improvements will not make flooding conditions worse during a 100-year storm event compared with existing conditions.

CONCLUSIONS:

1). Runoff from Basin C does not impact the improved Germann Road section.

2). Runoff from Basin A will flow through the proposed 24-inch CMP and discharge into an improved V-ditch along Germann Road. The capacity of proposed CMP is larger than 100-year runoff from Basin A.

3). Runoff from Basin B will still flow along Ellsworth Road to south following the existing flow path.

4). The improved Ellsworth Road and Germann Road will not make flooding conditions worse during a 100-year storm event compared with existing conditions.

5). It is assumed that as development occurs in Queen Creek to the south of Germann Road, on-site retention will be required. When this occurs, the overtopping condition described above will be mitigated. Should the City of Mesa elect to improve Germann Road, prior to ultimate on site retention being in place, to the east of the current project limits, enhanced pavement section design should be considered.

Discharge Estimation for Drainage Area A

Flood Control District of Maricopa County
Hydrologic Design Manual Rational Method

Wtcrse. Length = 1900 (feet)
Top Elev. = 1397.8 (feet)
Bottom Elev. = 1392 (feet)
Slope = .0031 (feet/feet)

Kb = .0621
P(10,6) = 1.9 (inches)
Area = 20 (acres)
C(10) = .15

Hydrological Summary Table

PARAMETER	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs):	3.6	5.4	7.2	10.4	13.3	16.0
C :	0.15	0.15	0.15	0.17	0.18	0.19
Tc (min):	38.2	32.7	29.3	26.4	24.9	23.5
i(Adj) (in/hr):	1.2	1.8	2.4	3.2	3.7	4.3
i(Phx) (in/hr):	1.3	2.0	2.6	3.4	4.0	4.7

Discharge Estimation for Drainage Area B

Flood Control District of Maricopa County
Hydrologic Design Manual Rational Method

Wtcrse. Length = 1900 (feet)
Top Elev. = 1397.8 (feet)
Bottom Elev. = 1394 (feet)
Slope = .0020 (feet/feet)

Kb = .0599
P(10,6) = 1.9 (inches)
Area = 29 (acres)
C(10) = .15

Hydrological Summary Table

PARAMETER	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs):	4.4	7.0	9.4	13.8	17.6	21.3
C :	0.15	0.15	0.15	0.17	0.18	0.19
Tc (min):	45.3	38.2	34.1	30.6	28.8	27.2
i(Adj) (in/hr):	1.0	1.6	2.2	2.9	3.4	3.9
i(Phx) (in/hr):	1.1	1.7	2.4	3.1	3.7	4.3

Discharge Estimation for Drainage Area C

Flood Control District of Maricopa County
Hydrologic Design Manual Rational Method

Wtcrse. Length = 19923 (feet)
Top Elev. = 1470 (feet)
Bottom Elev. = 1397 (feet)
Slope = .0037 (feet/feet)

Kb = .0407
P(10,6) = 1.9 (inches)
Area = 726 (acres)
C(10) = .15

Hydrological Summary Table

PARAMETER	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs):	54.1	85.3	109.0	164.7	196.2	237.5
C :	0.15	0.15	0.15	0.17	0.18	0.19
Tc (min):	130.9	110.1	100.3	88.9	86.0	81.2
i(Adj) (in/hr):	0.5	0.8	1.0	1.4	1.5	1.7
i(Phx) (in/hr):	0.5	0.9	1.1	1.5	1.6	1.9

CURRENT DATE: 11-30-2004 FILE DATE: 11-30-2004
CURRENT TIME: 12:03:19 FILE NAME: GERMANN

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS	SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1390.98	1390.42	125.36	1	RCP	2.00	2.00	.012	CONVENTIONAL
2									
3									
4									
5									
6									

SUMMARY OF CULVERT FLOWS (cfs) FILE: GERMANN DATE: 11-30-2004

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1390.98	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1391.61	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1391.93	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1392.19	6.0	6.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1392.41	8.0	8.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1392.60	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1392.86	12.0	12.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1393.04	14.0	14.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1393.23	16.0	16.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1393.28	16.5	16.5	0.0	0.0	0.0	0.0	0.0	0.00	1
1393.61	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1394.70	24.7	24.7	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: GERMANN DATE: 11-30-2004

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1390.98	0.000	0.00	0.00	0.00
1391.61	0.000	2.00	0.00	0.00
1391.93	0.000	4.00	0.00	0.00
1392.19	0.000	6.00	0.00	0.00
1392.41	0.000	8.00	0.00	0.00
1392.60	0.000	10.00	0.00	0.00
1392.86	0.000	12.00	0.00	0.00
1393.04	0.000	14.00	0.00	0.00
1393.23	0.000	16.00	0.00	0.00
1393.28	0.000	16.50	0.00	0.00
1393.61	0.000	20.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 11-30-2004 FILE DATE: 11-30-2004
CURRENT TIME: 12:03:19 FILE NAME: GERMANN

PERFORMANCE CURVE FOR CULVERT 1 - 1(2.00 (ft) BY 2.00 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1390.98	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
2.00	1391.61	0.63	0.63	1-S2n	0.46	0.48	0.38	0.61	4.75	1.38
4.00	1391.93	0.95	0.95	1-S2n	0.67	0.69	0.59	0.78	5.10	1.64
6.00	1392.19	1.21	1.21	1-S2n	0.83	0.86	0.76	0.91	5.45	1.82
8.00	1392.41	1.43	1.43	1-S2n	0.98	1.01	0.91	1.02	5.78	1.96
10.00	1392.60	1.62	1.62	1-S2n	1.12	1.13	1.03	1.10	6.15	2.07
12.00	1392.86	1.81	1.88	2-M2c	1.27	1.24	1.24	1.18	5.85	2.16

14.00	1393.04	1.99	2.06	2-M2c	1.42	1.34	1.34	1.25	6.24	2.25
16.00	1393.23	2.19	2.26	2-M2c	1.59	1.44	1.44	1.32	6.61	2.33
16.50	1393.28	2.24	2.30	2-M2c	1.65	1.46	1.46	1.33	6.73	2.34
20.00	1393.61	2.63	2.57	2-M2c	2.00	1.60	1.60	1.43	7.40	2.46

El. inlet face invert 1390.98 ft El. outlet invert 1390.42 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** EMBANKMENT TOE **********

UPSTREAM STATION	0.00 ft
UPSTREAM ELEVATION	1391.03 ft
UPSTREAM EMBANKMENT SLOPE (X:1)	6.00
DOWMSTREAM STATION	149.36 ft
DOWNSTREAM ELEVATION	1390.36 ft
DOWNSTREAM EMBANKMENT SLOPE (X:1)	6.00

