LOCAL-SCOUR ANALYSIS
FOR
NORTHERN AVENUE BRIDGE
AT NEW RIVER

sla

sla

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Dennis L. Richards, P.E.
Assistant Vice President

October 10, 1989

Mr. Lee Arnold
BRW, Inc.
2700 North Central Avenue
Suite 1000
Phoenix, AZ 85004

RE: DRAFT REPORT FOR THE LOCAL-SCOUR ANALYSIS FOR NORTHERN AVENUE BRIDGE AT NEW RIVER

Dear Lee:

Transmitted with this letter are four copies of the draft report for the local-scour analysis for the Northern Avenue Bridge at New River. The report provides local-scour estimates for a four-span structure with three columns per pier, and a three-span structure with four columns per pier. Each configuration was analyzed assuming columns five feet in diameter, and was analyzed both with and without consideration for debris buildup.

We appreciate having the opportunity to work with you on this project. If you have any questions or need additional information regarding this report, please call.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

Dennis L. Richards

Dennis L. Richards, P.E.
Vice President

DRAFT

LOCAL-SCOUR ANALYSIS FOR NORTHERN AVENUE BRIDGE AT NEW RIVER

Prepared For:

BRW, INC.
2700 North Central Avenue
Suite 1000
Phoenix, Arizona 85004

Prepared By:

SIMONS, LI & ASSOCIATES
4600 South Mill Avenue
Tempe, Arizona 85282

October 1989

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21590
DENNIS L. RICHARDS
Date Signed 10/9/89
ARIZONA, U.S.A.

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CERTIFICATE NO. 21560
DENNIS RICHARDS
Date Signed 10/9/89
ARIZONA, U.S.A.

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I. INTRODUCTION

BRW, Inc. was retained by the Flood Control District of Maricopa County to design the Northern Avenue Bridge at the New River. As a subconsultant to BRW, Inc., Simons, Li & Associates, Inc. (SLA), was responsible (1) for conducting the local-scour analysis required for the design of the new bridge; and (2) for verifying the scour analysis for other scour components to determine if the proposed toe-downs on the soil-cement bank protection, as proposed by others, are adequate.

Design plans for the channelization of a reach of the New River, which includes Northern Avenue, have recently been completed by Coe & Van Loo Consulting Engineers, Inc. (CVL). The plans provide for the construction of flood-control improvements to convey the Standard Project Flood (SPF) along the New River from Olive Avenue south to Bethany Home Road. The proposed channel will be trapezoidal in section, with a bottom width of 325 feet and an earthen invert. The channel banks will be soil cement, 8-foot in thickness, with sideslopes of 1:1.

II. HYDRAULIC ANALYSIS

The primary purpose of the hydraulic analysis was to establish hydraulic parameters to be used for the prediction of the local-scour depth. The U.S. Army Corps of Engineers (COE) HEC-2 Water Surface Profile Program (1) was used to perform the rigid-boundary hydraulic analysis.

A hydraulic analysis was conducted for both the 100-year flood event and the SPF event. Discharges used in the hydraulic analysis were the values used by CVL in their analysis for the New River Channelization project (2). The peak discharges used were 41,000 cfs for the 100-year event and 69,000 cfs for the SPF event.

The Flood Control District of Maricopa County furnished HEC-2 data files developed in conjunction with the New River Channelization project. Cross section data and Manning's roughness values were reviewed, and appropriate data files used for the hydraulic analysis. Initially, water-surface-profile computations were conducted using CVL's preliminary bridge configuration at Northern Avenue. This was done to confirm that the data files were providing results similar to the results obtained by CVL for the channelization design project.

Two bridge configurations were analyzed for the proposed Northern Avenue bridge. The first was a four-span structure with three columns per pier, each column five feet in diameter. The second was a three-span structure with four columns per pier. In each case, the structure was 393-feet in length and the columns were five feet in diameter. Each bridge configuration was analyzed both with and without consideration for debris buildup. Bridge-loss calculations for the proposed Northern Avenue bridge at New River were performed using the special-bridge routine of HEC-2. Detailed HEC-2 results are provided within Appendix A of this report.

