Mira Loma Road Extension
Hydraulic Analysis

1101-02 additional

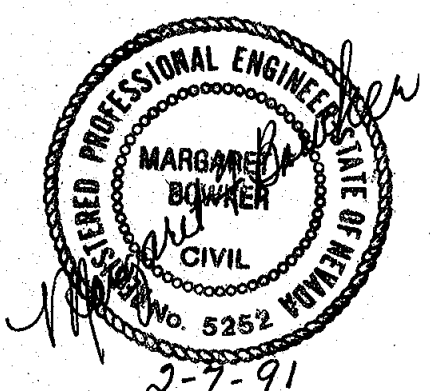
Steamboat Creek

City of Reno, Washoe County, Nevada

Prepared for:

City of Reno, Nevada
Engineering
450 Sinclair Street
Reno, Nevada 89502

January 1991
Nimbus Job # 9006



2-7-91

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Were enough sections taken to determine that a run-out apron was not required? Yes the select fill may be carried from the site by the higher flow velocities. Not true, check scour analysis.

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Where did the Q value of 5000 cfs come from? see letter from Winkler

ME 3-4-96

1.0 INTRODUCTION AND PURPOSE

This report was prepared to illustrate the effects of the proposed roadway and two bridges for the Mira Loma Drive extension across Steamboat Creek, in the City of Reno (See Figure 1). Nimbus Engineers has recently prepared a report for the City of Reno to obtain a revision to the floodway in this area; a more detailed physical description of this area can be found in that report (Reference 9). Mira Loma Drive is proposed to be extended as a feature of the Rosewood Lakes Development. The proposed extension is located at the southern end of Rosewood Lakes Golf Course and incorporates two hydraulic structures near the south sedimentation basin to accommodate the 100-Year flows from Steamboat Creek (See Figure 2).

The golf course was designed to allow low flows through the central portion of the course to maintain wetlands. To accommodate higher flows, a flood control channel was constructed along the east side of the course. Low flows will be passed into the central wetlands under the proposed roadway extension by three arches. Six arches convey additional high flows to the flood control channel. A series of low flow pipes and the sedimentation basin regulate the distribution of low flow between the two sets of arches, but are completely inundated and ineffective during flood conditions.

The proposed roadway spans the entire floodplain of Steamboat Creek. A cross section showing existing ground and the proposed roadway is shown in Figure 3. As can be seen in Figure 3, there are modifications proposed to the hydraulics within the floodway. The purpose of this report is to analyze and quantify the impact created by the roadway and bridges.

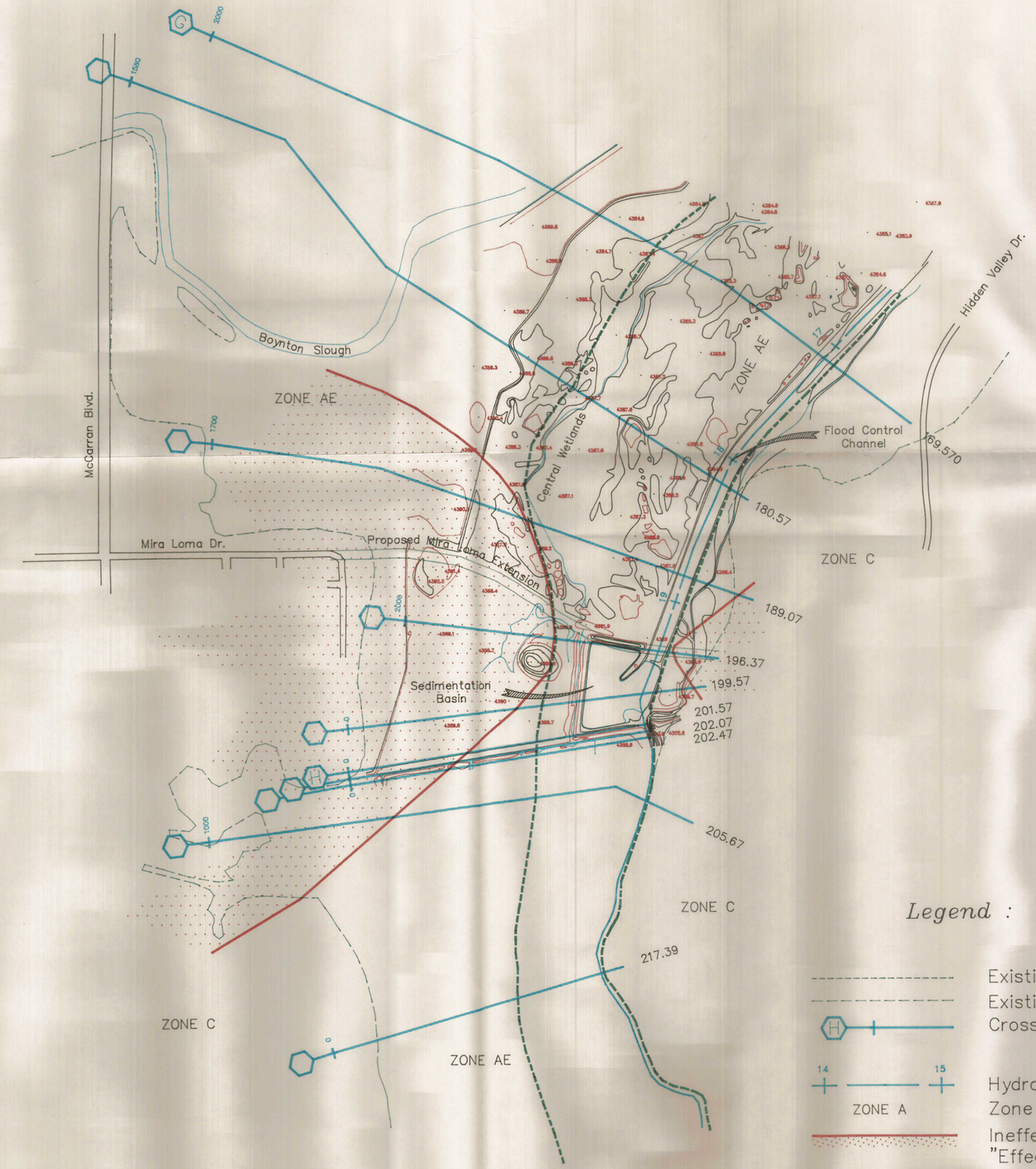
2.0 METHOD OF ANALYSIS

The Corps of Engineers HEC-2 computer model (Reference 16) was used for the hydraulic modeling. An existing conditions model or "Base" model was reproduced from the previously referenced Nimbus report and from a former model used to prepare the current Flood Insurance Study (FIS). In the previous Nimbus report, the floodway revision ended at the southern end of the sedimentation basin. Some minor modifications were made to the model in the area south of the sedimentation basin in order to properly extend the modeling effort upstream.

Modifications made are as follows:

1) Relocation of Channel Bank Stations - In cross sections 201.57, 202.07, 202.47, and 205.67, channel bank stations were relocated to the banks of Steamboat Creek. Previously, the bank stations of these sections were at the banks of an irrigation ditch.

2) Realignment of Hydraulic Base Line - After relocating channel bank stations, the hydraulic base line was also changed to follow Steamboat Creek.



Scale : 1" = 500'

Legend :

- Existing Floodway
- Existing Floodplain
- Cross Section
- 14 — 15 Hydraulic Base Line
- ZONE A Zone Designation
- Ineffective Area in "Effective Area" Model

FIGURE 2

Mira Loma Extension Existing Conditions Workmap

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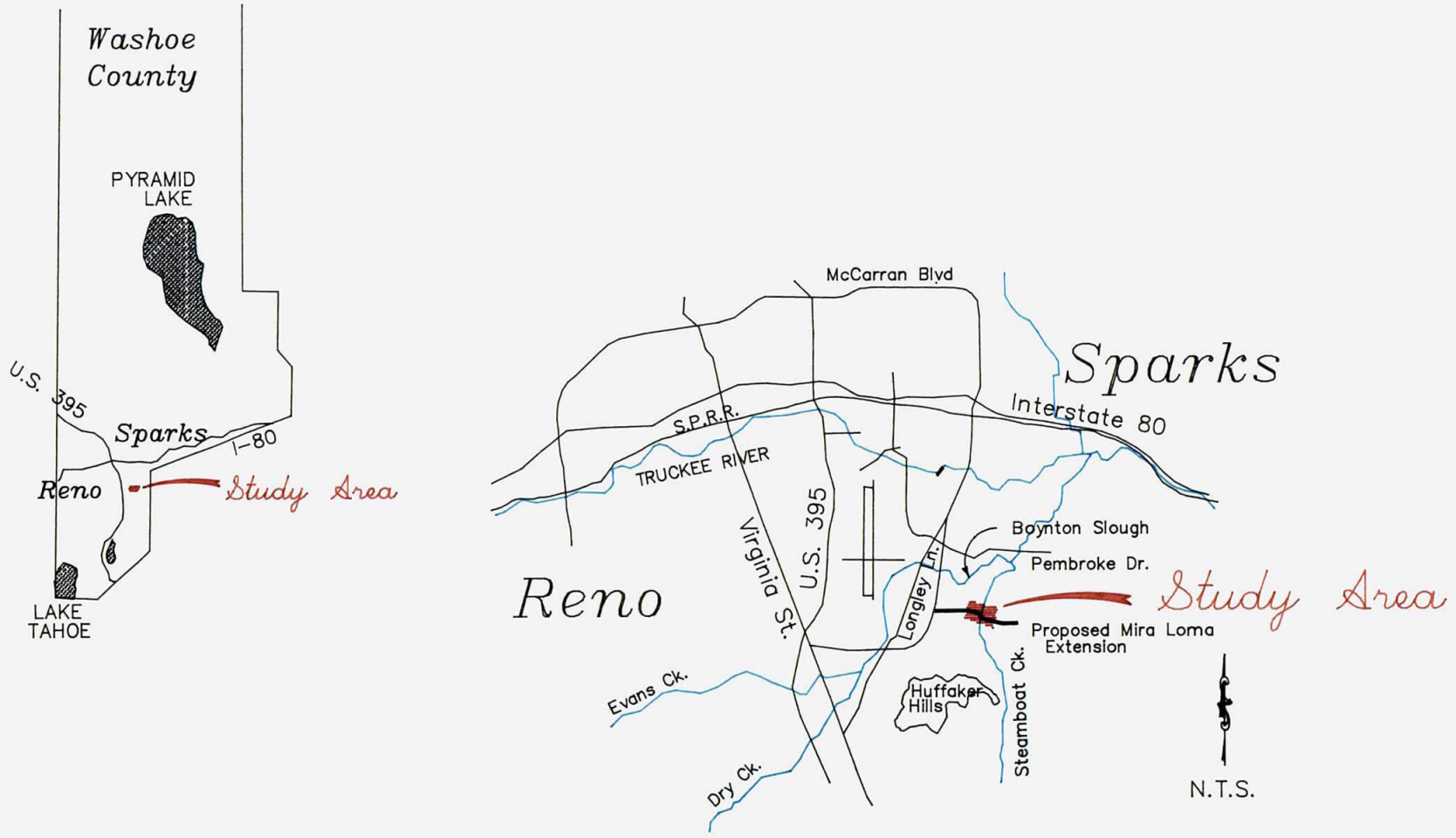

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FIGURE 1
Vicinity Map

Job No. : 9006 Date : 1/28/91

3) Removal of Special Bridge Routine at Cross Section 202.07 - In the previous FIS model, the bridge routine assumes weir flow and pressure flow at this location. This area is in a backwater condition which would not be best represented by a weir, and also is not under a pressure flow condition, but in an open channel condition.

The improvements to the model change the hydraulic parameters for the area, but have little effect on water surface elevations and floodway elevations. The model, which incorporates these modifications, will be referred to as the "Base" model.

As can be seen in Figure 2, the roadway extension is proposed to be constructed in both the floodway fringe (area between the floodway and floodplain boundaries) and the floodway. In the fringe, construction is permitted as long as it does not increase the water surface elevation over one foot. No construction is permitted in the floodway unless it can be shown there is no increase in the water surface elevation.

For this project, a second hydraulic model was created to show the increase in water surface elevation due to encroachment of the floodway fringe. A third model was then created to show the effects of floodway encroachment.

The second model is referred to as the "Effective Area" model. All areas in the floodway fringe which will become ineffective upon construction of the road and bridges are coded out of the model (See Figure 2). The bridge structures are not included in this model and no modifications were made within the floodway. The purpose of this model is to determine the rise in the water surface from encroachment of the floodway fringe.

A third HEC-2 model, referred to as the "Bridge" model, was created to include the arches and the entire roadway. The arches were modeled with the normal bridge routine, as suggested by the HEC-2 Users Manual. The normal bridge routine is able to model irregular openings, such as arches, using standard backwater equations. As outlined in the HEC-2 users manual, the normal bridge routine requires additional cross sections just inside and outside of the upstream and downstream openings of the bridges (See Figure 4).

3.0 RESULTS

The results of all three models are included in Table 1. The results of the Effective Area model are compared to those of the Base Model to determine the rise caused by fringe encroachment only. The next columns in the table show the results of the bridge model and how they compare to the results of the effective area model. This comparison shows the change in water surface elevation caused by modifications within the floodway. All the increase in water surface elevation created by this roadway extension results from encroachment in the floodway fringe. Modifications within the floodway actually increase flow conveyance and cause a decrease in the water surface elevations. The last column in the table contains the net results of all encroachment.