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	GROOVED END IN HEADWALL
INLET DEPRESSION	NONE

3

CURRENT DATE: 11-30-2004 FILE DATE: 11-30-2004
CURRENT TIME: 12:03:19 FILE NAME: GERMANN

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

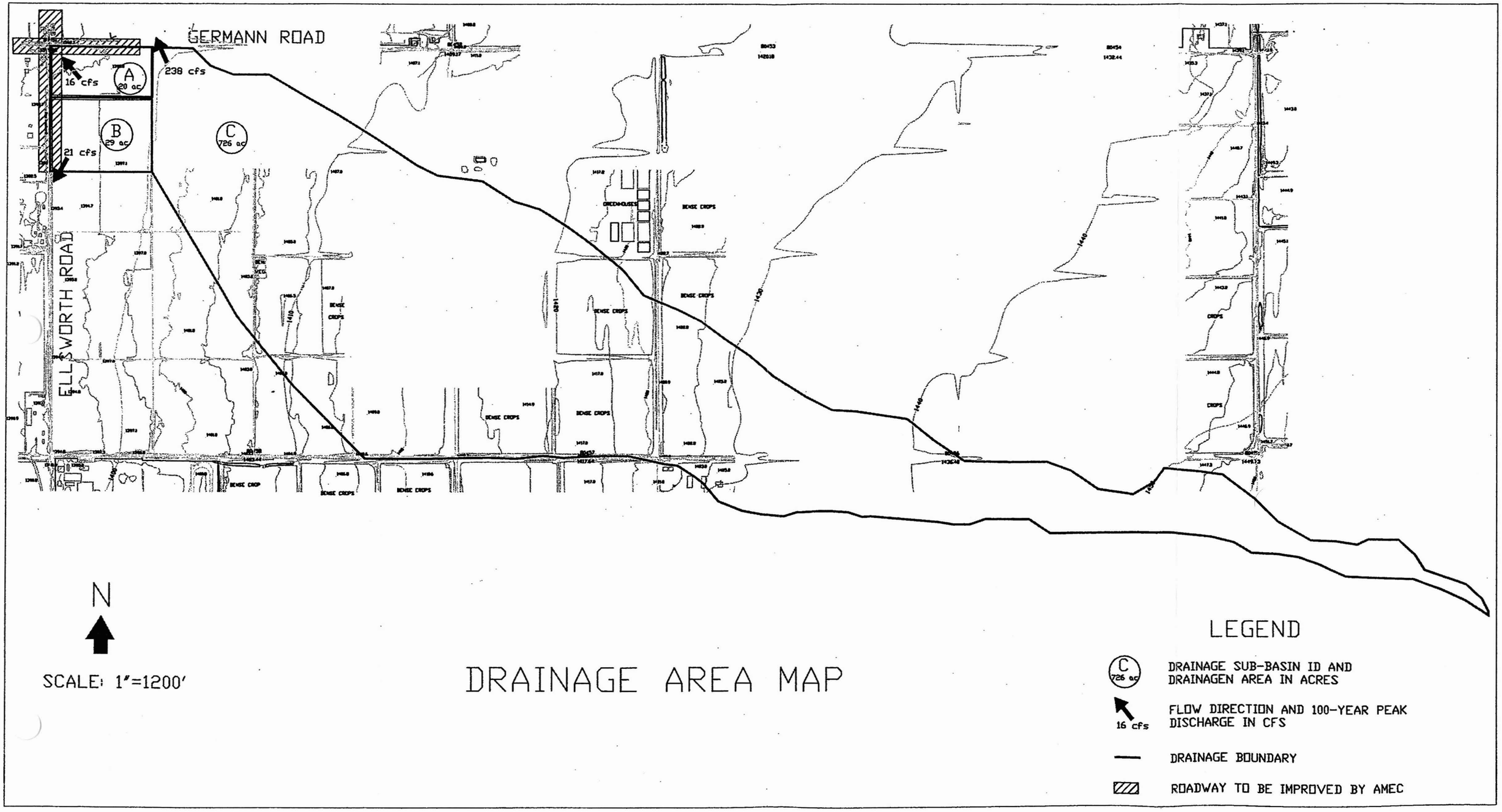
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (ft/ft)	0.003
MANNING'S n (.01-0.1)	0.025
CHANNEL INVERT ELEVATION	1390.42 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1390.42 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1390.42	0.000	0.00	0.00	0.00
2.00	1391.02	0.314	0.60	1.38	0.10
4.00	1391.20	0.328	0.78	1.64	0.14
6.00	1391.33	0.336	0.91	1.82	0.16
8.00	1391.43	0.343	1.01	1.96	0.18
10.00	1391.52	0.348	1.10	2.07	0.19
12.00	1391.60	0.352	1.18	2.16	0.21
14.00	1391.67	0.355	1.25	2.25	0.22
16.00	1391.73	0.358	1.31	2.33	0.23
16.50	1391.75	0.359	1.33	2.34	0.23
20.00	1391.85	0.363	1.43	2.46	0.25

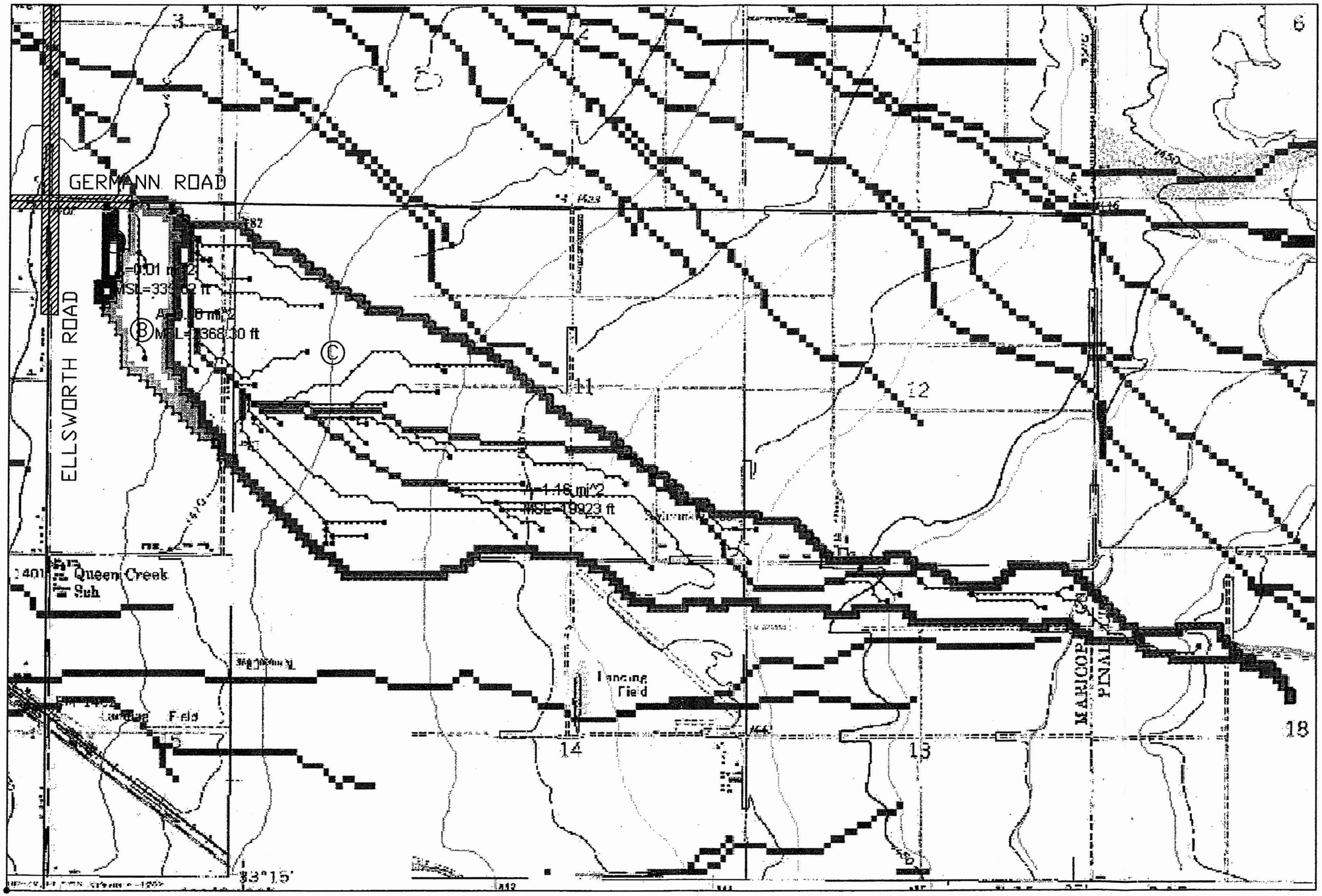
ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	94.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	1394.70 ft



DRAINAGE AREA MAP

:\Ellworth Channel\Germman ellsworth Drainage\Drainage area map.dwg, 12/02/2004 10:04:13 AM, \\msa-fs1\Toshiba e55 P6 1st


GERMANN ROAD
ELLSWORTH ROAD
Queen Creek Sub
Landing Field
Landing Field
MARICOPA
PINAL
A=1.18 mi^2
MSL=1923 ft
MSL=1368.30 ft
33°15'
3
2
1
6
11
12
7
14
13
18

APPENDIX O

WGA North Perimeter (NPC) Channel and Armory Culvert Drain Time Calculations

DESIGN MEMORANDUM

Client: _____ Sheet _____ Of _____

Project: _____ Date: _____

Data For: _____ Work Order: _____

Prepared By: _____ Checked By: _____ File No: _____

Note: This form must be used for project calculations and original filed in project files

APPENDIX O

TABLE OF CONTENTS

DESCRIPTION	PAGE #
E-MAIL DATED 2-21-05 (DESCRIPTION OF 48" N.P.C. & 42" ARMORY CULVERT H&H ANALYSIS)	O-1
RATIONAL METHOD VOLUME CALCULATION @ N.P.C.	O-2
TIME TO DRAIN CALCULATION FOR PROPOSED 48" RGRCP @ ABANDONED N.P.C.	O-7
EXHIBIT: "AVAILABLE RETENTION VOLUME IN ABANDONED NORTH PERIMETER CHANNEL"	O-10
E-MAIL DATED 3-2-05 (ARMORY CULVERT SURVEY INFO.)	O-11
ARMORY CULVERT DRAINAGE AREA EXHIBIT	O-12
TIME TO DRAIN CALCULATION FOR PROPOSED 42" ARMORY RGRCP	O-13
EXHIBIT: "REVISED PONDING AREA @ ARMORY CULVERT"	O-16
BACKUP SURVEY DATA FOR CONTOURS AT EXISTING 48" ARMORY CULVERT & ABANDONED N.P.C.	O-17
SUPERELEVATION CALCULATIONS @ STA 586+92	O-19

Alex Coronel

From: Alex Coronel
Sent: Monday, February 21, 2005 6:46 PM
To: 'cwr@mail.maricopa.gov'
Cc: 'bao@mail.maricopa.gov'; Gregory Holverson; Robert Davies (Mesa)
Subject: Tie-in at North Perimeter Channel and H&H for Existing 48" Culvert

Hi Cathy,

Per your request please find our analysis of the drain pipes at the North Perimeter Channel (NPC) and further downstream at the existing 48" pipe (Armory Culvert) . We used a combination of Orifice Flow and Culvert flow equations and made conservative, simplifying assumptions such as applying a constant tailwater depth in the Ellsworth Channel of 1 foot and using the total 100-year, 2-hour volume when computing the time to drain. These assumptions are conservative because the contributing drainage area to the NPC and Armory Culvert are much smaller than the contributing drainage area to the proposed Ellsworth Channel therefore in all likelihood a significant portion of the runoff to the NPC and Armory Culvert will be gone long before the peak form the Ellsworth Channel arrives. We recognize that a more appropriate analysis would include defining an inflow/outflow/time relationship in HEC-1 for the Ellsworth Channel and coupling that with the elevation-stage-storage relationship of the NPC and armory culvert ponding area. However we are confident that our analysis clearly shows the need for the drain pipes and the fact that the pipes will perform their primary function as designed.