III. SCOUR ANALYSIS

3.1 Local Scour

To assess the total scour potential of the channel bed at the bridge site, local scour due to the presence of bridge piers and debris in the flow field must be considered. Debris can increase local scour by increasing effective width at the piers. Therefore, an effective pier width greater than the actual pier width was used in the local-scour analysis to account for debris buildup.

The selection of an effective pier width to be used for debris buildup is not well documented, and is therefore based largely upon experience and engineering judgement. SLA met with FCD staff on September 28, 1989, to discuss FCD criteria and/or guidelines for evaluating local scour with debris buildup. Although the FCD has no rigid criteria for evaluating debris buildup, guidelines generally applied are to use either two (2) feet of overhang on each side of the pier or three times the pier diameter, whichever is greater. However, based upon our evaluation of the debris potential of the watershed contributing to New River, and the fact that the design pier diameter is large at five feet, it is felt that three times the pier diameter would be too excessive for use as an effective pier width in this instance. Therefore, local scour was estimated based upon an effective pier width of two times the pier diameter, or an effective pier width of ten feet.

Local scour was estimated for the proposed bridge configurations, with five-foot-diameter pier columns, using the CSU equation (3). Estimates were made both with and without consideration for debris buildup, and both the 100-year and SPF flood events were evaluated. Table 1 provides a summary of local-scour estimates for these various configurations. Scour computations are included in Appendix B.

NOT SUFFIENT INFO TO CALCULATE SCOUR NEED d_{50} OF MATL and/or V_c

TABLE 1. LOCAL-SCOUR ESTIMATES FOR NORTHERN AVENUE BRIDGE

Bridge Configuration	Discharge (cfs)	Flow Depth (ft)	Average Velocity (fps)	Pier Scour (ft)
3 span/4 column (w/o debris)	41,000	11.2	10.9	10.5
" " "	69,000	15.3	13.3	11.9
3 span/4 column (w/ debris)	41,000	11.4	10.7	16.3
" " "	69,000	15.7	12.9	18.5
4 span/3 column (w/o debris)	41,000	11.3	10.8	10.4
" " "	69,000	15.5	13.1	11.8
4 span/3 column (w/ debris)	41,000	11.7	10.4	16.2
" " "	69,000	16.1	12.6	18.3

3.2 Other Scour Components

Task 3 of SLA's Scope of Work was to review/verify the sediment-transport analyses for general scour/deposition and other scour components determined by others. This verification was to consist of reviewing the scour computations and procedures conducted by Coe & Van Loo for this reach of the New River, and to verify the soil-cement bank protection toe-down depths. The toe-down depths recommended for the soil-cement bank protection should be the sum of various applicable scour components, and should include an appropriate safety factor.

The total potential vertical movement of the channel bed should consider the magnitude of the contribution from each of the following components:

1. General scour/deposition.
2. Bed forms.
3. Bend scour.
4. Low-flow incisement.
5. Local scour.
6. Long-term channel degradation/aggradation.

The sum of these six components should equal the total aggradation/degradation response of the river bed during a long-term period within which a design flood may occur. A safety factor should be applied to the above scour components to account for the non-uniform flow distribution that is typical of alluvial channels.

A thorough review of the report titled, "Design Report for the New River Channelization, Bethany Home Road to Olive Avenue," (2) was conducted, and the only scour component documented was the maximum computed general-scour depth. In the vicinity of the proposed Northern Avenue bridge, a depth of 1.2 feet for the SPF event was computed by CVL using the FLUVIAL-12 computer model. With regard to toe-down depths, the report states the following: "Based on the sediment transport analysis and the anticipated long-term hydraulic characteristics of the channel, two toe-down depths were specified for the soil cement banks in the New River Channelization Design Plans. In locations subject to high velocities and turbulence (such as along the outside of bends, downstream of drop structures, and in channel transitions), the toe-down depth was specified as 15 to 20 feet below channel invert. Otherwise, the toe-down depth was specified as 10 feet below channel invert."