Mira Loma Bridge
Cross Section 196.37

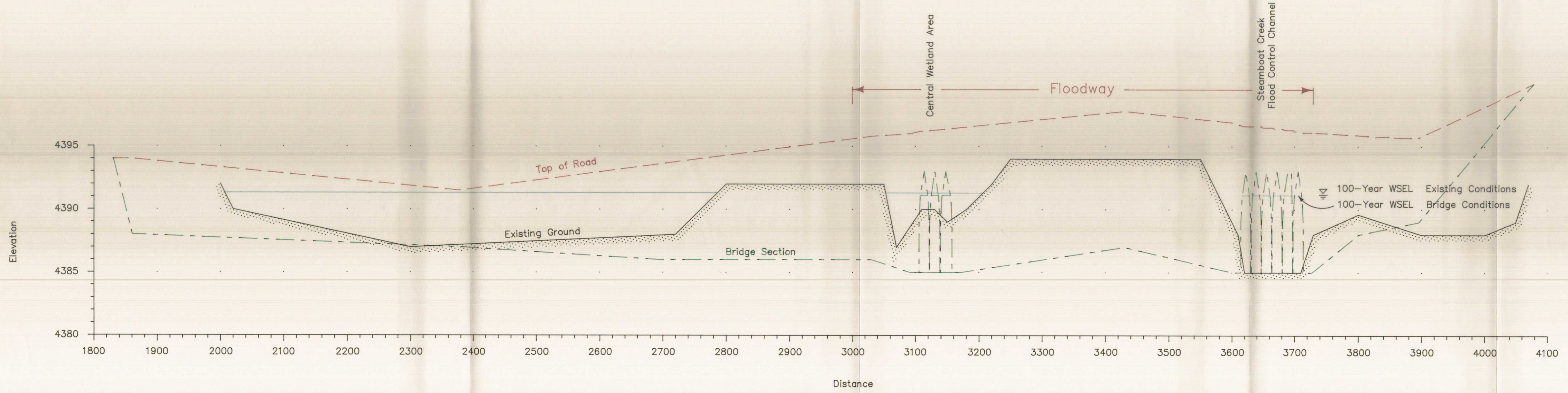

Figure 3
Bridge Cross Section
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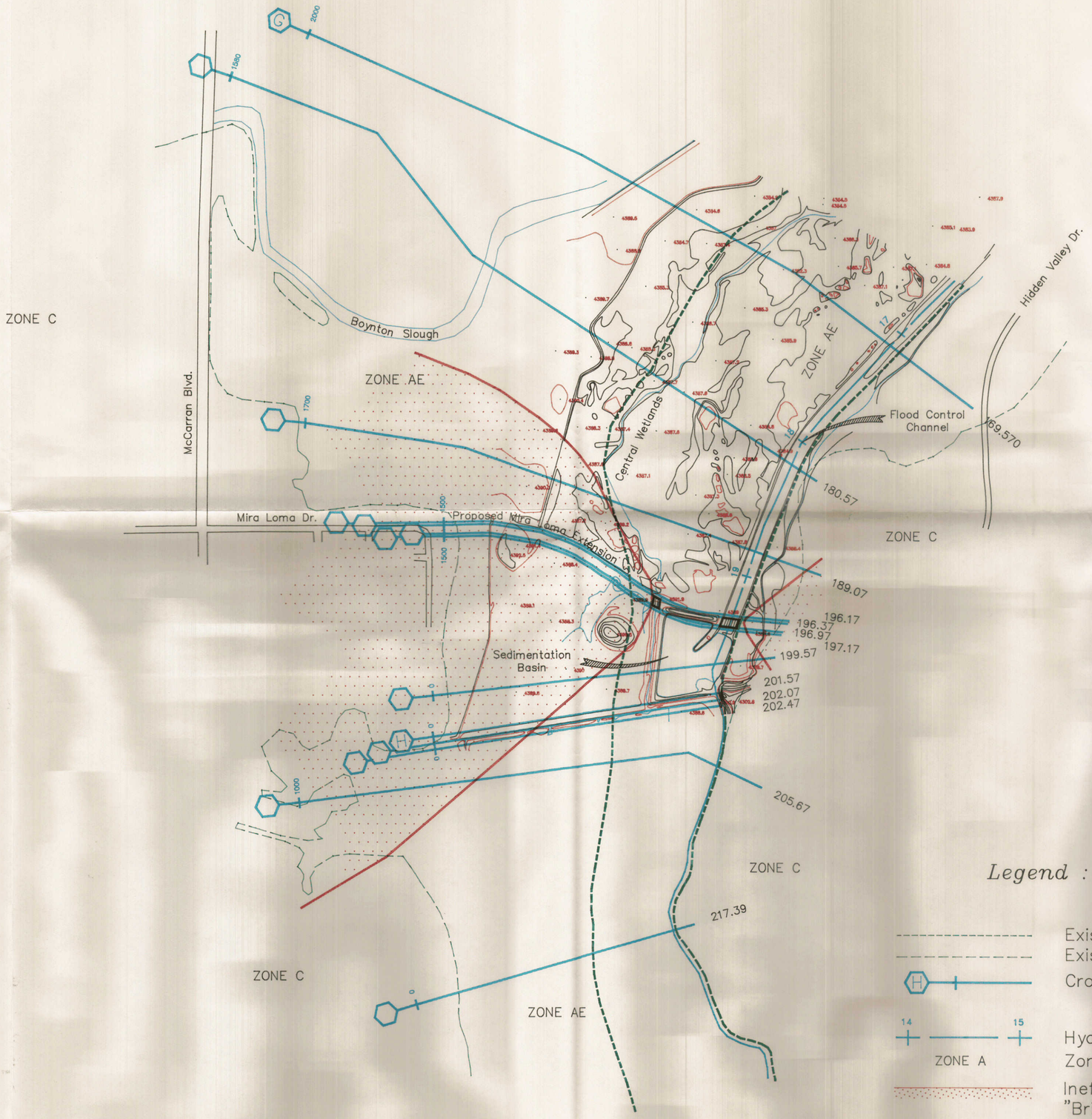
TABLE 1
Summary Water Surface Elevations

Sec. No.	Base Run WSEL	Base Run FWAY	Effective Area WSEL	Effective Area Diff.*	Bridge Model WSEL	Bridge Model Diff.**	Total Rise Bridge + Eff. Area
155.57	4391.25	4391.67	4391.25	0.00	4391.25	0.00	0.00
169.57	4391.26	4391.69	4391.26	0.00	4391.26	0.00	0.00
180.57	4391.26	4391.71	4391.26	0.00	4391.26	0.00	0.00
189.07	4391.28	4391.75	4391.27	-0.01	4391.27	0.00	-0.01
196.17					4391.22		
196.37	4391.31	4391.60	4391.13	-0.18	4391.08	-0.05	-0.23
196.97					4391.12		
197.17					4391.48		
199.57	4391.38	4392.10	4391.76	0.38	4391.75	-0.01	0.37
201.57	4391.39	4392.13	4391.79	0.40	4391.78	-0.01	0.39
202.07	4391.40	4392.14	4391.80	0.40	4391.79	-0.01	0.39
202.47	4391.40	4392.14	4391.80	0.40	4391.79	-0.01	0.39
205.67	4391.51	4392.30	4391.88	0.37	4391.87	-0.01	0.36
217.39	4393.23	4394.10	4393.22	-0.01	4393.17	-0.05	-0.06
224.98	4396.68	4397.54	4396.69	0.01	4396.71	0.02	0.03
235.23	4399.92	4400.77	4399.92	0.00	4399.91	-0.01	-0.01

* Difference between effective area model and base model

** Difference between bridge model and effective area model



Legend :

- Existing Floodway
- Existing Floodplain
- Cross Section
- Hydraulic Base Line Zone Designation (ZONE A)
- Ineffective Area in "Bridge" Model

Scale : 1" = 500'

FIGURE 4

Mira Loma Extension Future Conditions Workmap

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Development or construction of the floodway fringe and floodway is usually accompanied by an increase in the flow velocity. If the velocity increase is significant, attention should be given to scour potential. The roadway extension will increase the channel velocity from 2.3 to 5.9 feet per second in the vicinity of the bridges. The velocity increase has been incorporated into the bridge plans and geotechnical design (References 3 and 11 respectively). Appropriate cut-off walls are to be constructed at a depth of 4 and 5' respectively at the upstream and downstream faces of the bridge, and a backfill suitable to withstand the increased velocity will be placed three feet deep for approximately 20 feet upstream and downstream of the arches.

The information contained within the soils report indicates a ready availability of material at the project site which is suitable for scour protection. Scour calculations by Nimbus indicate that the material placed downstream of the structures should have at a minimum 25% (or a D_{75}) of 1.2" or larger material. This backfill should also be well graded so that the formation of open pockets is avoided. Scour calculations and a suggested gradation curve are included in the appendix. These recommendations are for material to withstand the scour only and do not incorporate any foundation specifications.

4.0 CONCLUSIONS

The entire roadway extension project will cause a maximum rise over the current FEMA base flood elevations of four tenths of a foot. All increases in water surface elevation can be attributed to encroachment in the floodway fringe. Modifications within the floodway increase flow capacity and lower water surface elevations.

As the total rise in water surface is less than the allowable one foot, and encroachment within the floodway does not raise the water surface, the proposed roadway and bridge comply with local and federal floodplain regulations.

5.0 REFERENCES

1. Chow, Ven Te, Open-Channel Hydraulics, 1959.

2. Churn, Fittinghoff, and Associates, Mira Loma Drive Extension East Air-O-Form Bridge, January 1991.

3. Churn, Fittinghoff, and Associates, Mira Loma Drive Extension West Air-O-Form Bridge, January 1991.

4. Federal Emergency Management Agency, Flood Boundary and Floodway Map, City of Reno, Washoe County, Nevada, copy Panels 1453 and 1461 April 16, 1990.

5. Federal Emergency Management Agency, Flood Insurance Rate Map, City of Reno, Washoe County, Nevada, Scale 1" = 500', April 16, 1990.

6. Federal Emergency Management Agency, Flood Insurance Study, City of Reno, Washoe County, Nevada, April 16, 1990.

7. Kenney Aerial Mapping, 1" = 200' scale topographic mapping, June 22, 1990.

8. Nimbus Engineers, Hydraulic Report for Brookside Lakes Golf Course, October 1986.

9. Nimbus Engineers, Request for Floodway Revision, Steamboat Creek, September 1990.

10. Nimbus Engineers, Steamboat Creek, Application for Letter of Map Revision of City of Reno, Nevada and Washoe County, Nevada, July 1986.

11. Pezonella Associates, Geotechnical Engineering Services, Rosewood Residential Development, February 4, 1991.

12. Simons, Li and Associates, Engineering Analysis of Fluvial Systems, 1982.

13. U.S. Army Corps of Engineers 1"=50' scale topographic mapping on orthophotos, Sheets 65, 66, 81, and 82, 1989.

14. U.S. Army Corps of Engineers 1" = 200' scale topographic mapping Truckee Meadows 1989.

15. U.S. Department of the Army, Corps of Engineers, Engineering and Design, Routing of Floods Through River Channels - EM-1110-2-1408, March 1, 1960.

16. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, Computer Program 723-X6-LZ02A, HEC II, Water Surface Profiles, Ver. 4.5.1, September 1990.

17. U.S. Geological Survey, Roughness Characteristic of Natural Channels, Geological Survey Water - Supply Paper 1949, 1977.

APPENDIX

```
*********************************************
*  HEC-2 WATER SURFACE PROFILES             *
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*                                           *
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*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616-4687         *
*          (916) 756-1104               *
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END OF BANNER

THIS RUN EXECUTED 31JAN91 14:50:13

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**************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.5.1;  September 1990
**************************************


T1      Mira Loma Bridge on Streamboat Creek,        WASHOE CO & RENO, NEVADA
T2      Nimbus Engineers     File : MIRABASE.DAT   Job No. 9006    January 1991
T3       Steamboat Creek          area around Proposed Mira Loma only

   This is the "Base Model" -
   - Mira Loma Bridge not in place
   - Sections upstream of sedimentation basin are improved :
       Special Bridge removed
       Channel banks relocated to Steamboat Creek
       Hydraulic base line straightened
       NH cards implemented

   FILENAME : MIRABASE.DAT


J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                                                           4391.25

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1                 -1


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43         4         53         54         1         50         25         26         0
    150       200

NC                                            .1        .3
NH        7      .100      2820       .045      5000       .025      5200       .045      6090       .035
NH     6980      .025      7135       .045      7635
QT        2      5000      5000
ET                                    9.1                                                 6000       7135
X1   155.57        43      6980       7135      1700       2065      2065
GR   4391.4      1600      4390       2200      4390       2820      4389       2870      4388       3260
GR   4387.4      3420      4388       3860      4388       4010      4389       4200      4389       4320
GR     4390      4530      4390       5000    4382.5       5020    4382.5       5180      4390       5200
GR     4390      5450      4388       5600      4386       5680      4388       5710      4388       5870
GR     4390      5880      4388       5950      4387       6000      4388       6050      4390       6075
GR     4392      6090      4390       6160      4388       6230      4386       6250    4385.4       6420
GR     4384      6650      4382       6660      4382       6720      4386       6735      4386       6980
GR     4381      7005      4381       7100      4386       7135      4387       7485      4388       7535
GR     4389      7551      4391       7565      4392       7635
```

NH	8	.10	2950	.045	4250	.025	4479	.040	4760	.035
NH	6000	.040	6430	.025	6590	.045	7200			
ET			9.1						5200	6590
X1	169.57	45	6430	6590	1070	1390	1380			
GR	4391.5	2000	4391	2230	4390	2700	4389	2950	4389	3100
GR	4388	3350	4388	3950	4390	4100	4390	4250	4390	4275
GR	4390	4300	4383	4325	4383	4435	4390	4479	4390	4480
GR	4390	4760	4386	4790	4384.8	4890	4386	5180	4386	5290
GR	4384	5340	4383.5	5430	4384	5520	4384	5700	4386	5820
GR	4386	5900	4388	5960	4390	6000	4388	6020	4388	6420
GR	4388	6430	4386	6460	4382	6470	4382	6570	4386	6590
GR	4386	6660	4385.5	6665	4386	6670	4387	6830	4388	6890
GR	4389	6990	4390	7010	4391	7030	4391	7190	4392	7200
NH	6	.100	3900	.025	4050	.040	5310	.045	6300	.025
NH	6420	.045	6570							
ET			9.1						5200	6420
X1	180.57	42	6300	6420	1090	1060	1060			
GR	4392	2000	4392	2400	4391	2700	4392	2950	4391	3200
GR	4391	3570	4391	3840	4390	3900	4385	3935	4384	3980
GR	4384	4025	4390	4050	4390	4100	4389.7	4700	4388	4705
GR	4386	4710	4386.8	4870	4386	4930	4385.3	5020	4386	5110
GR	4388	5115	4388	5220	4386	5230	4388	5260	4388	5310
GR	4386	5350	4385	5390	4386	5405	4387.6	5490	4386	5610
GR	4386	5840	4384.8	6000	4386	6160	4388	6270	4388	6300
GR	4383	6330	4383	6400	4386	6420	4386	6460	4388	6510
GR	4390	6550	4392	6570						
NH	4	.100	2900	.040	4860	.025	4970	.050	5370	
ET			9.1						3860	4970
X1	189.07	28	4860	4970	890	640	640			
GR	4392	1700	4391	1800	4390	2000	4390	2900	4390	3380
GR	4388	3430	4387.8	3540	4388	3600	4388.5	3650	4388	3720
GR	4387.3	3900	4387.5	4000	4387.5	4400	4388	4490	4388	4530
GR	4388	4720	4388	4830	4388	4860	4384	4870	4384	4960
GR	4388	4970	4388.4	5040	4388	5080	4386	5085	4386	5100
GR	4387	5340	4390	5360	4392	5370				

Proposed Mira Loma Road Extension (Not in place)

NH	5	.040	2800	.100	3050	.040	3550	.025	3730	.08
NH	4070									
ET			9.1						3000	3730
X1	196.37	26	3590	3730	810	515	520			
GR	4392	2000	4390	2020	4387	2300	4388	2720	4392	2800
GR	4392	3050	4387	3070	4390	3110	4390	3130	4389	3150
GR	4390	3180	4392	3220	4394	3250	4394	3550	4390	3590
GR	4388	3610	4385	3620	4385	3710	4388	3730	4389.6	3800
GR	4388	3900	4387.5	3905	4388	3910	4388	4000	4389	4050
GR	4392	4070								

```
NC      0       0       0       .1      .3
NH      6       .040    1100    .040    1450    .030    1510    .080    1700    .040
NH      2050    .250    2350
ET                      9.1                                             1270    2050
X1      199.57  20      1700    2050    480     270     280
GR      4395    0       4394    80      4390    250     4389    270     4388    610
GR      4388    1100    4388    1400    4390    1450    4386.8  1475    4386.8  1500
GR      4390    1510    4385    1550    4385    1700    4385    2000    4390    2040
GR      4390    2050    4389.7  2100    4388    2170    4390    2190    4392    2350

NH      6       .045    750     .045    1475    .030    1500    .045    1950    .03
NH      1984.5  .045    2000
ET                      9.1                                             1250    1985
X1      201.57  16      1950    1984.5  225     200     200
GR      4394    0       4392    30      4390    130     4389    150     4388    570
GR      4388    650     4388    750     4388    1200    4387.2  1475    4387.5  1500
GR      4387.1  1650    4390    1950    4387.5  1970    4387.5  1984    4392    1984.5
GR      4400    2000

NH      6       .045    650     .045    1475    .030    1500    .045    1950    .030
NH      1984.5  .045    2000
ET                      9.1                                             1230    1985
X1      202.07  0       0       0       50      50      50

NH      6       .045    450     .045    1490    .030    1530    .045    1900    .030
NH      1990    .045    2030
ET                      9.1                                             1220    1990
X1      202.47  22      1900    1990    40      40      40
GR      4393    0       4392    20      4391    50      4391    200     4390    250
GR      4390    450     4390    620     4388    660     4389    670     4388    800
GR      4390    860     4390    1140    4389    1160    4389    1400    4388    1490
GR      4388    1530    4389    1630    4390    1900    4389    1970    4389    1989
GR      4392    1990    4400    2030

NC      0       0       0       .1      .3
NH      5       .045    3492    .03     3624    .045    3842    .03     3878    .045
NH      3964
ET                      9.1                                             3150    3878
X1      205.67  29      3842    3878    270     425     425
GR      4394.5  0.      4393.7  92.     4396.2  163.    4394.0  198.    4393.7  457.
GR      4396.9  535.    4396.1  912.    4393.0  981.    4393.7  1050.   4394.7  1141.
GR      4393.7  1413.   4390.9  1427.   4396.7  1439.   4392.8  1612.   4394.0  1730.
GR      4390.4  2105.   4387.9  2156.   4390.2  2207.   4388.2  3492.   4386.0  3556.
GR      4388.3  3624.   4387.7  3778.   4389.7  3827.   4395.0  3842.   4390.5  3856.
GR      4390.5  3876.   4390.5  3877.   4393.0  3878.   4413.0  3964.

NC      .030    .030    .025    .1      .3
ET                      9.1                                             1253.33 1841.00
X1      217.39  16      1807    1841    1250    1172    1172
GR      4402.7  0       4400.7  101     4397.6  137     4393.0  327     4394.0  400
GR      4389.0  412.    4389.0  422.    4393.5  442.    4391.8  869.    4392.9  1023.
GR      4392.0  1512.   4395.0  1807.   4391.2  1827.   4395.7  1841.   4402.5  1886.
GR      4435.4  1975
```

ET			9.1						2298.56	3211.00
X1	224.98	23	3150	3211	1160	759	759			
GR	4413.7	0.	4402.9	109.	4406.4	122.	4404.4	174.	4409.2	383.
GR	4405.9	433.	4398.2	889.	4401.4	901.	4392.7	930.	4398.3	945.
GR	4397.0	972.	4394.3	983.	4396.5	1024.	4395.1	1816.	4395.8	2679.
GR	4394.9	2840.	4395.3	3109.	4399.7	3150.	4392.6	3162.	4402.1	3211.
GR	4417.2	3263.	4436.9	3315.	4450.6	3366.				
ET			9.1						782.75	1755.00
X1	235.23	19	1716	1755	960	1025	1025			
GR	4426.3	0.	4412.6	35.	4404.6	43.	4409.0	55.	4404.3	67.
GR	4404.4	88.	4400.3	98.	4395.7	104.	4398.8	129.	4398.7	501.
GR	4400.1	659.	4398.7	824.	4400.3	1302.	4400.2	1594.	4401.8	1716.
GR	4398.1	1727.	4398.1	1739.	4403.3	1755.	4429.2	1868.		