ATTACHED PLEASE FIND THE FOLLOWING:

Sheet 1:
Calculation that show the required time to drain the abandoned North Perimeter Channel (NPC) using a 48 inch pipe with a trash rack at the upstream side. A 50 % clogging factor was applied. The analysis shows that the ponding area will drain in approximately ~~6~~ 4.1 hours.

Sheet 2-3:
HY-8 Culvert Anaysis for the 48 inch pipe at the NPC.

Sheet 4:
100-year, 2-hour runoff volume calculations for area that is tributary to the existing 48" pipe culvert at approximate 609+15.

Time to drain calculations using a 48 inch pipe with a trach rack at the upstream side. A 50% clogging factor was applied. The analysis shows that the ponding area will drain in approximately ~~41~~ 18.4 hrs.

Sheets 5-6:
HY-8 Culvert Analysis for the 48 inch pipe.

Sheet 7:
Maximum Ponding Limits Exhibit for Existing 48 inch pipe. (1 inch = 400 feet)

Sheet 8:
Total Contributing drainage area Exhibit for Existing 48 inch pipe. (1 inch = 800 feet)

Per the analysis described above and attached to this E-mail, we will show 1 - 48 inch RGRCP with a trash rack at the inlet and a flap gate at the outet at the tie-in with the NPC and 1 - 48 inch RGRCP with a trash rack at the inlet and NO flap gate at the outlet at the location of the existing 48 inch armory culvert (approx station 609+15).

Please let me know if you have any questions or concerns so that we can address them in a timely manner .

Thank You,

Alex Coronel PE, CFM
AMEC E&C Services
Water Resources, Infrastructure Unit
Mesa, AZ
Phone +1 480 648 5283
Fax +1 480 830 3903

0-1

RATIONAL CHECK

D.A. = 4,089563 ft² (from MICROSTATION)
≈ 94 ACRES

L = 2600 ft

HIGH EL = 1385
LOW EL = 1373 TO TOP OF CHANNEL BANK

10-yr, 6hr precip = 1.9 IN.

10-yr "C" RUNOFF COEFF - MAINLY UN DEV. DESERT
≈ 0.10 , INCREASE DUE TO SOIL GRADING
= 0.45

$V = C \frac{P}{12} \cdot A$; P = 2.6 in, 100-yr/2hr
$= 0.45 \cdot \frac{2.6}{12} \cdot 94$ ACRES
= 9.2 Ac-ft

FROM: EQUN 3.4 of
MARICOPA COUNTY
DRAINAGE DESIGN MANUAL VOL. I.

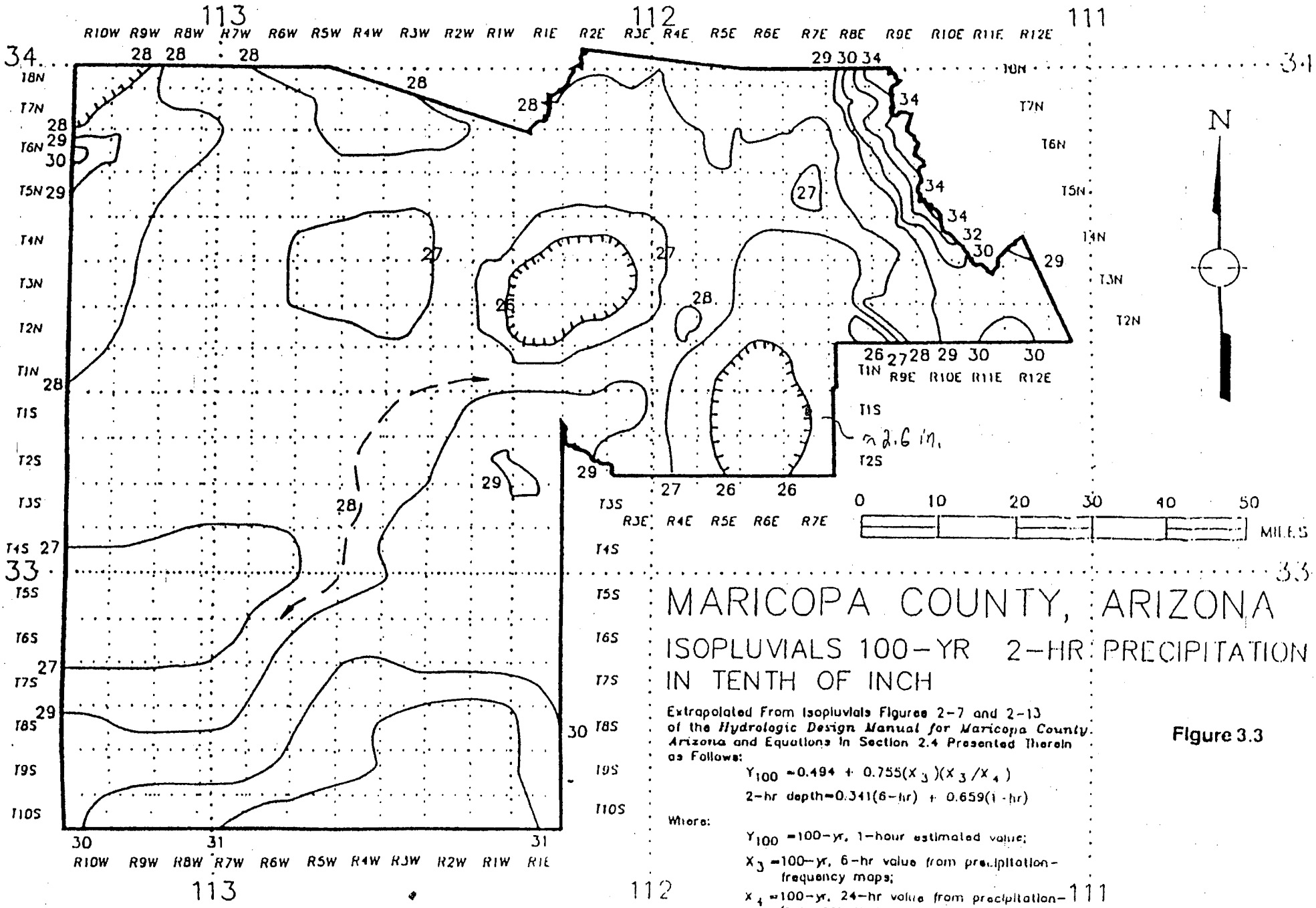

113
112
111
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
34
33
T8N
T7N
T6N
T5N
T4N
T3N
T2N
T1N
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
T10S
N
0 10 20 30 40 50
MILES
MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 100-YR 2-HR PRECIPITATION
IN TENTH OF INCH
Extrapolated From Isopluvials Figures 2-7 and 2-13 of the Hydrologic Design Manual for Maricopa County, Arizona and Equations in Section 2.4 Presented Therein as Follows:
$Y_{100} = 0.494 + 0.755(X_3)(X_3/X_4)$
2-hr depth = 0.341(6-hr) + 0.659(1-hr)
Where:
Y_{100} = 100-yr, 1-hour estimated value;
X_3 = 100-yr, 6-hr value from precipitation-frequency maps;
X_4 = 100-yr, 24-hr value from precipitation-frequency maps;