We concur with the results of the CVL FLUVIAL-12 analysis which predicts that the general scour in this reach of the New River will be 1.2 feet during the SPF event. However, since general scour is the only scour component provided in the documentation, we are unable to verify the toe-down depths provided for the New River Channelization project simply on this basis alone. This is because, as noted above, general scour/deposition is only one component of a very complex scour process.

However, the scour components due to bed forms and bend scour can be computed based upon the hydraulic parameters obtained in the HEC-2 analysis. No component should be included for bend scour, since the only channel bend in the vicinity of the Northern Avenue bridge occurs downstream of the bridge, and does not affect the bridge reach.

There is the potential for significant antidune formation during the SPF

event. Antidunes are sand waves that develop in the channel bed, either singly or in trains, and are in phase with, and strongly interact with water-surface waves. For a maximum velocity of 14.6 fps for the SPF event, the antidune wave height, h_a, from crest to trough should be about 5.8 feet. These waves are in phase with the movement of sand waves along the channel bed. The troughs of these waves are depressed below the normal, dry bed elevation of the channel. Accordingly, half the antidune wave height (1/2 h_a) or 2.9 feet is subtracted from the bed elevation for scour calculations. Antidune wave height computations are included in Appendix B.

During the passage of small magnitude flows, a low-flow channel can develop that provides hydraulically more efficient conveyance of these smaller discharges. The hydraulic conditions of a low-flow channel are entirely different than those associated with the primary channel geometry. Based upon experience and engineering judgement, it is recommended that a value of 1.5 feet be included for low-flow channel incisement.

Adding the above components, and multiplying them by a safety factor of 1.30 for the SPF event, yields a toe-down estimate of 7.3, say 8.0 feet. This value is below CVL's recommendations of 10 feet in locations not subject to high velocities and turbulence, and their values of 15 to 20 feet in locations subject to high velocities and turbulence. Therefore, based on our independent analysis it appears the toe-down values recommended by CVL are adequate for protection against short-term, single-event scour along the subject reach of the New River.

The preceding values do not account for long-term degradation/aggradation. To quantitatively establish this scour component, a detailed river-mechanics analysis would be required. Such work is outside the scope of services for this project.

IV. CONCLUSIONS & RECOMMENDATIONS

General scour is the only scour component provided in CVL's documentation for the New River Channelization Project. No other information is provided concerning their selection of final toe-down values. However, bed forms and bend scour have been estimated by SLA using the hydraulic parameters obtained from HEC-2, and a value for low-flow incisement has been selected based upon engineering experience. These values, including general scour and a 1.30 factor of safety, total 7.3 feet; which is less than CVL's final toe-down values, which vary from 10 to 20 feet in depth.

A detailed river-mechanics analysis of the New River system would be required to determine long-term degradation, and such a study is outside the scope of work for this project. Therefore, the adequacy of CVL's final toe-down values for long-term conditions cannot be verified at this time.

The total scour depth at any given point is the sum of the local scour, general scour, bedform trough depths, bend scour, low-flow channel incisement, and long-term degradation. To account for the non-uniform flow distribution that is typical of alluvial channels, a safety factor of 1.30 is included for the SPF. The piers are located far enough away from the channel bank that the zone of influence for pier scour will not impact the toe-down depths of the bank protection. Table 2 presents a summary of the total-scour depth at the piers, and the total-scour depths at the bank for the SPF event. The local-scour depth included in Table 2 is for a four-span structure with three columns per pier, and with consideration for debris buildup. It is recommended that, as a minimum, these scour values be used when designing the foundation for the proposed Northern Avenue Bridge at New River.