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 155.570

3265 DIVIDED FLOW

155.570	10.25	4391.25	.00	4391.25	4391.25	.00	.00	.00	4386.00
5000.0	3714.7	879.6	405.7	15241.8	1438.8	1913.7	.0	.0	4386.00
.00	.24	.21	.21	.037	.025	.045	.000	4381.00	1664.25
.000005	1700.	2065.	2065.	0	0	0	.00	5886.38	7582.50

1490 NH CARD USED
*SECNO 169.570

169.570	9.26	4391.26	.00	.00	4391.26	.00	.01	.00	4388.00
5000.0	3961.3	688.8	349.9	14799.4	1271.1	1776.9	470.8	139.7	4386.00
1.06	.27	.54	.20	.036	.025	.045	.000	4382.00	2111.86
.000005	1070.	1380.	1390.	0	0	0	.00	5080.71	7192.57

1490 NH CARD USED
*SECNO 180.570

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .58

180.570	8.26	4391.26	.00	.00	4391.27	.00	.01	.00	4388.00
5000.0	4028.9	792.6	178.5	9888.2	886.5	522.1	833.9	247.6	4386.00
1.68	.41	.89	.34	.040	.025	.045	.000	4383.00	2621.19
.000016	1090.	1060.	1060.	0	0	0	.00	3572.78	6562.63

1490 NH CARD USED
*SECNO 189.070

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .62

189.070	7.28	4391.28	.00	.00	4391.29	.01	.02	.00	4388.00
5000.0	3124.8	1042.3	832.9	7038.5	759.9	1643.1	1034.8	318.6	4388.00
2.03	.44	1.37	.51	.043	.025	.050	.000	4384.00	1772.80
.000041	890.	640.	640.	0	0	0	.00	3593.56	5366.36

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 196.370

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .51

196.370	6.31	4391.31	.00	.00	4391.35	.04	.05	.01	4390.00
5000.0	2837.9	1736.5	425.6	2791.2	757.5	916.4	1150.4	361.9	4388.00
2.17	1.02	2.29	.46	.040	.025	.080	.000	4385.00	2006.96
.000158	810.	520.	515.	1	0	0	.00	1420.80	4065.36

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 199.570

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.66

199.570	6.38	4391.38	.00	.00	4391.39	.01	.04	.00	4385.00
5000.0	3049.7	1924.5	25.8	5174.4	2082.3	376.8	1207.4	378.8	4390.00
2.32	.59	.92	.07	.046	.040	.250	.000	4385.00	191.44
.000057	480.	280.	270.	2	0	0	.00	2108.80	2300.23

1490 NH CARD USED
*SECNO 201.570

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .70

201.570	4.29	4391.39	.00	.00	4391.40	.01	.02	.00	4390.00
5000.0	4883.0	117.0	.0	6063.9	108.5	.0	1242.3	389.0	4392.00
2.40	.81	1.08	.00	.045	.030	.000	.000	4387.10	59.98
.000117	225.	200.	200.	0	0	0	.00	1924.45	1984.43

1490 NH CARD USED
*SECNO 202.070

202.070	4.30	4391.40	.00	.00	4391.41	.01	.01	.00	4390.00
5000.0	4883.0	117.0	.0	6060.2	108.4	.0	1249.4	391.3	4392.00
2.41	.81	1.08	.00	.045	.030	.000	.000	4387.10	60.08
.000118	50.	50.	50.	0	0	0	.00	1924.35	1984.43

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 202.470

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .46

202.470	3.40	4391.40	.00	.00	4391.42	.03	.01	.01	4390.00
5000.0	4667.7	332.3	.0	3486.3	180.0	.0	1253.9	393.0	4392.00
2.42	1.34	1.85	.00	.044	.030	.000	.000	4388.00	37.86
.000564	40.	40.	40.	0	0	0	.00	1951.95	1989.80

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 205.670

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.50

205.670	5.51	4391.51	.00	.00	4391.52	.02	.10	.00	4395.00
5000.0	4983.0	17.0	.0	4549.6	23.1	.0	1279.8	405.1	4393.00
2.49	1.10	.73	.00	.041	.030	.000	.000	4386.00	1423.93
.000250	270.	425.	425.	1	0	0	.00	1872.16	3877.41

CCHV= .100 CEHV= .300
*SECNO 217.390

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

217.390	4.23	4393.23	4393.23	.00	4393.64	.42	.95	.12	4395.00
5000.0	4890.4	109.6	.0	949.5	17.2	.0	1359.3	449.2	4395.70
2.56	5.15	6.38	.00	.030	.025	.000	.000	4389.00	317.68
.011785	1250.	1172.	1172.	20	17	0	.00	1203.27	1833.30

*SECNO 224.980

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.20

224.980	4.08	4396.68	.00	.00	4396.74	.06	3.07	.04	4399.70
5000.0	4820.9	179.0	.0	2530.2	57.1	.0	1406.2	494.3	4402.10
2.72	1.91	3.13	.00	.030	.025	.000	.000	4392.60	916.72
.001150	1160.	759.	759.	9	0	0	.00	2200.57	3183.07

*SECNO 235.230

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

235.230	4.22	4399.92	4399.92	.00	4400.37	.45	2.54	.12	4401.80
5000.0	4755.6	244.4	.0	902.9	31.8	.0	1445.1	530.4	4403.30
2.77	5.27	7.70	.00	.030	.025	.000	.000	4395.70	98.50
.011265	960.	1025.	1025.	20	9	0	.00	1069.07	1744.59

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T1      PROPOSED FLOODWAY REVISION (Sections 126.55 thru 201.57)
T2      Method 1 and Method 4
T3

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                3                                                           4391.67

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLOC     IBW       CHNIM     ITRACE

     15                 -1
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SECNO	DEPTH	CHSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 2

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 155.570

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 6000.0 7135.0 TYPE= 1 TARGET= 1135.000

155.570	10.67	4391.67	.00	4391.25	4391.68	.01	.00	.00	4386.00
5000.0	3307.2	1692.8	.0	5403.9	1503.8	.0	.0	.0	100000.00
.00	.61	1.13	.00	.035	.025	.000	.000	4381.00	6000.00
.000018	1700.	2065.	2065.	0	0	0	.00	1120.97	7135.00

1490 NH CARD USED
*SECNO 169.570

3470 ENCROACHMENT STATIONS= 5200.0 6590.0 TYPE= 1 TARGET= 1390.000

169.570	9.69	4391.69	.00	4391.26	4391.70	.01	.02	.00	4388.00
5000.0	3742.2	1257.8	.0	6877.8	1340.9	.0	195.9	32.0	100000.00
.50	.54	.94	.00	.036	.025	.000	.000	4382.00	5200.00
.000015	1070.	1380.	1390.	0	0	0	.00	1390.00	6590.00

1490 NH CARD USED
*SECNO 180.570

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .65

3470 ENCROACHMENT STATIONS= 5200.0 6420.0 TYPE= 1 TARGET= 1220.000

180.570	8.71	4391.71	.00	4391.26	4391.73	.01	.02	.00	4388.00
5000.0	3716.5	1283.5	.0	5948.6	940.4	.0	384.1	64.5	100000.00
.87	.62	1.36	.00	.045	.025	.000	.000	4383.00	5200.00
.000036	1090.	1060.	1060.	0	0	0	.00	1220.00	6420.00

1490 NH CARD USED
*SECNO 189.070

SECNO	DEPTH	CHSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .67

3470 ENCROACHMENT STATIONS= 3860.0 4970.0 TYPE= 1 TARGET= 1110.000

189.070	7.75	4391.75	.00	4391.28	4391.77	.03	.04	.00	4388.00
5000.0	3414.8	1585.2	.0	4047.6	811.4	.0	499.1	87.7	100000.00
1.06	.84	1.95	.00	.040	.025	.000	.000	4384.00	3860.00
.000080	890.	640.	640.	1	0	0	.00	1110.00	4970.00

1490 NH CARD USED
*SECNO 196.370

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .31

3470 ENCROACHMENT STATIONS= 3000.0 3730.0 TYPE= 1 TARGET= 730.000

196.370	6.60	4391.60	.00	4391.31	4392.01	.41	.12	.11	4390.00
5000.0	643.2	4356.8	.0	341.5	798.8	.0	549.5	100.1	100000.00
1.10	1.88	5.45	.00	.040	.025	.000	.000	4385.00	3051.61
.000860	810.	520.	515.	2	0	0	.00	316.35	3730.00

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 199.570
3280 CROSS SECTION 199.57 EXTENDED .10 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.85

3470 ENCROACHMENT STATIONS= 1270.0 2050.0 TYPE= 1 TARGET= 780.000

199.570	7.10	4392.10	.00	4391.38	4392.12	.02	.08	.04	4385.00
5000.0	1848.7	3151.3	.0	2199.5	2335.4	.0	573.6	105.0	100000.00
1.18	.84	1.35	.00	.056	.040	.000	.000	4385.00	1270.00
.000106	480.	280.	270.	2	0	0	.00	780.00	2050.00

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 201.570

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .57

3470 ENCROACHMENT STATIONS= 1250.0 1985.0 TYPE= 1 TARGET= 735.000

201.570	5.03	4392.13	.00	4391.39	4392.17	.04	.04	.01	4390.00
5000.0	4726.8	273.2	.0	2950.1	133.4	.0	592.6	108.8	4392.00
1.21	1.60	2.05	.01	.044	.030	.000	.000	4387.10	1250.00
.000328	225.	200.	200.	2	0	0	.00	734.74	1984.74

1490 NH CARD USED
*SECNO 202.070

3470 ENCROACHMENT STATIONS= 1230.0 1985.0 TYPE= 1 TARGET= 755.000

202.070	5.04	4392.14	.00	4391.40	4392.18	.04	.02	.00	4390.00
5000.0	4733.8	266.2	.0	3043.0	133.8	.0	596.2	109.7	4392.00
1.22	1.56	1.99	.01	.044	.030	.045	.000	4387.10	1230.00
.000308	50.	50.	50.	0	0	0	.00	754.76	1984.76

1490 NH CARD USED
*SECNO 202.470

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .65

3470 ENCROACHMENT STATIONS= 1220.0 1990.0 TYPE= 1 TARGET= 770.000

202.470	4.14	4392.14	.00	4391.40	4392.21	.07	.02	.01	4390.00
5000.0	4359.8	640.2	.0	2140.9	246.9	.0	598.7	110.4	100000.00
1.23	2.04	2.59	.00	.043	.030	.000	.000	4388.00	1220.00
.000739	40.	40.	40.	1	0	0	.00	770.00	1990.00

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 205.670

3265 DIVIDED FLOW

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.53

3470 ENCROACHMENT STATIONS= 3150.0 3878.0 TYPE= 1 TARGET= 728.000

205.670	6.30	4392.30	.00	4391.51	4392.34	.05	.13	.00	4395.00
5000.0	4949.7	50.3	.0	2839.5	43.4	.0	615.6	115.2	100000.00
1.27	1.74	1.16	.00	.040	.030	.000	.000	4386.00	3150.00
.000317	270.	425.	425.	2	0	0	.00	711.65	3877.72

CCHV= .100 CEHV= .300
*SECNO 217.390

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 1253.3 1841.0 TYPE= 1 TARGET= 587.670

217.390	5.10	4394.10	4394.10	4393.23	4394.82	.72	1.14	.20	4395.00
5000.0	4735.4	264.6	.0	698.5	35.2	.0	667.4	132.4	100000.00
1.32	6.78	7.51	.00	.030	.025	.000	.000	4389.00	1253.33
.010127	1250.	1172.	1172.	20	14	0	.00	489.46	1836.02

*SECNO 224.980

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.07

3470 ENCROACHMENT STATIONS= 2298.6 3211.0 TYPE= 1 TARGET= 912.440

224.980	4.94	4397.54	.00	4396.68	4397.66	.12	2.78	.06	4399.70
5000.0	4713.3	286.7	.0	1752.4	83.5	.0	701.1	150.1	100000.00
1.44	2.69	3.43	.00	.030	.025	.000	.000	4392.60	2298.56
.001071	1160.	759.	759.	5	0	0	.00	865.13	3187.47

SECNO	DEPTH	CHSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 235.230

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CHSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 782.8 1755.0 TYPE= 1 TARGET= 972.250

235.230	5.07	4400.77	4400.77	4399.92	4401.28	.51	2.32	.12	4401.80
5000.0	4530.2	469.8	.0	852.0	53.7	.0	731.4	169.4	100000.00
1.49	5.32	8.75	.00	.030	.025	.000	.000	4395.70	782.75
.009548	960.	1025.	1025.	20	9	0	.00	883.10	1747.22

THIS RUN EXECUTED 31JAN91 14:50:34

****
HEC-2 WATER SURFACE PROFILES

Version 4.5.1; September 1990
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