Figure 3.3

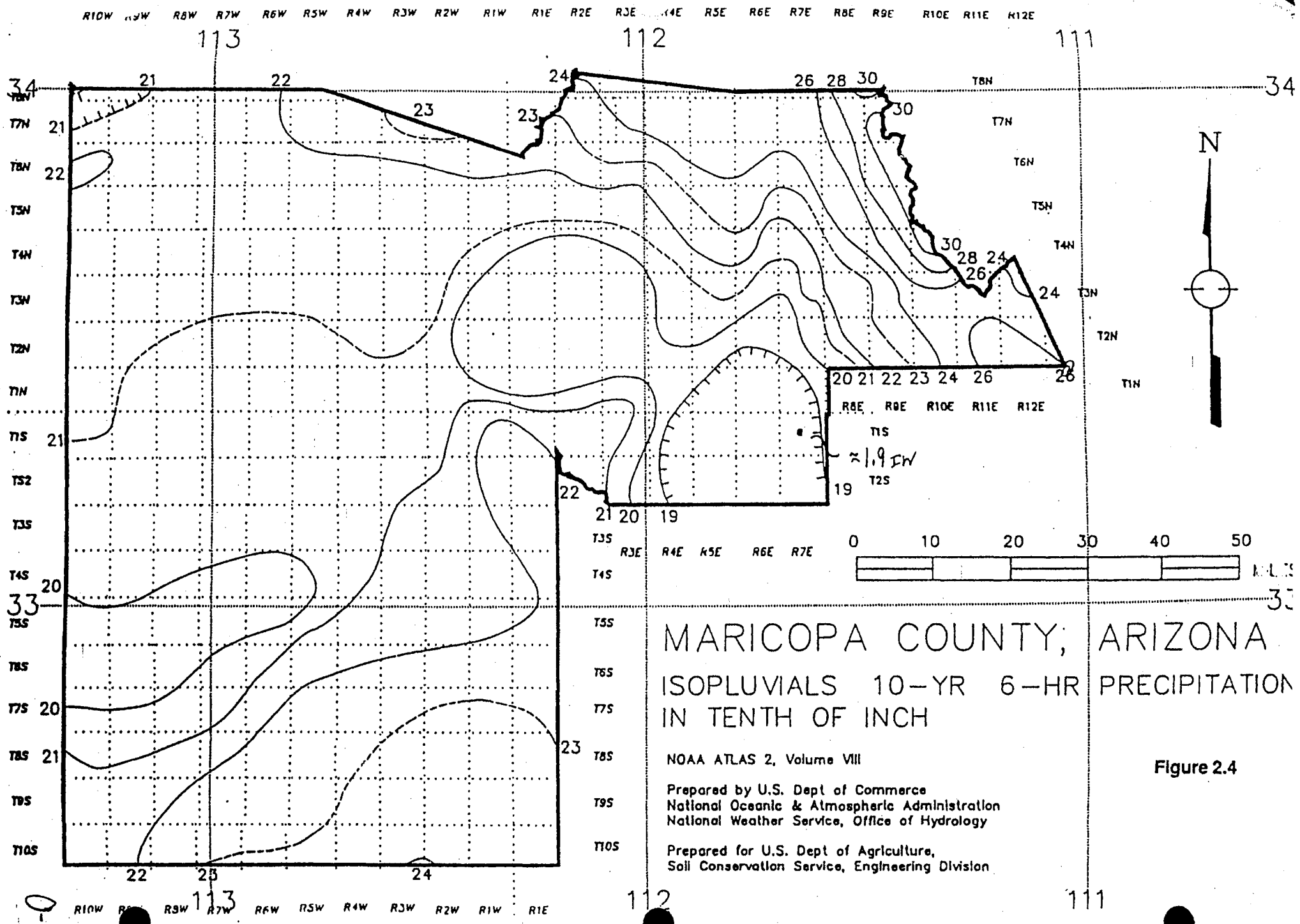
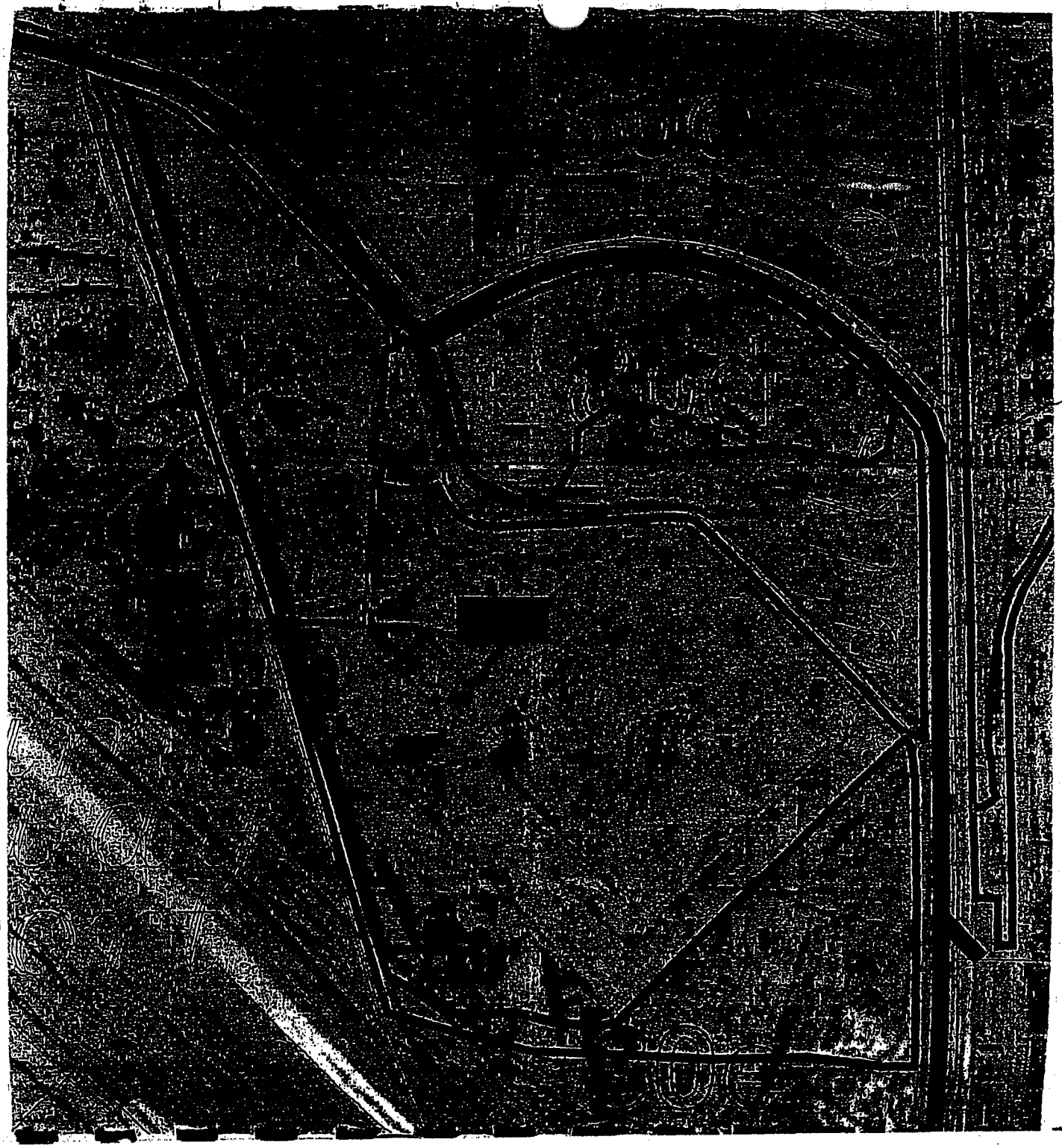

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 10-YR 6-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
≈1.9 IN
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
113 112 111
34 33

Figure 2.4


N
1" = 800 ft
to North Perimeter Channel

RATIONAL METHOD CHECK FOR NORTH PERIMETER CHANNEL

Select RATIONAL.EXE

Flood Control District of Maricopa County
Hydrologic Design Manual Rational Method

Wtcrse. Length = 2600 (feet)
Top Elev. = 1385 (feet)
Bottom Elev. = 1373 (feet)
Slope = .0046 (feet/feet)

Kb = .0529
P(10,6) = 1.9 (inches)
Area = 94 (acres)
C(10) = .45

Hydrological Summary Table

PARAMETER	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs):	54.4	80.7	106.6	152.9	195.5	235.0
C :	0.45	0.45	0.45	0.50	0.54	0.56
Tc (min):	35.1	30.3	27.2	24.6	23.2	21.9
i(Adj) (in/hr):	1.3	1.9	2.5	3.3	3.9	4.4
i(Phx) (in/hr):	1.4	2.1	2.7	3.6	4.2	4.8

<press 'p' to print or any key to continue>

100yr Q = 235 cfs

DESIGN MEMORANDUM

Client: MCDOT / FCD / CITY OF MESA Sheet ___ Of ___

Project: ___ Date: 2-18-05

Data For: ___ Work Order: (REVISED 2-22-05, per DISTRICT COMMENTS)

Prepared By: [illegible] Checked By: ___ File No: ___

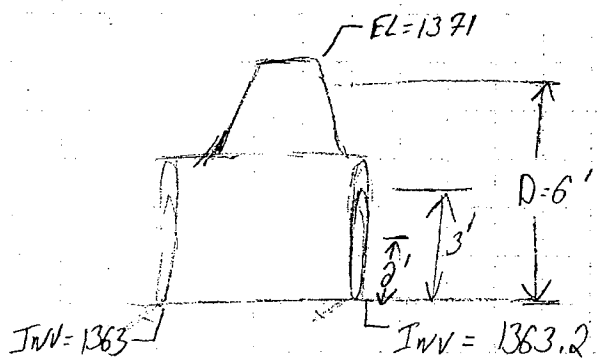
Note: This form must be used for project calculations and original filed in project files

QUESTION: HOW LONG WILL IT TAKE TO DRAIN NORTH PERIMETER CHANNEL PONDING AREA USING A 48" RCPCP W/ TRASH RACK AT ENTRANCE.