TABLE 2. PREDICTED SUMMARY OF TOTAL SCOUR FOR SPF EVENT AT NORTHERN AVENUE BRIDGE

Scour Component	Scour at Pier (ft)	Scour at Bank (ft)
Local scour	18.3	NA
General scour	1.2	1.2
Bed forms	2.9	2.9
Bend scour	NA	NA
Low-flow incisement	1.5	1.5
Safety factor	7.2	1.7
TOTAL SCOUR	31.1 (Say 31.0)	7.3 (Say 8.0)

V. REFERENCES

1. U. S. Army Corps of Engineers, Water Resources Support Center, "HEC-2 Water Surface Profiles," Computer Program 723-X6-L202A, September 1982.

2. Coe & Van Loo Consulting Engineers, Inc., "Design Report for the New River Channelization, Bethany Home Road to Olive Avenue," March 1989.

3. Federal Highway Administration, "Highways in the River Environment, Hydraulic and Environmental Design Considerations," May 1975.

APPENDIX A

HEC-2 MODELING RESULTS

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*  WATER SURFACE PROFILES                          *
*  VERSION OF NOVEMBER 1976                        *
*  UPDATED MAY 1984                                *
*  IBM-PC-XT VERSION AUGUST 1985                   *
*  RUN DATE  10-09-89   TIME  08:45:26               *
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*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616             *
   *  (916) 440-2105 (FTS) 448-2105
****************************************
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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
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Northern Avenue at New River near Phoenix, Arizona Base Flood Elevations from Coe & Van Loo Design Report March 1989

THIS RUN EXECUTED 10-09-89

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
*****************************************************
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THIS IS AN ARCHIVAL RUN ALL DATA AND RESULTS ARE SAVED ON UNIT   96

AC
T1              SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2        100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3       (NRBFE.DAT)   BASELINE DATA FROM CVL CHANNELIZATION PLANS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

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J2  NPROF    IPLOT    PRFVS    XSECV    XSECH     FN      ALLDC    IBW     CHNIM    ITRACE

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J3  VARIABLE CODES FOR SUMMARY PRINTOUT

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X1   123.000    10.000   297.000   703.000      .000      .000      .000      .000      .000      .000
GR  1068.600   297.000  1051.000   315.000  1051.000   368.000  1051.000   421.000  1051.000   500.000
GR  1051.000   527.000  1051.000   580.000  1051.000   633.000  1051.000   685.000  1068.600   703.000

X1   130.900     5.000   300.000   700.000   790.000   790.000   790.000      .000      .000      .000
GR  1067.600   300.000  1052.600   315.000  1052.600   500.000  1052.600   685.000  1067.600   700.000

X1   137.900     5.000   300.000   700.000   700.000   700.000   700.000      .000      .000      .000
GR  1069.000   300.000  1054.000   315.000  1054.000   500.000  1054.000   685.000  1069.000   700.000

X1   144.850     5.000   300.000   700.000   700.000   700.000   700.000      .000      .000      .000
GR  1070.400   300.000  1055.400   315.000  1055.400   500.000  1055.400   685.000  1070.400   700.000