Steamboat Creek

SUMMARY PRINTOUT

	SECNO	Q	TOPWID	SSTA	ENDST	CWSEL	DIFWSP	AREA	VCH
	155.570	5000.00	5886.38	1664.25	7582.50	4391.25	.00	18594.29	.61
	155.570	5000.00	1120.97	6000.00	7135.00	4391.67	.42	6907.69	1.13
	169.570	5000.00	5080.71	2111.86	7192.57	4391.26	.00	17847.45	.54
	169.570	5000.00	1390.00	5200.00	6590.00	4391.69	.44	8218.76	.94
*	180.570	5000.00	3572.78	2621.19	6562.63	4391.26	.00	11296.86	.89
*	180.570	5000.00	1220.00	5200.00	6420.00	4391.71	.45	6889.05	1.36
*	189.070	5000.00	3593.56	1772.80	5366.36	4391.28	.00	9441.51	1.37
*	189.070	5000.00	1110.00	3860.00	4970.00	4391.75	.47	4859.06	1.95
*	196.370	5000.00	1420.80	2006.96	4065.36	4391.31	.00	4465.08	2.29
*	196.370	5000.00	316.35	3051.61	3730.00	4391.60	.29	1140.28	5.45
*	199.570	5000.00	2108.80	191.44	2300.23	4391.38	.00	7633.48	.92
*	199.570	5000.00	780.00	1270.00	2050.00	4392.10	.72	4534.84	1.35
*	201.570	5000.00	1924.45	59.98	1984.43	4391.39	.00	6172.40	1.08
*	201.570	5000.00	734.74	1250.00	1984.74	4392.13	.73	3083.53	2.05
	202.070	5000.00	1924.35	60.08	1984.43	4391.40	.00	6168.64	1.08
	202.070	5000.00	754.76	1230.00	1984.76	4392.14	.74	3176.84	1.99
*	202.470	5000.00	1951.95	37.86	1989.80	4391.40	.00	3666.30	1.85
*	202.470	5000.00	770.00	1220.00	1990.00	4392.14	.75	2387.80	2.59
*	205.670	5000.00	1872.16	1423.93	3877.41	4391.51	.00	4572.70	.73
*	205.670	5000.00	711.65	3150.00	3877.72	4392.30	.79	2882.85	1.16
*	217.390	5000.00	1203.27	317.68	1833.30	4393.23	.00	966.72	6.38
*	217.390	5000.00	489.46	1253.33	1836.02	4394.10	.87	733.72	7.51

	SECNO	Q	TOPWID	SSTA	ENDST	CWSEL	DIFWSP	AREA	VCH
*	224.980	5000.00	2200.57	916.72	3183.07	4396.68	.00	2587.38	3.13
*	224.980	5000.00	895.13	2298.56	3187.47	4397.54	.86	1835.88	3.43
*	235.230	5000.00	1069.07	98.50	1744.59	4399.92	.00	934.64	7.70
*	235.230	5000.00	883.10	782.75	1747.22	4400.77	.86	905.65	8.75

Steamboat Creek

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	155.570	.00	.00	.00	4381.00	5000.00	4391.25	.00	4391.25	.05	.61	18594.29	21394.60
	155.570	.00	.00	.00	4381.00	5000.00	4391.67	.00	4391.68	.18	1.13	6907.69	11685.60
	169.570	1380.00	.00	.00	4382.00	5000.00	4391.26	.00	4391.26	.05	.54	17847.45	21726.08
	169.570	1380.00	.00	.00	4382.00	5000.00	4391.69	.00	4391.70	.15	.94	8218.78	12709.95
*	180.570	1060.00	.00	.00	4383.00	5000.00	4391.26	.00	4391.27	.16	.89	11296.86	12566.06
*	180.570	1060.00	.00	.00	4383.00	5000.00	4391.71	.00	4391.73	.36	1.36	6889.05	8301.67
*	189.070	640.00	.00	.00	4384.00	5000.00	4391.28	.00	4391.29	.41	1.37	9441.51	7787.69
*	189.070	640.00	.00	.00	4384.00	5000.00	4391.75	.00	4391.77	.80	1.95	4859.06	5587.58
*	196.370	520.00	.00	.00	4385.00	5000.00	4391.31	.00	4391.35	1.58	2.29	4465.08	3981.74
*	196.370	520.00	.00	.00	4385.00	5000.00	4391.60	.00	4392.01	8.60	5.45	1140.28	1704.80
*	199.570	280.00	.00	.00	4385.00	5000.00	4391.38	.00	4391.39	.57	.92	7633.48	6595.37
*	199.570	280.00	.00	.00	4385.00	5000.00	4392.10	.00	4392.12	1.06	1.35	4534.84	4856.87
*	201.570	200.00	.00	.00	4387.10	5000.00	4391.39	.00	4391.40	1.17	1.08	6172.40	4613.73
*	201.570	200.00	.00	.00	4387.10	5000.00	4392.13	.00	4392.17	3.28	2.05	3083.53	2761.87
	202.070	50.00	.00	.00	4387.10	5000.00	4391.40	.00	4391.41	1.18	1.08	6168.64	4609.21
	202.070	50.00	.00	.00	4387.10	5000.00	4392.14	.00	4392.18	3.08	1.99	3176.84	2847.76
*	202.470	40.00	.00	.00	4388.00	5000.00	4391.40	.00	4391.42	5.64	1.85	3666.30	2105.27
*	202.470	40.00	.00	.00	4388.00	5000.00	4392.14	.00	4392.21	7.39	2.59	2387.80	1839.74
*	205.670	425.00	.00	.00	4386.00	5000.00	4391.51	.00	4391.52	2.50	.73	4572.70	3164.48
*	205.670	425.00	.00	.00	4386.00	5000.00	4392.30	.00	4392.34	3.17	1.16	2882.85	2807.49
*	217.390	1172.00	.00	.00	4389.00	5000.00	4393.23	4393.23	4393.64	117.85	6.38	966.72	460.58
*	217.390	1172.00	.00	.00	4389.00	5000.00	4394.10	4394.10	4394.82	101.27	7.51	733.72	496.86
*	224.980	759.00	.00	.00	4392.60	5000.00	4396.68	.00	4396.74	11.50	3.13	2587.38	1474.82
*	224.980	759.00	.00	.00	4392.60	5000.00	4397.54	.00	4397.66	10.71	3.43	1835.88	1527.53
*	235.230	1025.00	.00	.00	4395.70	5000.00	4399.92	4399.92	4400.37	112.65	7.70	934.64	471.08
*	235.230	1025.00	.00	.00	4395.70	5000.00	4400.77	4400.77	4401.28	95.48	8.75	905.65	511.71

Steamboat Creek

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	155.570	5000.00	4391.25	.00	.00	.00	5886.38	.00
	155.570	5000.00	4391.67	.42	.00	.42	1120.97	.00
	169.570	5000.00	4391.26	.00	.01	.00	5080.71	1380.00
	169.570	5000.00	4391.69	.44	.02	.44	1390.00	1380.00
*	180.570	5000.00	4391.26	.00	.01	.00	3572.78	1060.00
*	180.570	5000.00	4391.71	.45	.02	.45	1220.00	1060.00
*	189.070	5000.00	4391.28	.00	.02	.00	3593.56	640.00
*	189.070	5000.00	4391.75	.47	.03	.47	1110.00	640.00
*	196.370	5000.00	4391.31	.00	.03	.00	1420.80	520.00
*	196.370	5000.00	4391.60	.29	-.15	.29	316.35	520.00
*	199.570	5000.00	4391.38	.00	.07	.00	2108.80	280.00
*	199.570	5000.00	4392.10	.72	.50	.72	780.00	280.00
*	201.570	5000.00	4391.39	.00	.02	.00	1924.45	200.00
*	201.570	5000.00	4392.13	.73	.02	.73	734.74	200.00
	202.070	5000.00	4391.40	.00	.01	.00	1924.35	50.00
	202.070	5000.00	4392.14	.74	.02	.74	754.76	50.00
*	202.470	5000.00	4391.40	.00	.00	.00	1951.95	40.00
*	202.470	5000.00	4392.14	.75	.00	.75	770.00	40.00
*	205.670	5000.00	4391.51	.00	.11	.00	1872.16	425.00
*	205.670	5000.00	4392.30	.79	.15	.79	711.65	425.00
*	217.390	5000.00	4393.23	.00	1.72	.00	1203.27	1172.00
*	217.390	5000.00	4394.10	.87	1.80	.87	489.46	1172.00
*	224.980	5000.00	4396.68	.00	3.46	.00	2200.57	759.00
*	224.980	5000.00	4397.54	.86	3.44	.86	865.13	759.00
*	235.230	5000.00	4399.92	.00	3.23	.00	1069.07	1025.00
*	235.230	5000.00	4400.77	.86	3.23	.86	883.10	1025.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=   180.570  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   180.570  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   189.070  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   189.070  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   196.370  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   196.370  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   199.570  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   199.570  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   201.570  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   201.570  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   202.470  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   202.470  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   205.670  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   205.670  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=   217.390  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   217.390  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   217.390  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=   217.390  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   217.390  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   217.390  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=   224.980  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   224.980  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=   235.230  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   235.230  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   235.230  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=   235.230  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   235.230  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   235.230  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

FLOODWAY DATA, Steamboat Creek
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
155.570	1135.	6908.	.7	4391.7	4391.3	.4
169.570	1390.	8219.	.6	4391.7	4391.3	.4
180.570	1220.	6889.	.7	4391.8	4391.3	.5
189.070	1110.	4859.	1.0	4391.8	4391.3	.5
196.370	678.	1140.	4.4	4391.6	4391.3	.3
199.570	780.	4535.	1.1	4392.1	4391.4	.7
201.570	735.	3084.	1.6	4392.1	4391.4	.7
202.070	755.	3177.	1.6	4392.1	4391.4	.7
202.470	770.	2388.	2.1	4392.1	4391.4	.7
205.670	728.	2883.	1.7	4392.3	4391.5	.8
217.390	583.	734.	6.8	4394.1	4393.2	.9
224.980	889.	1836.	2.7	4397.6	4396.7	.9
235.230	964.	906.	5.5	4400.8	4399.9	.9

Effective Area Model

```
*********************************************
*  HEC-2 WATER SURFACE PROFILES             *
*                                           *
*  Version   4.5.1;  September 1990         *
*                                           *
*  RUN DATE    31JAN91    TIME   15:27:16   *
*********************************************
```

```
*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616-4687         *
*          (916) 756-1104               *
*****************************************
```

```
X     X  XXXXXXX   XXXXX             XXXXX
X     X  X        X     X           X     X
X     X  X        X                       X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

END OF BANNER

THIS RUN EXECUTED 31JAN91 15:27:16

```
**************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.5.1i  September 1990
**************************************


T1      Mira Loma Bridge on Streamboat Creek,        WASHOE CO & RENO, NEVADA
T2      Nimbus Engineers     File : MIRAEFF.DAT   Job No. 9006    January 1991
T3       Steamboat Creek          area around Proposed Mira Loma only

   This is the "Effective Flow Model" which illustrates effects of the
   Bridge encroachments in the FLOODWAY FRINGE ONLY, no encroachment into the
   floodway.

   Profile 1 is existing (unencroached) conditions
   Profile 2 is encroached conditions

   Modified from file : mirabase.dat

   FILENAME : MIRAEFFA.DAT


J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                                                                 4391.25

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     1                  -1


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43        4         53        54        1         50        25        26        0
    150

NC                                      .1        .3
NH       7      .100      2820      .045      5000      .025      5200      .045      6090      .035
NH    6980      .025      7135      .045      7635
QT       2      5000      5000
X1  155.57        43      6980      7135      1700      2065      2065
GR  4391.4      1600      4390      2200      4390      2820      4389      2870      4388      3260
GR  4387.4      3420      4388      3860      4388      4010      4389      4200      4389      4320
GR    4390      4530      4390      5000    4382.5      5020    4382.5      5180      4390      5200
GR    4390      5450      4388      5600      4386      5680      4388      5710      4388      5870
GR    4390      5880      4388      5950      4387      6000      4388      6050      4390      6075
GR    4392      6090      4390      6160      4388      6230      4386      6250    4385.4      6420
GR    4384      6650      4382      6660      4382      6720      4386      6735      4386      6980
GR    4381      7005      4381      7100      4386      7135      4387      7485      4388      7535
GR    4389      7551      4391      7565      4392      7635
```

NH	8	.10	2950	.045	4250	.025	4479	.040	4760	.035
NH	6000	.040	6430	.025	6590	.045	7200			
X1	169.57	45	6430	6590	1070	1390	1380			
GR	4391.5	2000	4391	2230	4390	2700	4389	2950	4389	3100
GR	4388	3350	4388	3950	4390	4100	4390	4250	4390	4275
GR	4390	4300	4383	4325	4383	4435	4390	4479	4390	4480
GR	4390	4760	4386	4790	4384.8	4890	4386	5180	4386	5290
GR	4384	5340	4383.5	5430	4384	5520	4384	5700	4386	5820
GR	4386	5900	4388	5960	4390	6000	4388	6020	4388	6420
GR	4388	6430	4386	6460	4382	6470	4382	6570	4386	6590
GR	4386	6660	4385.5	6665	4386	6670	4387	6830	4388	6890
GR	4389	6990	4390	7010	4391	7030	4391	7190	4392	7200
NH	6	.100	3900	.025	4050	.040	5310	.045	6300	.025
NH	6420	.045	6570							
X1	180.57	42	6300	6420	1090	1060	1060			
GR	4392	2000	4392	2400	4391	2700	4392	2950	4391	3200
GR	4391	3570	4391	3840	4390	3900	4385	3935	4384	3980
GR	4384	4025	4390	4050	4390	4100	4389.7	4700	4388	4705
GR	4386	4710	4386.8	4870	4386	4930	4385.3	5020	4386	5110
GR	4388	5115	4388	5220	4386	5230	4388	5260	4388	5310
GR	4386	5350	4385	5390	4386	5405	4387.6	5490	4386	5610
GR	4386	5840	4384.8	6000	4386	6160	4388	6270	4388	6300
GR	4383	6330	4383	6400	4386	6420	4386	6460	4388	6510
GR	4390	6550	4392	6570						
NH	4	.100	2900	.040	4860	.025	4970	.050	5370	
ET			9.1						3860	4970
X1	189.07	28	4860	4970	890	640	640			
GR	4392	1700	4391	1800	4390	2000	4390	2900	4390	3380
GR	4388	3430	4387.8	3540	4388	3600	4388.5	3650	4388	3720
GR	4387.3	3900	4387.5	4000	4387.5	4400	4388	4490	4388	4530
GR	4388	4720	4388	4830	4388	4860	4384	4870	4384	4960
GR	4388	4970	4388.4	5040	4388	5080	4386	5085	4386	5100
GR	4387	5340	4390	5360	4392	5370				

Proposed Mira Loma Road Extension (Not in place)
Coefficients of expansion and contraction increased to reflect shock losses

NC	0	0	0	.2	.4					
NH	5	.040	2800	.100	3050	.040	3550	.025	3730	.08
NH	4070									
ET			9.1						3000	3730
X1	196.37	26	3590	3730	670	515	520			
GR	4392	2000	4390	2020	4387	2300	4388	2720	4392	2800
GR	4392	3050	4387	3070	4390	3110	4390	3130	4389	3150
GR	4390	3180	4392	3220	4394	3250	4394	3550	4390	3590
GR	4388	3610	4385	3620	4385	3710	4388	3730	4389.6	3800
GR	4388	3900	4387.5	3905	4388	3910	4388	4000	4389	4050
GR	4392	4070								

```
NC      0       0       0       .1      .3
NH      6       .040    1100    .040    1450    .030    1510    .080    1700    .040
NH      2050    .250    2350
ET                      9.1                                             1100    2100
X1      199.57  20      1700    2050    400     270     280
GR      4395    0       4394    80      4390    250     4389    270     4388    610
GR      4388    1100    4388    1400    4390    1450    4386.8  1475    4386.8  1500
GR      4390    1510    4385    1550    4385    1700    4385    2000    4390    2040
GR      4390    2050    4389.7  2100    4388    2170    4390    2190    4392    2350

NC      0       0       0       .1      .3
NH      6       .045    750     .045    1475    .030    1500    .045    1950    .03
NH      1984.5  .045    2000
ET                      9.1                                             750     2000
X1      201.57  16      1950    1984.5  225     200     200
GR      4394    0       4392    30      4390    130     4389    150     4388    570
GR      4388    650     4388    750     4388    1200    4387.2  1475    4387.5  1500
GR      4387.1  1650    4390    1950    4387.5  1970    4387.5  1984    4392    1984.5
GR      4400    2000

NH      6       .045    650     .045    1475    .030    1500    .045    1950    .030
NH      1984.5  .045    2000
ET                      9.1                                             650     2000
X1      202.07  0       0       0       50      50      50

NH      6       .045    450     .045    1490    .030    1530    .045    1900    .030
NH      1990    .045    2030
ET                      9.1                                             450     2030
X1      202.47  22      1900    1990    40      40      40
GR      4393    0       4392    20      4391    50      4391    200     4390    250
GR      4390    450     4390    620     4388    660     4389    670     4388    800
GR      4390    860     4390    1140    4389    1160    4389    1400    4388    1490
GR      4388    1530    4389    1630    4390    1900    4389    1970    4389    1989
GR      4392    1990    4400    2030

NC      0       0       0       .1      .3
NH      5       .045    3492    .03     3624    .045    3842    .03     3878    .045
NH      3964
ET                      9.1                                             1050    3964
X1      205.67  29      3842    3878    270     425     425
GR      4394.5  0.      4393.7  92.     4396.2  163.    4394.0  198.    4393.7  457.
GR      4396.9  535.    4396.1  912.    4393.0  981.    4393.7  1050.   4394.7  1141.
GR      4393.7  1413.   4390.9  1427.   4396.7  1439.   4392.8  1612.   4394.0  1730.
GR      4390.4  2105.   4387.9  2156.   4390.2  2207.   4388.2  3492.   4386.0  3556.
GR      4388.3  3624.   4387.7  3778.   4389.7  3827.   4395.0  3842.   4390.5  3856.
GR      4390.5  3876.   4390.5  3877.   4393.0  3878.   4413.0  3964.