• PER DISTRICT DESIGN MANUAL A 50% CLOGGING FACTOR WILL BE APPLIED.

A OF 48" PIPE = $\pi(2)^2 \Rightarrow A = 12.6\ ft^2 \Rightarrow A/2 = 6.3\ ft^2$

VOLUME IN N.P.C. = 9.2 Ac-ft



ASSUME 1/3 OF TIME WILL BE ORIFICE FLOW: (D AV = 3')

$Q_o = C_d A \sqrt{2gH}$

$= 0.62 \cdot 6.3 \sqrt{2 \cdot 32.2 \cdot 3}$

$Q = 54$ cfs

H = HEAD ABOVE BOTTOM OF CULVERT FOR ORIFICE

$C_d = 0.62$ for Sharp Edges.

ASSUME FOR 2/3 OF TIME WILL FLOW LIKE NORMAL CULVERT (D AV = 2')

FOR CULVERT ANALYSIS WHAT CULVERT DIAMETER YIELDS

$A/2 = 6.3\ ft^2 \Rightarrow 6.3\ ft^2 = \pi r^2$

$r = \sqrt{\frac{6.3}{\pi}} \Rightarrow r = 1.4' \Rightarrow D = 2.8'$

DESIGN STORM WILL HAVE PASSED WHEN CULVERT BEGINS TO FUNCTION ∴ ASSUME T.W. DEPTH OF 1' ⇒ 1364.06

FROM #18 WITH D = 2' ; EL = 1365.06 (SEE ATTACHED)

Q = 13.8 cfs

WEIGHTED $Q = 1/3 \cdot 54 + 2/3 \cdot 13.8 \Rightarrow Q = 27$ cfs

TIME TO EMPTY = $9.2 \cdot 43560 = \frac{400752\ ft^3}{27\ cfs} \Rightarrow 14843$ SEC ⇒ 4.1 HRS < 36 HRS ∴ O.K.

CURRENT DATE: 0-22-2005 FILE DATE: 02-22-2005
CURRENT TIME: 15:34:24 FILE NAME: 48ATNPC2

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

C U L V NO.	SITE DATA INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1363.34	1363.06	42.00	1 RCP	2.80	2.80	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: 48ATNPC2 DATE: 03-04-2005

65.06

13.80

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1364.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1365.51	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1366.89	40.0	40.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1367.81	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1371.07	80.0	74.8	0.0	0.0	0.0	0.0	0.0	4.70	17
1371.20	100.0	75.6	0.0	0.0	0.0	0.0	0.0	23.72	6
1371.30	120.0	76.2	0.0	0.0	0.0	0.0	0.0	43.14	5
1371.38	140.0	76.7	0.0	0.0	0.0	0.0	0.0	62.16	4
1371.45	160.0	77.2	0.0	0.0	0.0	0.0	0.0	81.92	4
1371.52	180.0	77.6	0.0	0.0	0.0	0.0	0.0	101.73	4
1371.58	200.0	78.0	0.0	0.0	0.0	0.0	0.0	120.14	3
1371.00	74.3	74.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: 48ATNPC2 DATE: 03-04-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1364.06	0.000	0.00	0.00	0.00
1365.51	0.000	20.00	0.00	0.00
1366.89	0.000	40.00	0.00	0.00
1367.81	0.000	50.00	0.00	0.00
1371.07	-0.003	80.00	0.50	0.63
1371.20	-0.004	100.00	0.64	0.64
1371.30	-0.004	120.00	0.62	0.52
1371.38	-0.008	140.00	1.09	0.78
1371.45	-0.006	160.00	0.87	0.54
1371.52	-0.005	180.00	0.65	0.36
1371.58	-0.004	200.00	1.88	0.94

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 03-04-2005 FILE DATE: 03-04-2005
CURRENT TIME: 15:34:24 FILE NAME: 48ATNPC2

PERFORMANCE CURVE FOR CULVERT 1 - 1(2.80 (ft) BY 2.80 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1364.06	0.00	0.72	0-NF	0.00	0.00	0.00	1.00	0.00	0.00
20.00	1365.51	2.17	2.17	1-S2n	1.24	1.46	1.28	1.00	7.27	0.00

A_2

40.00	1366.89	3.55	3.55	5-S2n	1.92	2.09	1.95	1.00	8.76	0.00
50.00	1367.81	4.47	4.29	2-M2c	2.36	2.31	2.31	1.00	9.22	0.00
74.79	1371.07	7.73	6.60	2-M2c	2.80	2.75	2.75	1.00	12.26	0.00
75.64	1371.20	7.86	6.70	2-M2c	2.80	2.77	2.77	1.00	12.36	0.00
76.24	1371.30	7.96	6.76	2-M2c	2.80	2.78	2.78	1.00	12.43	0.00
76.74	1371.38	8.04	6.82	2-M2c	2.80	2.79	2.79	1.00	12.49	0.00
77.20	1371.45	8.11	6.87	2-M2c	2.80	2.80	2.80	1.00	12.55	0.00
77.62	1371.52	8.18	6.92	6-S2n	2.80	2.80	2.70	1.00	12.84	0.00
77.98	1371.58	8.24	6.96	6-S2n	2.80	2.80	2.70	1.00	12.90	0.00

ÄÄ

El. inlet face invert 1363.34 ft El. outlet invert 1363.06 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

ÄÄ

***** SITE DATA ***** CULVERT INVERT **************

INLET STATION	0.00 ft
INLET ELEVATION	1363.34 ft
OUTLET STATION	42.00 ft
OUTLET ELEVATION	1363.06 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0067
CULVERT LENGTH ALONG SLOPE	42.00 ft

***** CULVERT DATA SUMMARY ************************

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.80 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

ÄÄ

3

CURRENT DATE: 03-04-2005 FILE DATE: 03-04-2005
CURRENT TIME: 15:34:24 FILE NAME: 48ATNPC2

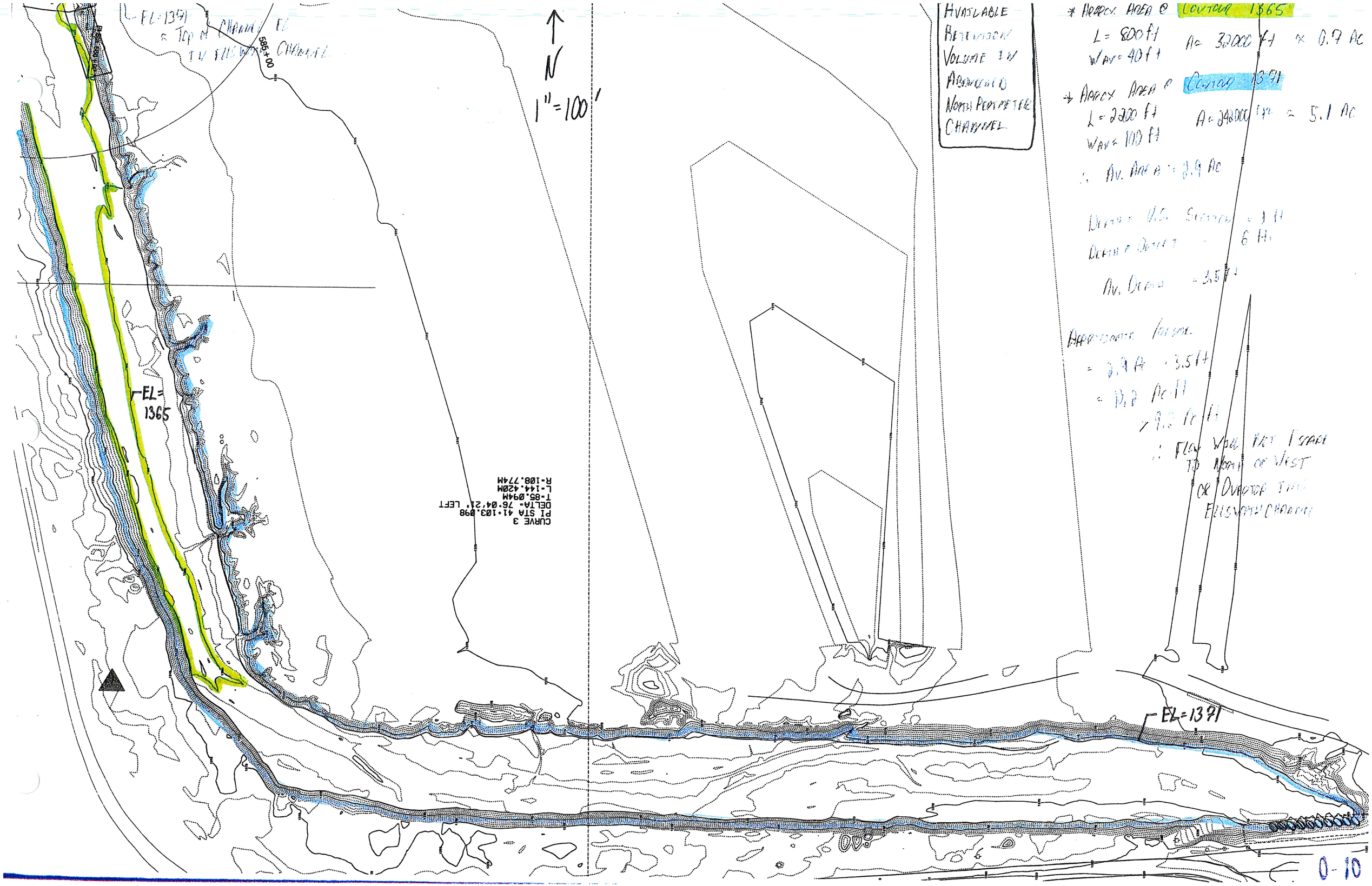
ÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ TAILWATER ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄ
ÄÄ