X1   147.100    10.000   319.000   681.000   225.000   225.000   225.000      .000    -1.350      .000
GR  1075.500   319.000  1057.200   337.500  1057.200   383.000  1057.200   430.000  1057.200   476.000
GR  1057.200   500.000  1057.200   568.000  1057.200   614.000  1057.200   662.500  1075.500   681.000
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X1	154.000	10.000	319.000	681.000	690.000	690.000	690.000	.000	.000	.000
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GR	1057.200	500.000	1057.200	568.000	1057.200	614.000	1057.200	662.500	1075.500	681.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	157.830	5.000	321.500	678.500	385.000	385.000	385.000	.000	.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
X1	159.450	5.000	319.000	681.000	162.000	162.000	162.000	.000	.000	.000
GR	1076.800	319.000	1058.300	337.500	1058.300	500.000	1058.300	662.500	1076.800	681.000
SB	1.050	1.560	2.900	388.000	325.000	21.000	6322.000	1.000	1058.460	1058.300
X1	160.250	5.000	319.000	681.000	80.000	80.000	80.000	.000	.000	.000
X2	.000	.000	1.000	1078.000	1082.000	.000	.000	1.330	.000	.000
GR	1077.000	319.000	1058.460	337.500	1058.460	500.000	1058.460	662.500	1077.000	681.000
X1	167.800	5.000	321.500	678.500	755.000	755.000	755.000	.000	2.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
NC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
X1	169.800	5.000	325.000	675.000	200.000	200.000	200.000	.000	.000	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	175.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1080.100	325.000	1062.100	343.000	1062.100	500.000	1062.100	657.000	1080.100	675.000
X1	181.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1081.500	325.000	1063.500	343.000	1063.500	500.000	1063.500	657.000	1081.500	675.000
X1	187.700	5.000	325.000	675.000	600.000	600.000	600.000	.000	4.370	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	192.800	5.000	325.000	675.000	500.000	500.000	500.000	.000	.000	.000
GR	1084.200	325.000	1066.200	343.000	1066.200	500.000	1066.200	657.000	1084.200	675.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	199.000	5.000	324.500	675.500	630.000	630.000	630.000	.000	.000	.000
GR	1086.200	324.500	1067.700	343.000	1067.700	500.000	1067.700	657.000	1086.200	675.500
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

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      .02      .00    10.20      .00     .030     .030     .030     .000  1052.60   304.44
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*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

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  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*SECNO 154.000
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 .002273     690.     690.     690.        2       15        0      .00   347.06   673.53


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SPECIAL BRIDGE

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     1.05     1.56     2.90   388.00   325.00    21.00  6322.00     1.00  1058.46  1058.30

*SECNO 160.250
CLASS A LOW FLOW

3420 BRIDGE W.S.=   1069.04 BRIDGE VELOCITY=,     12.22      CALCULATED CHANNEL AREA=,     3328.

 EGPRS     EGLWC     H3      QWEIR     QLOW     BAREA  TRAPEZOID     ELLC     ELTRD
                                                          AREA
      .00  1071.69     .53       0.   41000.    6322.    6322.    1078.00  1082.00


  160.25    11.48  1069.94      .00      .00  1071.69     1.75      .40      .00  1077.00
  41000.       0.   41000.       0.       0.    3862.       0.     331.      32.  1077.00
     .10      .00    10.62      .00     .000     .030     .000     .000  1058.46   326.05
 .001922      80.      80.      80.        0        0        0      .00   347.91   673.95
```

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


*SECNO 167.800
   167.80    11.40  1071.40  1067.82      .00  1073.17     1.78     1.47      .01  1076.00
   41000.       0.  41000.       0.       0.    3833.       0.     397.      38.  1076.00
      .12      .00    10.70      .00     .030     .030     .030     .000  1060.00   326.10
  .001970     755.     755.     755.        2       14        0      .00   347.79   673.90


CCHV=    .100 CEHV=    .300
*SECNO 169.800
   169.80    11.05  1071.65  1068.59      .00  1073.67     2.02      .43      .07  1078.60
   41000.       0.  41000.       0.       0.    3592.       0.     414.      40.  1078.60
      .12      .00    11.41      .00     .030     .030     .030     .000  1060.60   331.95
  .002337     200.     200.     200.        2       19        0      .00   336.10   668.05


*SECNO 175.800
   175.80    10.95  1073.05  1070.11      .00  1075.11     2.06     1.42      .01  1080.10
   41000.       0.  41000.       0.       0.    3557.       0.     464.      44.  1080.10
      .14      .00    11.53      .00     .030     .030     .030     .000  1062.10   332.05
  .002412     600.     600.     600.        2       15        0      .00   335.89   667.95


*SECNO 181.800
   181.80    11.01  1074.51  1071.50      .00  1076.55     2.04     1.43      .00  1081.50
   41000.       0.  41000.       0.       0.    3577.       0.     513.      49.  1081.50
      .15      .00    11.46      .00     .030     .030     .030     .000  1063.50   331.99
  .002369     600.     600.     600.        2       15        0      .00   336.01   668.01


*SECNO 187.700
   187.70    10.96  1075.93  1072.98      .00  1077.98     2.06     1.43      .00  1082.97
   41000.       0.  41000.       0.       0.    3563.       0.     562.      54.  1082.97
      .17      .00    11.51      .00     .030     .030     .030     .000  1064.97   332.04
  .002400     600.     600.     600.        1       15        0      .00   335.93   667.96


*SECNO 192.800
   192.80    10.92  1077.12  1074.20      .00  1079.20     2.07     1.21      .01  1084.20
   41000.       0.  41000.       0.       0.    3547.       0.     603.      57.  1084.20
      .18      .00    11.56      .00     .030     .030     .030     .000  1066.20   332.08
  .002433     500.     500.     500.        0       15        0      .00   335.84   667.92
```