NC      .030    .030    .025    .1      .3
X1      217.39  16      1807    1841    1250    1172    1172
GR      4402.7  0       4400.7  101     4397.6  137     4393.0  327     4394.0  400
GR      4389.0  412.    4389.0  422.    4393.5  442.    4391.8  869.    4392.9  1023.
GR      4392.0  1512.   4395.0  1807.   4391.2  1827.   4395.7  1841.   4402.5  1886.
GR      4435.4  1975
```

XI	224.98	23	3150	3211	1160	759	759			
GR	4413.7	0.	4402.9	109.	4406.4	122.	4404.4	174.	4409.2	383.
GR	4405.9	433.	4398.2	889.	4401.4	901.	4392.7	930.	4398.3	945.
GR	4397.0	972.	4394.3	983.	4396.5	1024.	4395.1	1816.	4395.8	2679.
GR	4394.9	2840.	4395.3	3109.	4399.7	3150.	4392.6	3162.	4402.1	3211.
GR	4417.2	3263.	4436.9	3315.	4450.6	3366.				
XI	235.23	19	1716	1755	960	1025	1025			
GR	4426.8	0.	4412.6	35.	4404.6	43.	4409.0	55.	4404.3	67.
GR	4404.4	88.	4400.3	98.	4395.7	104.	4398.8	129.	4398.7	501.
GR	4400.1	659.	4398.7	824.	4400.3	1302.	4400.2	1594.	4401.8	1716.
GR	4398.1	1727.	4398.1	1739.	4403.3	1755.	4429.2	1868.		

SECNO	DEPTH	CNSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV..
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 155.570

3265 DIVIDED FLOW

155.570	10.25	4391.25	.00	4391.25	4391.25	.00	.00	.00	4386.00
5000.0	3714.7	879.6	405.7	15241.8	1438.8	1913.7	.0	.0	4386.00
.00	.24	.61	.21	.037	.025	.045	.000	4381.00	1664.25
.000005	1700.	2065.	2065.	0	0	0	.00	5886.38	7582.50

1490 NH CARD USED
*SECNO 169.570

169.570	9.26	4391.26	.00	.00	4391.26	.00	.01	.00	4388.00
5000.0	3961.3	688.8	349.9	14799.4	1271.1	1776.9	470.8	139.7	4386.00
1.06	.27	.54	.20	.036	.025	.045	.000	4382.00	2111.86
.000005	1070.	1380.	1390.	0	0	0	.00	5080.71	7192.57

1490 NH CARD USED
*SECNO 180.570

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .58

180.570	8.26	4391.26	.00	.00	4391.27	.00	.01	.00	4388.00
5000.0	4028.9	792.6	178.5	9888.2	886.5	522.1	833.9	247.6	4386.00
1.68	.41	.89	.34	.040	.025	.045	.000	4383.00	2621.19
.000016	1090.	1060.	1060.	0	0	0	.00	3572.78	6562.63

1490 NH CARD USED
*SECNO 189.070

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .62

189.070	7.28	4391.28	.00	.00	4391.29	.01	.02	.00	4388.00
5000.0	3124.8	1042.3	832.9	7038.5	759.9	1643.1	1034.8	318.6	4388.00
2.03	.44	1.37	.51	.043	.025	.050	.000	4384.00	1772.80
.000041	890.	640.	640.	0	0	0	.00	3593.56	5366.36

SECNO	DEPTH	CUSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .200 CEHV= .400
1490 NH CARD USED
*SECNO 196.370

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .51

196.370	6.31	4391.31	.00	.00	4391.34	.04	.04	.01	4390.00
5000.0	2837.5	1736.9	425.5	2789.3	757.2	915.7	1134.6	355.4	4388.00
2.15	1.02	2.29	.46	.040	.025	.080	.000	4385.00	2006.98
.000158	670.	520.	515.	1	0	0	.00	1420.66	4065.34

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 199.570

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.65

199.570	6.37	4391.37	.00	.00	4391.38	.01	.03	.00	4385.00
5000.0	3048.3	1926.0	25.8	5164.8	2080.1	375.3	1184.2	370.1	4390.00
2.29	.59	.93	.07	.046	.040	.250	.000	4385.00	191.71
.000058	400.	280.	270.	2	0	0	.00	2108.02	2299.73

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 201.570

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .70

201.570	4.29	4391.39	.00	.00	4391.40	.01	.02	.00	4390.00
5000.0	4883.0	117.0	.0	6050.1	108.2	.0	1219.0	380.3	4392.00
2.36	.81	1.08	.00	.045	.030	.000	.000	4387.10	60.35
.000118	225.	200.	200.	0	0	0	.00	1924.09	1984.43

1490 NH CARD USED
*SECNO 202.070

202.070	4.29	4391.39	.00	.00	4391.40	.01	.01	.00	4390.00
5000.0	4883.0	117.0	.0	6046.4	108.1	.0	1226.1	382.5	4392.00
2.38	.81	1.08	.00	.045	.030	.000	.000	4387.10	60.44
.000119	50.	50.	50.	0	0	0	.00	1923.99	1984.43

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 202.470

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .46

202.470	3.39	4391.39	.00	.00	4391.42	.03	.01	.01	4390.00
5000.0	4667.8	332.2	.0	3472.7	179.3	.0	1230.6	384.3	4392.00
2.39	1.34	1.85	.00	.044	.030	.000	.000	4388.00	38.08
.000571	40.	40.	40.	0	0	0	.00	1951.72	1989.80

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 205.670

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.51

205.670	5.50	4391.50	.00	.00	4391.52	.02	.10	.00	4395.00
5000.0	4983.1	16.9	.0	4537.0	22.9	.0	1256.4	396.3	4393.00
2.46	1.10	.73	.00	.041	.030	.000	.000	4386.00	1423.96
.000252	270.	425.	425.	1	0	0	.00	1871.36	3877.40

CCHV= .100 CEHV= .300
*SECNO 217.390

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

217.390	4.23	4393.23	4393.23	.00	4393.64	.42	.96	.12	4395.00
5000.0	4890.4	109.6	.0	950.7	17.2	.0	1335.7	440.4	4395.70
2.52	5.14	6.37	.00	.030	.025	.000	.000	4389.00	317.64
.011746	1250.	1172.	1172.	20	17	0	.00	1203.73	1833.30

*SECNO 224.980

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.19

224.980	4.09	4396.69	.00	.00	4396.75	.06	3.07	.04	4399.70
5000.0	4820.8	179.2	.0	2527.0	57.1	.0	1382.7	485.6	4402.10
2.69	1.91	3.14	.00	.030	.025	.000	.000	4392.60	916.72
.001154	1160.	759.	759.	8	0	0	.00	2200.53	3183.06

*SECNO 235.230

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

235.230	4.22	4399.92	4399.92	.00	4400.37	.45	2.55	.12	4401.80
5000.0	4755.7	244.3	.0	903.4	31.8	.0	1421.5	521.6	4403.30
2.74	5.26	7.69	.00	.030	.025	.000	.000	4395.70	98.50
.011249	960.	1025.	1025.	20	9	0	.00	1069.33	1744.59

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T1  Floodway Fringe encroached at bridge location and inneffective areas
T2  coded out with ET cards
T3

J1  ICHECK    INQ       NINW      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                3                                                           4391.25

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     15                 -1
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SECNO	DEPTH	CHSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 2

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 155.570

3265 DIVIDED FLOW

155.570	10.25	4391.25	.00	4391.25	4391.25	.00	.00	.00	4386.00
5000.0	3714.7	879.6	405.7	15241.8	1438.8	1913.7	.0	.0	4386.00
.00	.24	.61	.21	.037	.025	.045	.000	4381.00	1664.25
.000005	1700.	2065.	2065.	0	0	0	.00	5886.38	7582.50

1490 NH CARD USED
*SECNO 169.570

169.570	9.26	4391.26	.00	.00	4391.26	.00	.01	.00	4388.00
5000.0	3961.3	688.8	349.9	14799.4	1271.1	1776.9	470.8	139.7	4386.00
1.06	.27	.54	.20	.036	.025	.045	.000	4382.00	2111.86
.000005	1070.	1380.	1390.	0	0	0	.00	5080.71	7192.57

1490 NH CARD USED
*SECNO 180.570

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .58

180.570	8.26	4391.26	.00	.00	4391.27	.00	.01	.00	4388.00
5000.0	4028.9	792.6	178.5	9888.2	886.5	522.1	833.9	247.6	4386.00
1.68	.41	.89	.34	.040	.025	.045	.000	4383.00	2621.19
.000016	1090.	1060.	1060.	0	0	0	.00	3572.78	6562.63

1490 NH CARD USED
*SECNO 189.070

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .37

SECNO	DEPTH	CHSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3470 ENCROACHMENT STATIONS= 3860.0 4970.0 TYPE= 1 TARGET= 1110.000

189.070	7.27	4391.27	.00	4391.28	4391.30	.03	.03	.01	4388.00
5000.0	3307.4	1692.6	.0	3579.4	759.9	.0	987.4	294.4	100000.00
1.85	.92	2.23	.00	.040	.025	.000	.000	4384.00	3860.00
.000113	890.	640.	640.	0	0	0	.00	1110.00	4970.00

CCHV= .200 CEHV= .400
1490 NH CARD USED
*SECNO 196.370

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .31

3470 ENCROACHMENT STATIONS= 3000.0 3730.0 TYPE= 1 TARGET= 730.000

196.370	6.13	4391.13	.00	4391.31	4391.65	.52	.15	.20	4390.00
5000.0	524.6	4475.4	.0	262.5	733.1	.0	1025.8	304.8	100000.00
1.88	2.00	6.10	.00	.040	.025	.000	.000	4385.00	3053.48
.001203	670.	520.	515.	2	0	0	.00	300.40	3730.00

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 199.570

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.47

3470 ENCROACHMENT STATIONS= 1100.0 2100.0 TYPE= 1 TARGET= 1000.000

199.570	6.76	4391.76	.00	4391.37	4391.78	.02	.08	.05	4385.00
5000.0	2172.3	2819.2	8.5	2692.5	2216.3	95.5	1049.2	310.0	4390.00
1.96	.81	1.27	.09	.053	.040	.250	.000	4385.00	1100.00
.000100	400.	280.	270.	2	0	0	.00	1000.00	2100.00

SECNO	DEPTH	CHSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 201.570

3470 ENCROACHMENT STATIONS= 750.0 2000.0 TYPE= 1 TARGET= 1250.000

201.570	4.69	4391.79	.00	4391.39	4391.81	.02	.03	.00	4390.00
5000.0	4834.6	165.4	.0	4613.1	121.9	.0	1073.6	315.6	4392.00
2.01	1.05	1.36	.00	.044	.030	.000	.000	4387.10	750.00
.000161	225.	200.	200.	2	0	0	.00	1234.48	1984.48

1490 NH CARD USED
*SECNO 202.070

3470 ENCROACHMENT STATIONS= 650.0 2000.0 TYPE= 1 TARGET= 1350.000

202.070	4.70	4391.80	.00	4391.39	4391.81	.01	.01	.00	4390.00
5000.0	4846.5	153.5	.0	5000.2	122.1	.0	1079.3	317.1	4392.00
2.03	.97	1.26	.00	.044	.030	.000	.000	4387.10	650.00
.000138	50.	50.	50.	0	0	0	.00	1334.48	1984.48

1490 NH CARD USED
*SECNO 202.470

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .61

3470 ENCROACHMENT STATIONS= 450.0 2030.0 TYPE= 1 TARGET= 1580.000

202.470	3.80	4391.80	.00	4391.39	4391.83	.03	.01	.00	4390.00
5000.0	4633.7	366.3	.0	3677.5	216.0	.0	1083.4	318.4	4392.00
2.04	1.26	1.70	.00	.044	.030	.000	.000	4388.00	450.00
.000376	40.	40.	40.	0	0	0	.00	1539.94	1989.94

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 205.670

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.52

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3470 ENCROACHMENT STATIONS= 1050.0 3964.0 TYPE= 1 TARGET= 2914.000

205.670	5.88	4391.88	.00	4391.50	4391.89	.01	.07	.00	4395.00
5000.0	4976.8	23.2	.0	5245.8	32.5	.0	1112.3	329.4	4393.00
2.12	.95	.71	.00	.042	.030	.000	.000	4386.00	1422.06
.000162	270.	425.	425.	1	0	0	.00	1915.96	3877.55

CCHV= .100 CEHV= .300
*SECNO 217.390

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

217.390	4.22	4393.22	4393.22	4393.23	4393.64	.42	.65	.12	4395.00
5000.0	4890.2	109.8	.0	943.8	17.1	.0	1201.8	374.0	4395.70
2.19	5.18	6.42	.00	.030	.025	.000	.000	4389.00	317.88
.011980	1250.	1172.	1172.	20	14	0	.00	1200.93	1833.29

*SECNO 224.980

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.24

224.980	4.09	4396.69	.00	4396.69	4396.75	.06	3.07	.04	4399.70
5000.0	4821.2	178.8	.0	2534.5	57.2	.0	1248.7	419.1	4402.10
2.35	1.90	3.13	.00	.030	.025	.000	.000	4392.60	916.71
.001144	1160.	759.	759.	9	0	0	.00	2200.62	3183.08

*SECNO 235.230

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

235.230	4.22	4399.92	4399.92	4399.92	4400.37	.45	2.53	.12	4401.80
5000.0	4755.6	244.4	.0	902.9	31.8	.0	1287.7	455.2	4403.30
2.40	5.27	7.70	.00	.030	.025	.000	.000	4395.70	98.50
.011265	960.	1025.	1025.	20	9	0	.00	1069.07	1744.59

THIS RUN EXECUTED 31JAN91 15:27:39

****
HEC-2 WATER SURFACE PROFILES

Version 4.5.1; September 1990
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

Steamboat Creek

SUMMARY PRINTOUT

	SECNO	Q	TOPWID	SSTA	ENDST	CWSEL	DIFWSP	AREA	VCH
	155.570	5000.00	5886.38	1664.25	7582.50	4391.25	.00	18594.29	.61
	155.570	5000.00	5886.38	1664.25	7582.50	4391.25	.00	18594.29	.61
	169.570	5000.00	5080.71	2111.86	7192.57	4391.26	.00	17847.45	.54
	169.570	5000.00	5080.71	2111.86	7192.57	4391.26	.00	17847.45	.54
*	180.570	5000.00	3572.78	2621.19	6562.63	4391.26	.00	11296.86	.89
*	180.570	5000.00	3572.78	2621.19	6562.63	4391.26	.00	11296.86	.89
*	189.070	5000.00	3593.56	1772.80	5366.36	4391.28	.00	9441.51	1.37
*	189.070	5000.00	1110.00	3860.00	4970.00	4391.27	-.01	4339.29	2.23
*	196.370	5000.00	1420.66	2006.98	4065.34	4391.31	.00	4462.30	2.29
*	196.370	5000.00	300.40	3053.48	3730.00	4391.13	-.18	995.58	6.10
*	199.570	5000.00	2108.02	191.71	2299.73	4391.37	.00	7620.09	.93
*	199.570	5000.00	1000.00	1100.00	2100.00	4391.76	.39	5004.24	1.27
*	201.570	5000.00	1924.09	60.35	1984.43	4391.39	.00	6158.30	1.08
	201.570	5000.00	1234.48	750.00	1984.48	4391.79	.40	4734.92	1.36
	202.070	5000.00	1923.99	60.44	1984.43	4391.39	.00	6154.54	1.08
	202.070	5000.00	1334.48	650.00	1984.48	4391.80	.41	5122.30	1.26
*	202.470	5000.00	1951.72	38.08	1989.80	4391.39	.00	3652.00	1.85
*	202.470	5000.00	1539.94	450.00	1989.94	4391.80	.41	3893.48	1.70
*	205.670	5000.00	1871.36	1423.96	3877.40	4391.50	.00	4559.90	.73
*	205.670	5000.00	1915.96	1422.06	3877.55	4391.88	.38	5278.35	.71
*	217.390	5000.00	1203.73	317.64	1833.30	4393.23	.00	967.89	6.37
*	217.390	5000.00	1200.33	317.88	1833.29	4393.22	-.01	960.85	6.42

	SECNO	Q	TOPWID	SSTA	ENDST	CWSEL	DIFWSP	AREA	VCH
*	224.980	5000.00	2200.53	916.72	3183.06	4396.69	.00	2584.15	3.14
*	224.980	5000.00	2200.62	916.71	3183.08	4396.69	-.01	2591.68	3.13
*	235.230	5000.00	1069.33	98.50	1744.59	4399.92	.00	935.16	7.69
*	235.230	5000.00	1068.07	98.50	1744.59	4399.92	.00	934.64	7.70

Steamboat Creek

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	155.570	.00	.00	.00	4381.00	5000.00	4391.25	.00	4391.25	.05	.61	18594.29	21394.60
	155.570	.00	.00	.00	4381.00	5000.00	4391.25	.00	4391.25	.05	.61	18594.29	21394.60
	169.570	1380.00	.00	.00	4382.00	5000.00	4391.26	.00	4391.26	.05	.54	17847.45	21726.08
	169.570	1380.00	.00	.00	4382.00	5000.00	4391.26	.00	4391.26	.05	.54	17847.45	21726.08
*	180.570	1060.00	.00	.00	4383.00	5000.00	4391.26	.00	4391.27	.16	.89	11296.86	12566.06
*	180.570	1060.00	.00	.00	4383.00	5000.00	4391.26	.00	4391.27	.16	.89	11296.86	12566.06
*	189.070	640.00	.00	.00	4384.00	5000.00	4391.28	.00	4391.29	.41	1.37	9441.51	7787.69
*	189.070	640.00	.00	.00	4384.00	5000.00	4391.27	.00	4391.30	1.13	2.23	4339.29	4704.07
*	196.370	520.00	.00	.00	4385.00	5000.00	4391.31	.00	4391.34	1.58	2.29	4462.30	3978.23
*	196.370	520.00	.00	.00	4385.00	5000.00	4391.13	.00	4391.65	12.03	6.10	995.58	1441.54
*	199.570	280.00	.00	.00	4385.00	5000.00	4391.37	.00	4391.38	.58	.93	7620.09	6578.43
*	199.570	280.00	.00	.00	4385.00	5000.00	4391.76	.00	4391.78	1.00	1.27	5004.24	4995.27
*	201.570	200.00	.00	.00	4387.10	5000.00	4391.39	.00	4391.40	1.18	1.08	6158.30	4596.79
	201.570	200.00	.00	.00	4387.10	5000.00	4391.79	.00	4391.81	1.61	1.36	4734.92	3935.69
	202.070	50.00	.00	.00	4387.10	5000.00	4391.39	.00	4391.40	1.19	1.08	6154.54	4592.28
	202.070	50.00	.00	.00	4387.10	5000.00	4391.80	.00	4391.81	1.38	1.26	5122.30	4251.58
*	202.470	40.00	.00	.00	4388.00	5000.00	4391.39	.00	4391.42	5.71	1.85	3652.00	2093.12
*	202.470	40.00	.00	.00	4388.00	5000.00	4391.80	.00	4391.83	3.76	1.70	3893.48	2580.12
*	205.670	425.00	.00	.00	4386.00	5000.00	4391.50	.00	4391.52	2.52	.73	4559.90	3151.26
*	205.670	425.00	.00	.00	4386.00	5000.00	4391.88	.00	4391.89	1.62	.71	5278.35	3923.25
*	217.390	1172.00	.00	.00	4389.00	5000.00	4393.23	4393.23	4393.64	117.46	6.37	967.89	461.34
*	217.390	1172.00	.00	.00	4389.00	5000.00	4393.22	4393.22	4393.64	119.80	6.42	960.85	456.82
*	224.980	759.00	.00	.00	4392.60	5000.00	4396.69	.00	4396.75	11.54	3.14	2584.15	1471.69
*	224.980	759.00	.00	.00	4392.60	5000.00	4396.69	.00	4396.75	11.44	3.13	2591.68	1478.52
*	235.230	1025.00	.00	.00	4395.70	5000.00	4399.92	4399.92	4400.37	112.49	7.69	935.16	471.43
*	235.230	1025.00	.00	.00	4395.70	5000.00	4399.92	4399.92	4400.37	112.65	7.70	934.64	471.08

Steamboat Creek

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CHSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	155.570	5000.00	4391.25	.00	.00	.00	5886.38	.00
	155.570	5000.00	4391.25	.00	.00	.00	5886.38	.00
	169.570	5000.00	4391.26	.00	.01	.00	5080.71	1380.00
	169.570	5000.00	4391.26	.00	.01	.00	5080.71	1380.00
*	180.570	5000.00	4391.26	.00	.01	.00	3572.78	1060.00
*	180.570	5000.00	4391.26	.00	.01	.00	3572.78	1060.00
*	189.070	5000.00	4391.28	.00	.02	.00	3593.56	640.00
*	189.070	5000.00	4391.27	-.01	.01	-.01	1110.00	640.00
*	196.370	5000.00	4391.31	.00	.03	.00	1420.66	520.00
*	196.370	5000.00	4391.13	-.18	-.14	-.18	300.40	520.00
*	199.570	5000.00	4391.37	.00	.06	.00	2108.02	280.00
*	199.570	5000.00	4391.76	.39	.63	.39	1000.00	280.00
*	201.570	5000.00	4391.39	.00	.02	.00	1924.09	200.00
	201.570	5000.00	4391.79	.40	.03	.40	1234.48	200.00
	202.070	5000.00	4391.39	.00	.01	.00	1923.99	50.00
	202.070	5000.00	4391.80	.41	.01	.41	1334.48	50.00
*	202.470	5000.00	4391.39	.00	.00	.00	1951.72	40.00
*	202.470	5000.00	4391.80	.41	.00	.41	1539.94	40.00
*	205.670	5000.00	4391.50	.00	.11	.00	1871.36	425.00
*	205.670	5000.00	4391.88	.38	.08	.38	1915.96	425.00
*	217.390	5000.00	4393.23	.00	1.73	.00	1203.73	1172.00
*	217.390	5000.00	4393.22	-.01	1.34	-.01	1200.93	1172.00
*	224.980	5000.00	4396.69	.00	3.46	.00	2200.53	759.00
*	224.980	5000.00	4396.69	-.01	3.46	-.01	2200.62	759.00
*	235.230	5000.00	4399.92	.00	3.23	.00	1069.33	1025.00
*	235.230	5000.00	4399.92	.00	3.23	.00	1069.07	1025.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=   180.570  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   180.570  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   189.070  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   189.070  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   196.370  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   196.370  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   199.570  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   199.570  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   201.570  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   202.470  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   202.470  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=   205.670  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   205.670  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=   217.390  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   217.390  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   217.390  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=   217.390  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   217.390  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   217.390  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=   224.980  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=   224.980  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=   235.230  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   235.230  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   235.230  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=   235.230  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   235.230  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   235.230  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

Bridge Model