CONSTANT WATER SURFACE ELEVATION
1364.06

ÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ ROADWAY OVERTOPPING DATA ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄ

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH	13.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1371.00 ft

ÄÄ


EL=1371
≈ TOP OF CHANNEL
TO FLOW IN CHANNEL
585+00
EL=1365
N
1"=100'
CURVE 3
PI STA 41+103.098
DELTA- 76°04'21" LEFT
T-85.094M
L-144.420M
R-108.774M
AVAILABLE
RETENTION
VOLUME IN
ABANDONED
NORTH PERIMETER
CHANNEL
* APPROX AREA @ CONTOUR 1365
L = 800 ft
W AV = 40 ft
A = 32000 ft² × 0.7 AC
* APPROX AREA @ CONTOUR 1371
L = 2200 ft
W AV = 100 ft
A = 240000 ft² = 5.1 AC
∴ AV. AREA = 2.9 AC
DEPTH = U.S. SIDE = 1 ft
DEPTH @ DOWNS = 6 ft
AV. DEPTH = 3.5 ft
APPROXIMATE VOLUME
= 2.9 AC × 3.5 ft
= 10.2 AC-ft
≈ 9.5 AC-ft
∴ FLOW WILL NOT START TO NORTH OR WEST OF OVERFLOW INTO ABANDONED CHANNEL
0-10

Alex Coronel

From: Catherine Regester - FCDX [cwr@mail.maricopa.gov]
Sent: Wednesday, March 02, 2005 1:42 PM
To: Alex Coronel
Cc: Bobbie Ohler - FCDX; Gary Shapiro - FCDX
Subject: RE: 48" Culvert at WGA Armory

Alex,

How large is the revised ponding area? If we filled it in, would we be diverting a large amount of flow or is the ponding area/volume insignificant?

Cathy

-----Original Message-----
From: Alex Coronel [mailto:alex.coronel@amec.com]
Sent: Wednesday, March 02, 2005 1:29 PM
To: Catherine Regester - FCDX
Cc: Robert Davies (Mesa)
Subject: 48" Culvert at WGA Armory

Hi Cathy,

Per our conversation yesterday:

- Our project vertical control datum is NAVD88.
- The topography that I used for the hydrologic / hydraulic analysis at the Armory culvert is based on City of Mesa Vertical Datum (See attached .pdf for survey Benchmark)

I discussed the issue of Datum conversion at this location with our survey group. Our survey group has actually shot the Benchmark in question (chiseled "x" on top of irrigation headwall at northeast corner of Power and Ray) as part of a previous survey and recorded the same elevation (1323.04 City of Mesa Datum). As part of that same project, our survey group ran a bench loop to a GDACS control point located at the corner of Rittenhouse and Power roads and established that there is a 0.30 foot conversion from City of Mesa Datum to NAVD88. Therefore I submit that for the analysis that we have provided this datum shift will not have a significant effect on the results.

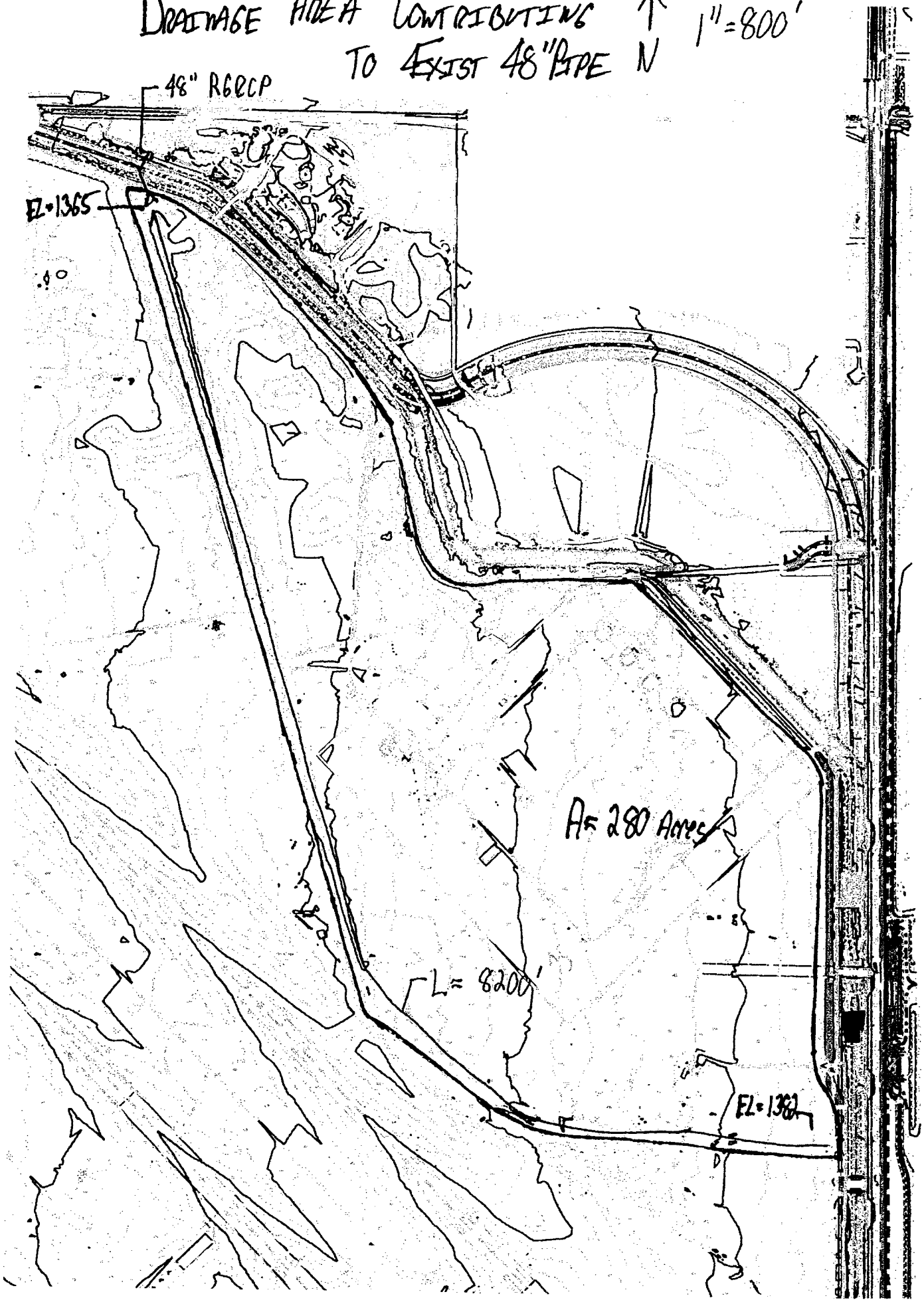
Furthermore, per your request, I will deliver a revised ponding area exhibit to you for the proposed (existing) 48" Armory Culvert. The revised exhibit shows that flow can indeed weir flow to the west at an elevation of 1367.5. However we recommend that the existing 48" culvert be replaced in kind since otherwise there will still be approximately 2.5 feet of ponded water at this location.

Thanks,

Alex Coronel PE, CFM
AMEC E&C Services
Water Resources, Infrastructure Unit
Mesa, AZ
Phone +1 480 648 5283
Fax +1 480 830 3903

DRAINAGE AREA CONTRIBUTING TO EXIST 48" PIPE

1" = 800'



DESIGN MEMORANDUM

Client: MCDOT / FCD / CITY OF MESA Sheet 4 Of 8

Project: Date:

Data For: Work Order:

Prepared By: Checked By: File No:

Note: This form must be used for project calculations and original filed in project files

100 yr, 2 hr VOLUME AT EXISTING 48" PIPE

$V = C \cdot \frac{P}{12} \cdot A$; $P = 2.6$ in, 100-yr/2 hr ; $C = 0.45$

$= 0.45 \cdot \frac{2.6}{12} \cdot 280$ Acres

$= 27.3$ Ac-ft (SEE ATTACHED, PAGES 8 & 9)

DRAIN PONDING AREA WITH A 42" RCRCP W/ TRASH RACK

* SINCE D = 42" & DEPTH OF PONDING IS ONLY 3', ORIFICE EQUATION IS NOT APPLICABLE ∴ TREAT AS NORMAL CULVERT WITH TAIL WATER DEPTH OF 1' SINCE PONDING AREA WILL DRAIN AFTER THE DESIGN EVENT HAS PASSED.

FROM ATTACHED HY-8 @ D = 2' (EL = 1364.6)

$Q = 15.9$ cfs

∴ TIME TO DRAIN PONDING AREA ≈

$27.3 \text{ Ac-ft} \cdot 43560 \frac{\text{ft}^2}{\text{Ac}} \Rightarrow 1189188 \text{ ft}^3 / 15.9 \text{ ft}^3/\text{s}$

$\Rightarrow 74791$ sec

≈ 21 hrs < 36 hrs ∴ O.K.

42" PIPE ; $A = \pi (1.75^2)$

$= 9.63 \text{ ft}^2 \Rightarrow A/2 \Rightarrow 4.81 \text{ ft}^2$ $\Rightarrow 4.81 = \pi r^2$

$r = \sqrt{4.81} \Rightarrow r = 1.24' \Rightarrow d = 2.4'$

CURRENT DATE: 04-15-2005 FILE DATE: 04-15-2005
CURRENT TIME: 15:43:37 FILE NAME: 42ATARM

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

C U L V NO.	SITE DATA INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1362.60	1357.70	105.11	1 RCP	2.40	2.40	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: 42ATARM DATE: 04-15-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1364.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1364.08	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1364.17	8.0	8.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1364.28	12.0	12.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1364.53	15.0	15.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1364.94	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1365.29	24.0	24.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1365.68	28.0	28.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1366.13	32.0	32.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1366.65	36.0	36.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1367.24	40.0	40.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1371.00	59.3	59.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

C4.6
.15.9

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: 42ATARM DATE: 04-15-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1364.06	0.000	0.00	0.00	0.00
1364.08	0.000	4.00	0.00	0.00
1364.17	0.000	8.00	0.00	0.00
1364.28	0.000	12.00	0.00	0.00
1364.53	0.000	15.00	0.00	0.00
1364.94	0.000	20.00	0.00	0.00
1365.29	0.000	24.00	0.00	0.00
1365.68	0.000	28.00	0.00	0.00
1366.13	0.000	32.00	0.00	0.00
1366.65	0.000	36.00	0.00	0.00
1367.24	0.000	40.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 04-15-2005 FILE DATE: 04-15-2005
CURRENT TIME: 15:43:37 FILE NAME: 42ATARM

PERFORMANCE CURVE FOR CULVERT 1 - 1(2.40 (ft) BY 2.40 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1364.06	0.00	1.46	0-NF	0.00	0.00	0.00	6.36	0.00	0.00
4.00	1364.08	0.81	1.48	1-S1f	0.33	0.66	2.40	6.36	0.88	0.00

D-14

8.00	1364.17	1.29	1.57	1-S1f	0.49	0.95	2.40	6.36	1.77	0.00
12.00	1364.28	1.68	1.68	1-S1f	0.59	1.17	1.30	6.36	4.80	0.00
15.00	1364.53	1.93	1.93	1-S1f	0.67	1.32	1.50	6.36	5.05	0.00
20.00	1364.94	2.34	2.34	1-S1f	0.78	1.53	1.70	6.36	5.83	0.00
24.00	1365.29	2.69	2.49	4-FFt	0.86	1.69	0.86	6.36	16.43	0.00
28.00	1365.68	3.08	2.86	4-FFt	0.94	1.81	0.94	6.36	17.06	0.00
32.00	1366.13	3.53	3.29	4-FFt	1.01	1.94	1.01	6.36	17.74	0.00
36.00	1366.65	4.05	3.78	4-FFt	1.08	2.03	1.08	6.36	18.26	0.00
40.00	1367.24	4.64	4.33	4-FFt	1.15	2.12	1.15	6.36	18.74	0.00

El. inlet face invert 1362.60 ft El. outlet invert 1357.70 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1362.60 ft
OUTLET STATION	105.00 ft
OUTLET ELEVATION	1357.70 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0467
CULVERT LENGTH ALONG SLOPE	105.11 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.40 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

3

CURRENT DATE: 04-15-2005 FILE DATE: 04-15-2005
CURRENT TIME: 15:43:37 FILE NAME: 42ATARM

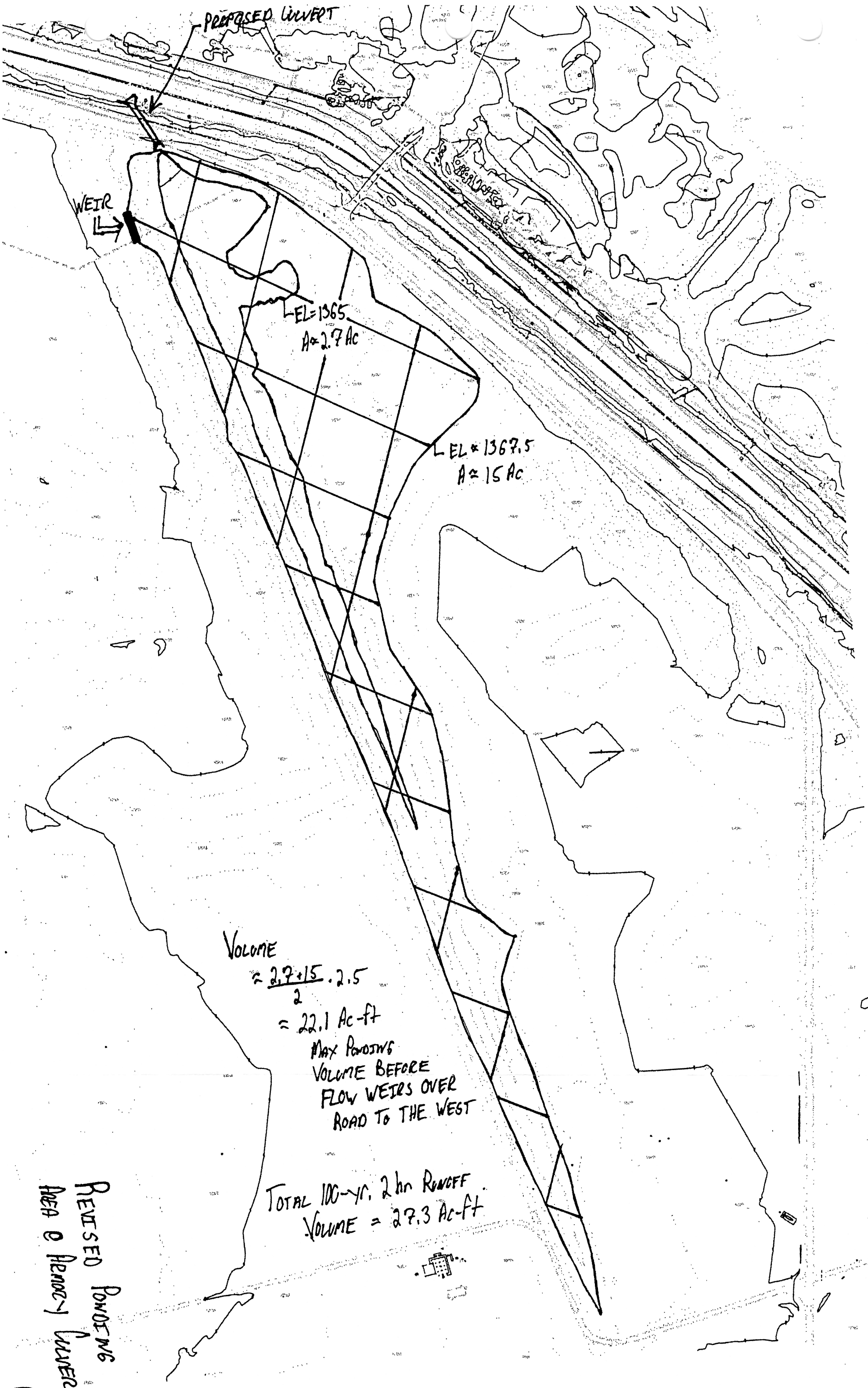
TAILWATER

CONSTANT WATER SURFACE ELEVATION
1364.06

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH	10.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1371.00 ft

A-15



REVISED PONDING
AREA @ PROPOSED CULVERT

0-

SYMBOLS

POWER POLE W/ LIGHT	WATER VALVE	SAGUARO CACTUS
POWER POLE W/ DBL. LIGHT	FIRE HYDRANT	OCOTILLO CACTUS
LIGHT POLE	VALVE	TREE
POWER POLE	UTILITY BOX	DATE PALM
POLE	MANHOLE	FAN PALM
FLAG POLE	SEWER MANHOLE	ROCK
POST	STORM DRAIN MANHOLE	GATE
GUY ANCHOR	CATCH BASIN	SPOT ELEVATION
TRAFFIC LIGHT	STREET SIGN	BUMPER CURB
SIGN	ROAD SIGN	CONTROL POINT

LEGEND

FOUND BRASS CAP MARKED "WGA 1995" UNLESS OTHERWISE NOTED

FOUND BRASS CAP IN HANDHOLE

FOUND CORNER AS NOTED

BOUNDARY LINE

SECTION LINE

EASEMENT LINE

CONTOUR LINE

EDGE OF VEGETATION

HEDGE

EDGE OF PAVEMENT

EDGE OF CONCRETE

WIRE FENCE

BLOCK WALL

WOOD FENCE

SWALE LINE OR EDGE OF WATER

NOTES:

THE BOUNDARY INFORMATION SHOWN ON THIS SURVEY IS THE SAME DATA USED BY DAVID EVANS AND ASSOCIATES, INC TO PREPARE THE "RECORD OF SURVEY" FILED IN BK. 409, PG. 13, RECORD NO. 96-0036934, RECORDS OF MARICOPA COUNTY, ARIZONA.