```
*********************************************
*  HEC-2 WATER SURFACE PROFILES             *
*                                           *
*  Version   4.5.1;  September 1990         *
*                                           *
*  RUN DATE    31JAN91    TIME   14:36:43   *
*********************************************
```

```
*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616-4687         *
*          (916) 756-1104               *
*****************************************
```

```
X     X  XXXXXXX   XXXXX             XXXXX
X     X  X        X     X           X     X
X     X  X        X                       X
XXXXXXX  XXXX     X          XXXXX   XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

END OF BANNER

THIS RUN EXECUTED 31JAN91 14:36:43

```
**************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.5.1; September 1990
**************************************


T1      Mira Loma Bridge on Streamboat Creek,        WASHOE CO & RENO, NEVADA
T2      Nimbus Engineers     File : MIRABRIG.DAT   Job No. 9006    January 1991
T3       Steamboat Creek          area around Proposed Mira Loma only

   This is the "Bridge Model" which illustrates effects of the
   Bridge encroachments in the FLOODWAY FRINGE AND the FLOODWAY.

   Compare the results of this model to the results from model "MIRAEFFA.DAT"
   for effects of construction in the FLOODWAY ONLY

   Modified from files: mirabase.dat, miraeffa.dat

   FILENAME : MIRABRIG.DAT

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                                                          4391.25

J2  NPROF     IPLOT     PPFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     -1                 -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43        4         53        54        1         50        25        26        0
     150

NC                                      .1        .3
NH        7      .100      2820      .045      5000      .025      5200      .045      6090      .035
NH     6980      .025      7135      .045      7635
QT        1      5000
X1   155.57        43      6980      7135      1700      2065      2065
GR   4391.4      1600      4390      2200      4390      2820      4389      2870      4388      3260
GR   4387.4      3420      4388      3860      4388      4010      4389      4200      4389      4320
GR     4390      4530      4390      5000    4382.5      5020    4382.5      5180      4390      5200
GR     4390      5450      4388      5600      4386      5680      4388      5710      4388      5870
GR     4390      5880      4388      5950      4387      6000      4388      6050      4390      6075
GR     4392      6090      4390      6160      4388      6230      4386      6250    4385.4      6420
GR     4384      6650      4382      6660      4382      6720      4386      6735      4386      6980
GR     4381      7005      4381      7100      4386      7135      4387      7485      4388      7535
GR     4389      7551      4391      7565      4392      7635
```

```
NH       8      .10     2950     .045     4250     .025     4479     .040     4760     .035
NH    6000      .040    6430     .025     6590     .045     7200
X1  169.57       45     6430     6590     1070     1390     1380
GR  4391.5     2000     4391     2230     4390     2700     4389     2950     4389     3100
GR    4388     3350     4388     3950     4390     4100     4390     4250     4390     4275
GR    4390     4300     4383     4325     4383     4435     4390     4479     4390     4480
GR    4390     4760     4386     4790   4384.8     4890     4386     5180     4386     5290
GR    4384     5340   4383.5     5430     4384     5520     4384     5700     4386     5820
GR    4386     5900     4388     5960     4390     6000     4388     6020     4388     6420
GR    4388     6430     4386     6460     4382     6470     4382     6570     4386     6590
GR    4386     6660   4385.5     6665     4386     6670     4387     6830     4388     6890
GR    4389     6990     4390     7010     4391     7030     4391     7190     4392     7200

NH       6     .100     3900     .025     4050     .040     5310     .045     6300     .025
NH    6420      .045    6570
X1  180.57       42     6300     6420     1090     1060     1060
GR    4392     2000     4392     2400     4391     2700     4392     2950     4391     3200
GR    4391     3570     4391     3840     4390     3900     4385     3935     4384     3980
GR    4384     4025     4390     4050     4390     4100   4389.7     4700     4388     4705
GR    4386     4710   4386.8     4870     4386     4930   4385.3     5020     4386     5110
GR    4388     5115     4388     5220     4386     5230     4388     5260     4388     5310
GR    4386     5350     4385     5390     4386     5405   4387.6     5490     4386     5610
GR    4386     5840   4384.8     6000     4386     6160     4388     6270     4388     6300
GR    4383     6330     4383     6400     4386     6420     4386     6460     4388     6510
GR    4390     6550     4392     6570

NH       4     .100     2900     .040     4860     .025     4970     .050     5370
ET             9.1                                                    3860     4970
X1  189.07       28     4860     4970      890      640      640
GR    4392     1700     4391     1800     4390     2000     4390     2900     4390     3380
GR    4388     3430   4387.8     3540     4388     3600   4388.5     3650     4388     3720
GR  4387.3     3900   4387.5     4000   4387.5     4400     4388     4490     4388     4530
GR    4388     4720     4388     4830     4388     4860     4384     4870     4384     4960
GR    4388     4970   4388.4     5040     4388     5080     4386     5085     4386     5100
GR    4387     5340     4390     5360     4392     5370
```

Start Normal Bridge Routine
GR Points used to model effective area within channel
X3 Card used to model effective area outside channel

```
NC     .250     .250     .025       .1       .3                                 -.1
```

Ineffective area between arches is coded out with GR data

```
X1  196.17       20   3061.1     3697      550      450      450
X3      10                                                      4391.5   4391.5
GR    4394     1800     4388     1830     4387     2242     4386     2664     4386     3000
GR    4385   3061.1     4385  3075.25     4385  3126.76     4385     3140     4400     3141
GR    4400     3400     4400     3569     4385   3569.5     4385   3583.5     4385  3683.25
GR    4385  3683.26     4385     3697     4388     3770     4389     3865     4400     4048
```

Proposed Mira Loma Road Extension -- Normal Bridge

Downstream face of Bridge

NC	.04	.04	.016	.3	.5					
	Normal Bridge Routine									
X1	196.37	76	3075.26	3683.26	20	20	20			
X3	10							4391.5	4391.5	
BT	-76	1800	4394	4394	1830	4394	4388	2347	4391.5	4387
BT		2664	4393.6	4386	3000	4395.8	4386	3061.1	4396	4385
BT		3075.25	4396.17	4385	3075.26	4396.17	4389	3077.26	4396.2	4391
BT		3083.25	4396.21	4393	3089.25	4396.22	4391	3091.24	4396.25	4389
BT		3091.25	4396.25	4385	3092	4396.25	4385	3092.01	4396.25	4389
BT		3094	4396.26	4391	3100	4396.29	4393	3106	4396.31	4391
BT		3108	4396.32	4389	3108.01	4396.32	4385	3108.75	4396.32	4385
BT		3108.76	4396.32	4389	3110.75	4396.34	4391	3116.75	4396.37	4393
BT		3124.75	4396.39	4391	3126.75	4396.4	4389	3126.76	4396.41	4385
BT		3140	4396.5	4385	3400	4397.8	4387	3569.5	4396.9	4385
BT		3583.5	4396.7	4385	3583.51	4396.7	4389	3585.5	4396.65	4391
BT		3591.5	4396.6	4393	3597.5	4396.6	4391	3599.5	4396.6	4389
BT		3599.51	4396.6	4385	3600.25	4396.6	4385	3600.26	4396.6	4389
BT		3602.25	4396.6	4391	3608.25	4396.6	4393	3614.25	4396.6	4391
BT		3616.25	4396.6	4389	3616.26	4396.6	4385	3617	4396.6	4385
BT		3617.01	4396.6	4389	3619	4396.5	4391	3625	4396.5	4393
BT		3631	4396.5	4391	3633	4396.5	4389	3633.01	4396.5	4385
BT		3633.75	4396.5	4385	3633.76	4396.5	4389	3635.75	4396.45	4391
BT		3641.75	4396.4	4393	3647.75	4396.4	4391	3649.75	4396.4	4389
BT		3649.76	4396.4	4385	3650.5	4396.4	4385	3650.51	4396.4	4389
BT		3652.5	4396.35	4391	3658.5	4396.3	4393	3664.5	4396.3	4393
BT		3666.5	4396.3	4389	3666.51	4396.3	4385	3667.25	4396.3	4385
BT		3667.26	4396.3	4389	3669.25	4396.2	4391	3675.25	4396.2	4393
BT		3681.25	4396.2	4391	3683.25	4396.2	4389	3683.26	4396.1	4385
BT		3697	4396.1	4385	3770	4397.6	4388	3865	4395.7	4389
BT		4048	4400	4400						
GR	4394	1800	4388	1830	4387	2347	4386	2664	4386	3000
GR	4385	3061.1	4385	3075.25	4385	3075.26	4385	3077.26	4385	3083.25
GR	4385	3089.25	4385	3091.24	4385	3091.25	4385	3092	4385	3092.01
GR	4385	3094	4385	3100	4385	3106	4385	3108	4385	3108.01
GR	4385	3108.75	4385	3108.76	4385	3110.75	4385	3116.75	4385	3124.75
GR	4385	3126.75	4385	3126.76	4385	3140	4387	3400	4385	3569.5
GR	4385	3583.5	4385	3583.51	4385	3585.5	4385	3591.5	4385	3597.5
GR	4385	3599.5	4385	3599.51	4385	3600.25	4385	3600.26	4385	3602.25
GR	4385	3608.25	4385	3614.25	4385	3616.25	4385	3616.26	4385	3617
GR	4385	3617.01	4385	3619	4385	3625	4385	3631	4385	3633
GR	4385	3633.01	4385	3633.75	4385	3633.76	4385	3635.75	4385	3641.75
GR	4385	3647.75	4385	3649.75	4385	3649.76	4385	3650.5	4385	3650.51
GR	4385	3652.5	4385	3658.5	4385	3664.5	4385	3666.5	4385	3666.51
GR	4385	3667.25	4385	3667.26	4385	3669.25	4385	3675.25	4385	3681.25
GR	4385	3683.25	4385	3683.26	4385	3697	4388	3770	4389	3865
GR	4400	4048								

Upstream face of bridge

ET			9.11						3075	3684
X1	196.97	76	3075.26	3683.26	60	60	60			
X3	10							4391.5	4391.5	
BT	-76	1800	4394	4394	1830	4394	4388	2347	4391.5	4387
BT		2664	4393.6	4386	3000	4395.8	4386	3061.1	4396	4385
BT		3075.25	4396.17	4385	3075.26	4396.17	4389	3077.26	4396.2	4391
BT		3083.25	4396.21	4393	3089.25	4396.22	4391	3091.24	4396.25	4389
BT		3091.25	4396.25	4385	3092	4396.25	4385	3092.01	4396.25	4389
BT		3094	4396.26	4391	3100	4396.29	4393	3106	4396.31	4391
BT		3108	4396.32	4389	3108.01	4396.32	4385	3108.75	4396.32	4385
BT		3108.76	4396.32	4389	3110.75	4396.34	4391	3116.75	4396.37	4393
BT		3124.75	4396.39	4391	3126.75	4396.4	4389	3126.76	4396.41	4385
BT		3140	4396.5	4385	3400	4397.8	4387	3569.5	4396.9	4385
BT		3583.5	4396.7	4385	3583.51	4396.7	4389	3585.5	4396.65	4391
BT		3591.5	4396.6	4393	3597.5	4396.6	4391	3599.5	4396.6	4389
BT		3599.51	4396.6	4385	3600.25	4396.6	4385	3600.26	4396.6	4389
BT		3602.25	4396.6	4391	3608.25	4396.6	4393	3614.25	4396.6	4391
BT		3616.25	4396.6	4389	3616.26	4396.6	4385	3617	4396.6	4385
BT		3617.01	4396.6	4389	3619	4396.5	4391	3625	4396.5	4393
BT		3631	4396.5	4391	3633	4396.5	4389	3633.01	4396.5	4385
BT		3633.75	4396.5	4385	3633.76	4396.5	4389	3635.75	4396.45	4391
BT		3641.75	4396.4	4393	3647.75	4396.4	4391	3649.75	4396.4	4389
BT		3649.76	4396.4	4385	3650.5	4396.4	4385	3650.51	4396.4	4389
BT		3652.5	4396.35	4391	3658.5	4396.3	4393	3664.5	4396.3	4393
BT		3666.5	4396.3	4389	3666.51	4396.3	4385	3667.25	4396.3	4385
BT		3667.26	4396.3	4389	3669.25	4396.2	4391	3675.25	4396.2	4393
BT		3681.25	4396.2	4391	3683.25	4396.2	4389	3683.26	4396.1	4385
BT		3697	4396.1	4385	3770	4397.6	4388	3865	4395.7	4389
BT		4048	4400	4400						
GR	4394	1800	4388	1830	4387	2347	4386	2664	4386	3000
GR	4385	3061.1	4385	3075.25	4385	3075.26	4385	3077.26	4385	3083.25
GR	4385	3089.25	4385	3091.24	4385	3091.25	4385	3092	4385	3092.01
GR	4385	3094	4385	3100	4385	3106	4385	3108	4385	3108.01
GR	4385	3108.75	4385	3108.76	4385	3110.75	4385	3116.75	4385	3124.75
GR	4385	3126.75	4385	3126.76	4385	3140	4387	3400	4385	3569.5
GR	4385	3583.5	4385	3583.51	4385	3585.5	4385	3591.5	4385	3597.5
GR	4385	3599.5	4385	3599.51	4385	3600.25	4385	3600.26	4385	3602.25
GR	4385	3608.25	4385	3614.25	4385	3616.25	4385	3616.26	4385	3617
GR	4385	3617.01	4385	3619	4385	3625	4385	3631	4385	3633
GR	4385	3633.01	4385	3633.75	4385	3633.76	4385	3635.75	4385	3641.75
GR	4385	3647.75	4385	3649.75	4385	3649.76	4385	3650.5	4385	3650.51
GR	4385	3652.5	4385	3658.5	4385	3664.5	4385	3666.5	4385	3666.51
GR	4385	3667.25	4385	3667.26	4385	3669.25	4385	3675.25	4385	3681.25
GR	4385	3683.25	4385	3683.26	4385	3697	4388	3770	4389	3865
GR	4400	4048								

Just upstream of bridge
Ineffective areas coded out with NC outside of channel and GR inside

```
NC     .250      .250      .025       .1        .3

         Inneffective area between arches is coded out with GR data

X1   197.17        20    3061.1     3697        20        20        20                .03
X3        10                                                            4391.5    4391.5
GR      4394      1800      4388     1830      4387      2242      4386      2664      4386      3000
GR      4385    3061.1      4385  3075.25      4385    3126.76      4385      3140      4400      3141
GR      4400      3400      4400     3569      4385    3569.5      4385    3583.5      4385   3683.25
GR      4385   3683.26      4385     3697      4388      3770      4389      3865      4400      4048

   Bridge Routine Over


NC         0         0         0       .1        .3
NH         6      .040      1100     .040      1450      .030      1510      .080      1700      .040
NH      2050      .250      2350
ET                 9.1                                                             1100      2100
X1   199.57        20      1700     2050       425       250       250
GR      4395         0      4394       80      4390       250      4389       270      4388       610
GR      4388      1100      4388     1400      4390      1450    4386.8      1475    4386.8      1500
GR      4390      1510      4385     1550      4385      1700      4385      2000      4390      2040
GR      4390      2050    4389.7     2100      4388      2170      4390      2190      4392      2350

NH         6      .045       750     .045      1475      .030      1500      .045      1950       .03
NH    1984.5      .045      2000
ET                 9.1                                                             750       2000
X1   201.57        16      1950    1984.5       225       200       200
GR      4394         0      4392       30      4390       130      4389       150      4388       570
GR      4388       650      4388      750      4388      1200    4387.2      1475    4387.5      1500
GR    4387.1      1650      4390     1950    4387.5      1970    4387.5      1984      4392    1984.5
GR      4400      2000

NH         6      .045       650     .045      1475      .030      1500      .045      1950      .030
NH    1984.5      .045      2000
ET                 9.1                                                             650       2000
X1   202.07         0         0        0        50        50        50

NH         6      .045       450     .045      1490      .030      1530      .045      1900      .030
NH      1990      .045      2030
ET                 9.1                                                             450       2030
X1   202.47        22      1900     1990        40        40        40
GR      4393         0      4392       20      4391        50      4391       200      4390       250
GR      4390       450      4390      620      4388       660      4389       670      4388       800
GR      4390       860      4390     1140      4389      1160      4389      1400      4388      1490
GR      4388      1530      4389     1630      4390      1900      4389      1970      4389      1989
GR      4392      1990      4400     2030
```

```
NC       0        0        0       .1       .3
NH       5     .045     3492     .03     3624     .045     3842     .03     3878     .045
NH    3964
ET             9.1                                                          1050     3964
X1  205.67       29     3842     3878      270      425      425
GR  4394.5       0.   4393.7      92.   4396.2     163.   4394.0     198.   4393.7     457.
GR  4396.9     535.   4396.1     912.   4393.0     981.   4393.7    1050.   4394.7    1141.
GR  4393.7    1413.   4390.9    1427.   4396.7    1439.   4392.8    1612.   4394.0    1730.
GR  4390.4    2105.   4387.9    2156.   4390.2    2207.   4388.2    3492.   4386.0    3556.
GR  4388.3    3624.   4387.7    3778.   4389.7    3827.   4395.0    3842.   4390.5    3856.
GR  4390.5    3876.   4390.5    3877.   4393.0    3878.   4413.0    3964.

NC    .030     .030     .025       .1       .3
X1  217.39       16     1807     1841     1250     1172     1172
GR  4402.7        0   4400.7      101   4397.6      137   4393.0      327   4394.0      400
GR  4389.0     412.   4389.0      422.   4393.5      442.   4391.8      869.   4392.9     1023.
GR  4392.0    1512.   4395.0     1807.   4391.2     1827.   4395.7     1841.   4402.5     1886.
GR  4435.4    1975

X1  224.98       23     3150     3211     1160      759      759
GR  4413.7        0.   4402.9      109.   4406.4      122.   4404.4      174.   4409.2      383.
GR  4405.9     433.   4398.2      889.   4401.4      901.   4392.7      930.   4398.3      945.
GR  4397.0     972.   4394.3      983.   4396.5     1024.   4395.1     1816.   4395.8     2679.
GR  4394.9    2840.   4395.3     3109.   4399.7     3150.   4392.6     3162.   4402.1     3211.
GR  4417.2    3263.   4436.9     3315.   4450.6     3366.

X1  235.23       19     1716     1755      960     1025     1025
GR  4426.8        0.   4412.6       35.   4404.6       43.   4409.0       55.   4404.3       67.
GR  4404.4       88.   4400.3       98.   4395.7      104.   4398.8      129.   4398.7      501.
GR  4400.1      659.   4398.7      824.   4400.3     1302.   4400.2     1594.   4401.8     1716.
GR  4398.1     1727.   4398.1     1739.   4403.3     1755.   4429.2     1868.
```

SECNO	DEPTH	CUSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 155.570

3265 DIVIDED FLOW

155.570	10.25	4391.25	.00	4391.25	4391.25	.00	.00	.00	4386.00
5000.0	3714.7	879.6	405.7	15241.8	1438.8	1913.7	.0	.0	4386.00
.00	.24	.61	.21	.037	.025	.045	.000	4381.00	1664.25
.000005	1700.	2065.	2065.	0	0	0	.00	5886.38	7582.50

1490 NH CARD USED
*SECNO 169.570

169.570	9.26	4391.26	.00	.00	4391.26	.00	.01	.00	4388.00
5000.0	3961.3	688.8	349.9	14799.4	1271.1	1776.9	470.8	139.7	4386.00
1.06	.27	.54	.20	.036	.025	.045	.000	4382.00	2111.86
.000005	1070.	1380.	1390.	0	0	0	.00	5080.71	7192.57

1490 NH CARD USED
*SECNO 180.570

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .58

180.570	8.26	4391.26	.00	.00	4391.27	.00	.01	.00	4388.00
5000.0	4028.9	792.6	178.5	9888.2	886.5	522.1	833.9	247.6	4386.00
1.68	.41	.89	.34	.040	.025	.045	.000	4383.00	2621.19
.000016	1090.	1060.	1060.	0	0	0	.00	3572.78	6562.63

1490 NH CARD USED
*SECNO 189.070

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .37

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3470 ENCROACHMENT STATIONS= 3860.0 4970.0 TYPE= 1 TARGET= 1110.000

189.070	7.27	4391.27	.00	.00	4391.30	.03	.03	.01	4388.00
5000.0	3307.4	1692.6	.0	3579.4	759.9	.0	987.4	294.4	100000.00
1.85	.92	2.23	.00	.040	.025	.000	.000	4384.00	3860.00
.000113	890.	640.	640.	0	0	0	.00	1110.00	4970.00

CCHV= .100 CEHV= .300
*SECNO 196.170

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .53

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 4391.50 ELREA= 4391.50

Inneffective area between arches is coded out with GR data

196.170	6.22	4391.22	.00	.00	4391.46	.23	.09	.06	4385.00
5000.0	.0	5000.0	.0	.0	1286.6	.0	1020.6	302.3	4385.00
1.88	.00	3.89	.00	.000	.025	.000	.000	4385.00	3061.10
.000403	550.	450.	450.	2	0	0	.00	207.02	3697.00

CCHV= .300 CEHV= .500
*SECNO 196.370

3370 NORMAL BRIDGE, NRD= 76 MIN ELTRD= 4391.50 MAX ELLC= 4393.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 4391.50 ELREA= 4391.50

Normal Bridge Routine

196.370	6.08	4391.08	.00	.00	4391.62	.54	.01	.15	4385.00
5000.0	.0	5000.0	.0	.0	850.6	.0	1021.0	302.5	4385.00
1.88	.00	5.88	.00	.000	.016	.000	.000	4385.00	3075.26
.000585	20.	20.	20.	2	0	0	-2501.99	608.00	3683.26

SECNO	DEPTH	CHSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 196.970

3370 NORMAL BRIDGE, NRD= 76 MIN ELTRD= 4391.50 MAX ELLC= 4393.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 4391.50 ELREA= 4391.50

196.970	6.12	4391.12	.00	.00	4391.66	.53	.04	.00	4385.00
5000.0	.0	5000.0	.0	.0	854.2	.0	1022.2	303.3	4385.00
1.89	.00	5.85	.00	.000	.016	.000	.000	4385.00	3075.26
.000584	60.	60.	60.	1	0	0	-2519.62	608.00	3683.26

CCHV= .100 CEHV= .300
*SECNO 197.170

3265 DIVIDED FLOW

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 4391.50 ELREA= 4391.50

Inneffective area between arches is coded out with GR data

197.170	6.45	4391.48	.00	.00	4391.70	.22	.01	.03	4385.03
5000.0	.0	5000.0	.0	.0	1333.2	.0	1022.7	303.5	4385.03
1.89	.00	3.75	.00	.000	.025	.000	.000	4385.03	3061.10
.000359	20.	20.	20.	2	0	0	.00	207.04	3697.00

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 199.570

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.88

3470 ENCROACHMENT STATIONS= 1100.0 2100.0 TYPE= 1 TARGET= 1000.000

199.570	6.75	4391.75	.00	.00	4391.77	.02	.05	.02	4385.00
5000.0	2170.2	2821.3	8.5	2684.0	2211.3	94.8	1046.3	308.2	4390.00
1.96	.81	1.28	.09	.053	.040	.250	.000	4385.00	1100.00
.000101	425.	250.	250.	2	0	0	.00	1000.00	2100.00

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 201.570

3470 ENCROACHMENT STATIONS= 750.0 2000.0 TYPE= 1 TARGET= 1250.000

201.570	4.68	4391.78	.00	.00	4391.79	.02	.03	.00	4390.00
5000.0	4834.6	165.4	.0	4608.4	121.7	.0	1070.7	313.8	4392.00
2.02	1.05	1.36	.00	.044	.030	.000	.000	4387.10	750.00
.000162	225.	200.	200.	1	0	0	.00	1234.48	1984.48