ALL DIGITAL DATA HAS BEEN SCALED, ROTATED AND TRANSLATED TO AGREE WITH THE CITY OF MESA'S G.I.S. DATA BASE. HOWEVER, ALL BOUNDARY ANNOTATION HAS BEEN SHOWN IN AGREEMENT WITH THE GROUND MEASURED DISTANCES PER THE ABOVE "RECORD OF SURVEY".

BASIS OF BEARINGS GEODETIC ESTABLISHED BY G.P.S. OBSERVATION.

DISTANCES ARE AT GROUND AND MEASURED UNLESS OTHERWISE NOTED.

CONTOURS DEPICTING SMALL DIRT MOUNDS OF ONE FOOT OR LESS HIGH AND LESS THAN 20 FEET IN DIAMETER HAVE NOT BEEN DRAWN FOR PURPOSES OF CLARITY.

AERIAL MAPPING DATA SHOWN HEREON WAS PROVIDED BY AERIAL MAPPING COMPANY, INC FROM CONTROL ESTABLISHED BY DAVID EVANS AND ASSOCIATES, INC.

BENCHMARK:

CHISELD "[ ]" ON TOP OF IRRIGATION HEADWALL AT NORTHWEST CORNER OF POWER ROAD AND RAY ROAD.
ELEVATION 1323.04 (CITY OF MESA DATUM)

FROM AUTOCAD TOPOGRAPHY FILE PROVIDED BY WGA

0-17

	01 2003 044 & 01 2003 033 PNT #		CITY OF MESA 01-2001 ~~50~~	DATUM (WOOD) PNT TO 6?	GDACS DATUM TO QC	
# 50			1334.20	1332.65	1334.50	2CM1 (GDACS PNT) BASE
# 51					1378.85	2DN1 "
# 52						2BN2 "
# 53		# 228				NW COR SEC 6 FD GLO BC IN POT HOLE
# 54						N 1/4 CORNER SEC 6 T2S R6E (NOTHING FD)
# 55						REF MON FOR #54
# 56						" " " "
# 57						
# 58						E 1/4 COR SEC 6 FD GLO BCHH
# 59						
# 60						S 1/4 COR SEC 6 FD 2" MC ALUM CAP
# 61		# 232				SW COR SEC 6 FD BCHH
# 62		# 231				W 1/4 COR SEC 6 FD BCHH
# 63						
# 100						SET 1/2" RB W/CAP RLS 37497
# 101						"
# 102						"
# 103						"
# 104						"
# 105						"
# 106						"
# 107						
# 108						

0-18

* CITY OF MESA TO NGVD29 DATUM CONVERSION

DESIGN MEMORANDUM

Client: MCDOT / FCD / CITY OF MESA Sheet 1 Of

Project: ELLSWORTH ROAD Date: 1-29-05

Data For: SUPERELEVATION CALCS @ STA 586+62 Work Order:

Prepared By: [illegible] Checked By: File No:

Note: This form must be used for project calculations and original filed in project files

• USE EQUATION 6.9 from MARICOPA COUNTY FLOOD CONTROL DISTRICT DRAINAGE DESIGN MANUAL VOLUME II.

$$\Delta y = \text{SUPERELEVATION} = \frac{V^2 \cdot T}{g \cdot r_c}$$

; $T = \boxed{\text{From HEC-RAS SEC 3300}}$ $= 103$ ft.

$V = 4.50$ ft/s

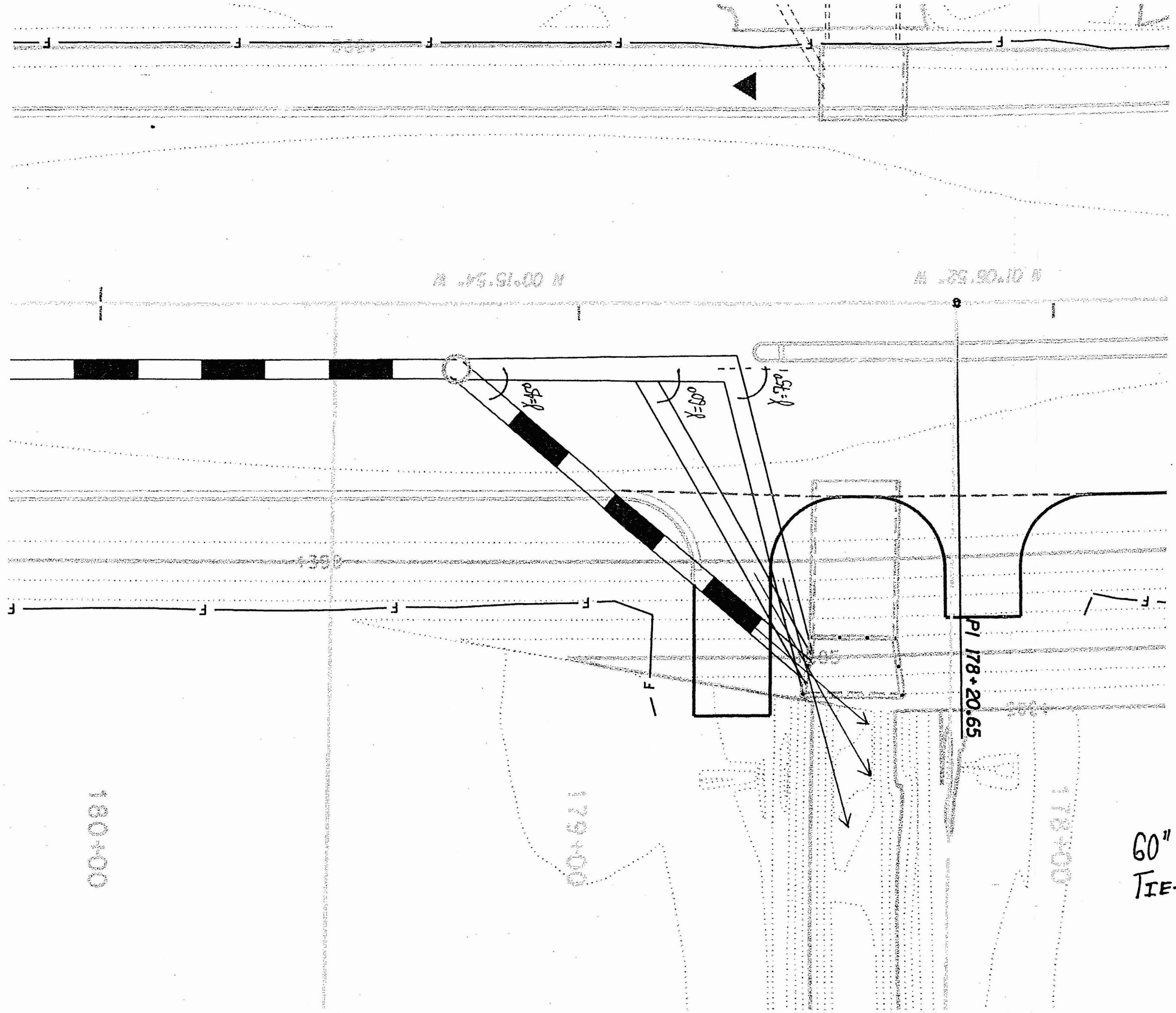
$r_c = 310$ ft

$$\Delta y = \frac{(4.5)^2 \cdot 103}{32.2 \cdot 310}$$

$$\boxed{\Delta y = 0.21 \text{ ft.}}$$

APPENDIX P

Storm Drain Tie-in Check at Powerline Floodway



60" STORM DRAIN
TIE-IN @ POWERLINE F.W.

APPENDIX Q

Electronic Hydraulic Models

- EllsworthChannel.prj
- EllsworthExistingOT.prj
- Ellsworth_Rd_overtopping.prj

Electronic Hydrologic Model

- ELLS10.IN