1490 NH CARD USED
*SECNO 202.070

3470 ENCROACHMENT STATIONS= 650.0 2000.0 TYPE= 1 TARGET= 1350.000

202.070	4.69	4391.79	.00	.00	4391.80	.02	.01	.00	4390.00
5000.0	4846.5	153.5	.0	4982.5	121.6	.0	1076.3	315.3	4392.00
2.03	.97	1.26	.00	.044	.030	.000	.000	4387.10	650.00
.000140	50.	50.	50.	0	0	0	.00	1334.48	1984.48

1490 NH CARD USED
*SECNO 202.470

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .61

3470 ENCROACHMENT STATIONS= 450.0 2030.0 TYPE= 1 TARGET= 1580.000

202.470	3.79	4391.79	.00	.00	4391.81	.03	.01	.00	4390.00
5000.0	4634.0	366.0	.0	3657.7	214.7	.0	1080.4	316.6	4392.00
2.04	1.27	1.70	.00	.044	.030	.000	.000	4388.00	450.00
.000382	40.	40.	40.	0	0	0	.00	1539.93	1989.93

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 205.670

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.52

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3470 ENCROACHMENT STATIONS= 1050.0 3964.0 TYPE= 1 TARGET= 2914.000

205.670	5.87	4391.87	.00	.00	4391.88	.01	.07	.00	4395.00
5000.0	4977.0	23.0	.0	5222.8	32.2	.0	1109.2	327.5	4393.00
2.12	.95	.72	.00	.042	.030	.000	.000	4386.00	1422.13
.000165	270.	425.	425.	1	0	0	.00	1914.53	3877.55

CCHV= .100 CEHV= .300
*SECNO 217.390

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

217.390	4.17	4393.17	4393.17	.00	4393.65	.48	.67	.14	4395.00
5000.0	4888.1	111.9	.0	883.7	16.2	.0	1197.4	371.9	4395.70
2.19	5.53	6.89	.00	.030	.025	.000	.000	4389.00	320.00
.014284	1250.	1172.	1172.	20	13	0	.00	1176.37	1833.13

*SECNO 224.980

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.62

224.980	4.11	4396.71	.00	.00	4396.77	.06	3.07	.04	4399.70
5000.0	4823.4	176.6	.0	2573.7	57.7	.0	1244.1	416.6	4402.10
2.35	1.87	3.06	.00	.030	.025	.000	.000	4392.60	916.65
.001089	1160.	759.	759.	11	0	0	.00	2201.09	3183.18

*SECNO 235.230

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

235.230	4.21	4399.91	4399.91	.00	4400.37	.46	2.44	.12	4401.80
5000.0	4755.5	244.5	.0	901.9	31.7	.0	1283.5	452.7	4403.30
2.40	5.27	7.71	.00	.030	.025	.000	.000	4395.70	98.50
.011299	960.	1025.	1025.	20	9	0	.00	1068.54	1744.58

THIS RUN EXECUTED 31JAN91 14:37:03

****
HEC-2 WATER SURFACE PROFILES

Version 4.5.1; September 1990
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

Steamboat Creek

SUMMARY PRINTOUT

	SECNO	Q	TOPWID	SSTA	ENDST	CWSEL	DIFWSP	AREA	VCH
	155.570	5000.00	5886.38	1664.25	7582.50	4391.25	.00	18594.29	.61
	169.570	5000.00	5080.71	2111.86	7192.57	4391.26	.00	17847.45	.54
*	180.570	5000.00	3572.78	2621.19	6562.63	4391.26	.00	11296.86	.89
*	189.070	5000.00	1110.00	3860.00	4970.00	4391.27	.00	4339.29	2.23
*	196.170	5000.00	207.02	3061.10	3697.00	4391.22	.00	1286.60	3.89
	196.370	5000.00	608.00	3075.26	3683.26	4391.08	.00	850.56	5.88
	196.970	5000.00	608.00	3075.26	3683.26	4391.12	.00	854.18	5.85
	197.170	5000.00	207.04	3061.10	3697.00	4391.48	.00	1333.20	3.75
*	199.570	5000.00	1000.00	1100.00	2100.00	4391.75	.00	4990.08	1.28
	201.570	5000.00	1234.48	750.00	1984.48	4391.78	.00	4730.10	1.36
	202.070	5000.00	1334.48	650.00	1984.48	4391.79	.00	5104.06	1.26
*	202.470	5000.00	1539.93	450.00	1989.93	4391.79	.00	3872.42	1.70
*	205.670	5000.00	1914.53	1422.13	3877.55	4391.87	.00	5254.97	.72
*	217.390	5000.00	1176.37	320.00	1833.13	4393.17	.00	899.91	6.89
*	224.980	5000.00	2201.09	916.65	3183.18	4396.71	.00	2631.44	3.06
*	235.230	5000.00	1068.54	98.50	1744.58	4399.91	.00	933.60	7.71

Steamboat Creek

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	155.570	.00	.00	.00	4381.00	5000.00	4391.25	.00	4391.25	.05	.61	18594.29	21394.60
	169.570	1380.00	.00	.00	4382.00	5000.00	4391.26	.00	4391.26	.05	.54	17847.45	21726.08
*	180.570	1060.00	.00	.00	4383.00	5000.00	4391.26	.00	4391.27	.16	.89	11296.86	12566.06
*	189.070	640.00	.00	.00	4384.00	5000.00	4391.27	.00	4391.30	1.13	2.23	4339.29	4704.07
*	196.170	450.00	.00	.00	4385.00	5000.00	4391.22	.00	4391.46	4.03	3.89	1286.60	2491.09
	196.370	20.00	4391.50	4393.00	4385.00	5000.00	4391.08	.00	4391.62	5.85	5.88	850.56	2067.05
	196.970	60.00	4391.50	4393.00	4385.00	5000.00	4391.12	.00	4391.66	5.84	5.85	854.18	2068.66
	197.170	20.00	.00	.00	4385.03	5000.00	4391.48	.00	4391.70	3.59	3.75	1333.20	2639.66
*	199.570	250.00	.00	.00	4385.00	5000.00	4391.75	.00	4391.77	1.01	1.28	4990.08	4972.98
	201.570	200.00	.00	.00	4387.10	5000.00	4391.78	.00	4391.79	1.62	1.36	4730.10	3929.08
	202.070	50.00	.00	.00	4387.10	5000.00	4391.79	.00	4391.80	1.40	1.26	5104.06	4226.63
*	202.470	40.00	.00	.00	4388.00	5000.00	4391.79	.00	4391.81	3.82	1.70	3872.42	2557.88
*	205.670	425.00	.00	.00	4386.00	5000.00	4391.87	.00	4391.88	1.65	.72	5254.97	3897.20
*	217.390	1172.00	.00	.00	4389.00	5000.00	4393.17	4393.17	4393.65	142.84	6.89	899.91	418.35
*	224.980	759.00	.00	.00	4392.60	5000.00	4396.71	.00	4396.77	10.89	3.06	2631.44	1514.87
*	235.230	1025.00	.00	.00	4395.70	5000.00	4399.91	4399.91	4400.37	112.99	7.71	933.60	470.38

Steamboat Creek

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CUSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	155.570	5000.00	4391.25	.00	.00	.00	5886.38	.00
	169.570	5000.00	4391.26	.00	.01	.00	5080.71	1380.00
*	180.570	5000.00	4391.26	.00	.01	.00	3572.78	1060.00
*	189.070	5000.00	4391.27	.00	.01	.00	1110.00	640.00
*	196.170	5000.00	4391.22	.00	-.05	.00	207.02	450.00
	196.370	5000.00	4391.08	.00	-.14	.00	608.00	20.00
	196.970	5000.00	4391.12	.00	.04	.00	608.00	60.00
	197.170	5000.00	4391.48	.00	.35	.00	207.04	20.00
*	199.570	5000.00	4391.75	.00	.27	.00	1000.00	250.00
	201.570	5000.00	4391.78	.00	.03	.00	1234.48	200.00
	202.070	5000.00	4391.79	.00	.01	.00	1334.48	50.00
*	202.470	5000.00	4391.79	.00	.00	.00	1539.93	40.00
*	205.670	5000.00	4391.87	.00	.08	.00	1914.53	425.00
*	217.390	5000.00	4393.17	.00	1.30	.00	1176.37	1172.00
*	224.980	5000.00	4396.71	.00	3.54	.00	2201.09	759.00
*	235.230	5000.00	4399.91	.00	3.21	.00	1068.54	1025.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 180.570 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 189.070 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 196.170 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 199.570 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

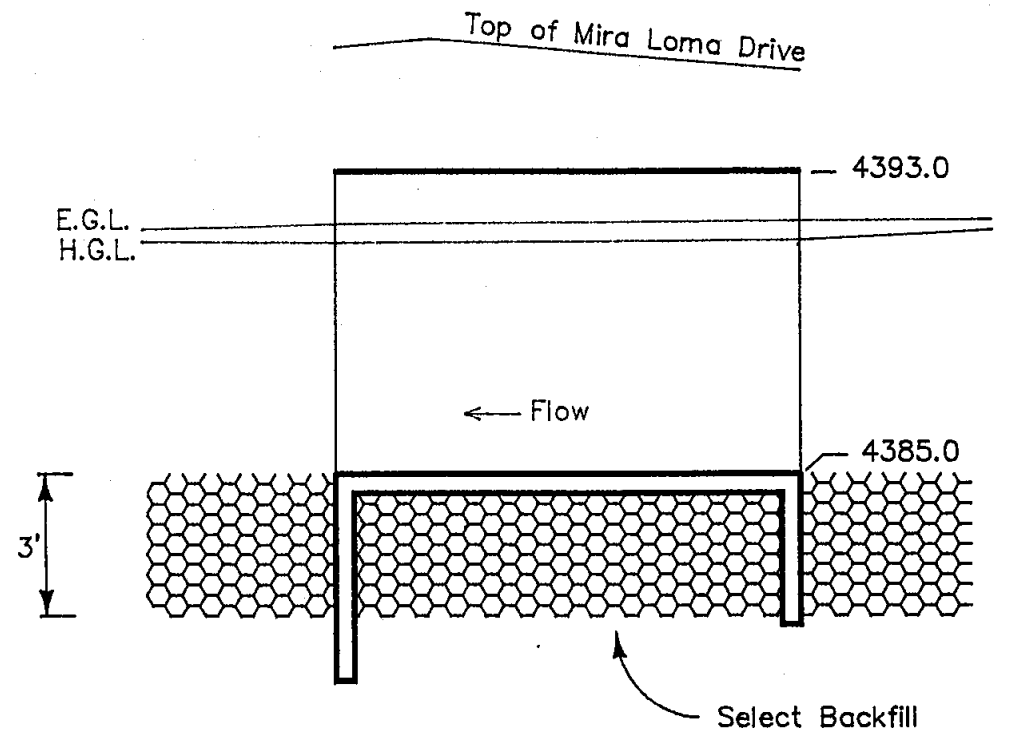
WARNING SECNO= 202.470 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 205.670 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 217.390 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 217.390 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 217.390 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO= 224.980 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 235.230 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 235.230 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 235.230 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL



Scale :
Horizontal : 1" = 20'
Vertical : 1" = 5'

Typical Arch Section

Nimbus Engineers

Profile Through Bridge

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(702) 689-8630

JOB 9006
SHEET NO. 1 OF 4
CALCULATED BY PMF DATE 2/5/91
CHECKED BY DATE
SCALE MIRA LOMA SCOUR

SCOUR ANALYSIS

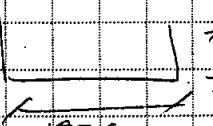
MIRA LOMA DRIVE EXT

BASED ON "METHOD OF TRACTIVE FORCE"
(REFERENCE 1, AND 12)

COURSE, NONCOHESIVE MATERIAL
SLIGHTLY TO MODERATELY ANGULAR

UNIT TRACTIVE FORCE

$T_o = WRS$ CRITICAL SECTION



$W = 62.4$ LB/FT^3
$R = 700/114 = 6.14$
$S = .0006$ (FROM H&R-2)

$T_o = 0.23$ → CRITICAL T_o ON LEVEL BOTTOM
(SIDES ARE WINGWALLS)

MINIMUM FACTOR OF SAFETY = 2.0

$$T_o = 0.46 \text{ LB/FT}^2$$

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JOB 9006
SHEET NO. 2 OF 4
CALCULATED BY ____ DATE ____
CHECKED BY PMF DATE 2/5/91
SCALE ____

MINIMUM D_{75} TO WITHSTAND

$\tau_o = 0.46$ LB/FT²

FIG 7-10 CHOW (U.S.B.R.)

$D_{75\ MIN} = 30$ mm
$= 1.2$ IN. DIA

i.e. 25% RIP RAP MUST BE LARGER THAN 1.2" DIA - AND MEET "SUGGESTED GRADATION OF RIP RAP" (SIMONS, LI + ASSOC.)

SCOUR DEPTH (MAX.)

$V_c = 18.4 D_s^{1/2}$

ASSUME $V_c = 6$ FPS

$D_s = 0.11$ ft. $= 1.28$"
$= 32.4$ mm

$\Delta Z = \frac{2(D_s)}{P_c}$ P_c = % COMPSER = 0.25 MINIMUM

$= \frac{2(1.28)}{.25} = 10.2$"

$\Delta Z = 0.85'$ MAX.

APRON DEPTH O.K. (3')

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JOB 9006
SHEET NO. 3 OF 4
CALCULATED BY PMF DATE 2/5/91
CHECKED BY DATE
SCALE

LOCAL PIER SCOUR

$$\frac{d_s}{d_1} = 2.2\left(\frac{b}{d_1}\right)^{0.65} Fr_1^{0.43}$$

Pier b = .75
u/s D $d_1 = 7$
$Fr = V/\sqrt{gd} = 4/\sqrt{32.2(7)} = 0.4$

$$d_s = 7\left(2.2\left(\frac{.75}{7}\right)^{0.65} .4^{(.43)}\right)$$

$$d_s = 2.43'$$

FOR ALL SDA @ INCIPIENT MOTION - CONSERVATIVE

∴ CUT-OFF WALLS ARE ADEQUATE

12.8.4 Riprap Gradation and Placement

Riprap gradation should follow a smooth size distribution curve such as that shown in Figure 12.25. The ratio of maximum size to median size D_{50} should be approximately two and the ratio between median size and the 20 percent size should also be about two. This means that the largest stones would be 6.5 times the weight of the median size and small sizes would range down to gravels. Representative rock size D for the gradation shown in Figure 12.25 is 1.25 times the median rock size, D_{50}, which is approximately equal to the D_{67} .

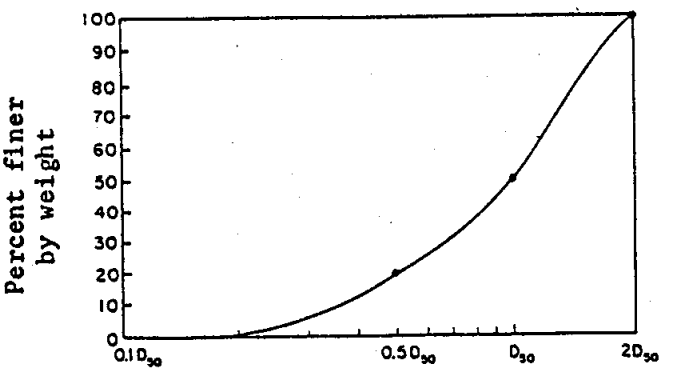

Figure 12.25. Suggested gradation for riprap.

With a distributed size range, the interstices formed by larger stones are filled with smaller sizes in an interlocking fashion, preventing formation of open pockets. Riprap consisting of angular stones is more suitable than that consisting of rounded stones. Control of the gradation of the riprap is almost always made by visual inspection.

If it is necessary, poor gradations of rock can be employed as riprap provided the proper filter is placed between the riprap and the bank of bed material. Representative grain size of riprap is approximately D_{67} and the filter is designed in accordance with the criteria given in the next section.

Riprap placement is usually accomplished by dumping directly from trucks. If riprap is placed during

– Ref. 12