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


CCHV=    .300 CEHV=    .500
*SECNO 199.000
  199.00    10.97  1078.67  1075.70      .00  1080.72     2.05     1.52      .01  1086.20
  41000.       0.  41000.       0.       0.    3564.       0.     654.      62.   1086.20
     .19      .00    11.50      .00     .030     .030     .030     .000  1067.70   332.03
 .002396     630.     630.     630.        2       15        0      .00   335.94   667.97
```

THIS RUN EXECUTED 10-09-89

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*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
*****************************************************


T1              SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2        100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3       (NRBFE.DAT)   BASELINE DATA FROM CVL CHANNELIZATION PLANS

J1  ICHECK    INQ      NINV      IDIR      STRT     METRIC    HVINS     Q        WSEL      FQ

      0.       3.       0.        0.    .000000     .00       .0       0.   1065.920    .000

J2  NPROF     IPLOT    PRFVS     XSECV     XSECH     FN      ALLDC     IBW      CHNIM     ITRACE

    15.000     .000   -1.000     .000      .000     .000   -1.000     .000     .000      .000
```

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

*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300

*SECNO 123.000

123.00	14.92	1065.92	1061.13	1065.92	1068.16	2.24	.00	.00	1068.60
69000.	0.	69000.	0.	0.	5748.	0.	0.	0.	1068.60
.00	.00	12.00	.00	.030	.030	.030	.000	1051.00	299.74
.001752	0.	0.	0.	0	13	0	.00	400.52	700.26

*SECNO 130.900

130.90	14.69	1067.29	1062.74	.00	1069.60	2.31	1.42	.02	1067.60
69000.	0.	69000.	0.	0.	5654.	0.	103.	7.	1067.60
.02	.00	12.20	.00	.030	.030	.030	.000	1052.60	300.30
.001845	790.	790.	790.	1	14	0	.00	399.39	699.70

*SECNO 137.900

137.90	14.57	1068.57	1064.14	.00	1070.92	2.36	1.31	.01	1069.00
69000.	0.	69000.	0.	0.	5602.	0.	194.	14.	1069.00
.03	.00	12.32	.00	.030	.030	.030	.000	1054.00	300.43
.001899	700.	700.	700.	2	14	0	.00	399.14	699.57

*SECNO 144.850

144.85	14.49	1069.89	1065.53	.00	1072.27	2.38	1.34	.01	1070.40
69000.	0.	69000.	0.	0.	5569.	0.	284.	20.	1070.40
.05	.00	12.39	.00	.030	.030	.030	.000	1055.40	300.52
.001936	700.	700.	700.	1	19	0	.00	398.97	699.48

*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

147.10	13.91	1069.76	1066.87	.00	1073.08	3.32	.53	.28	1074.15
69000.	0.	69000.	0.	0.	4719.	0.	310.	22.	1074.15
.05	.00	14.62	.00	.030	.030	.030	.000	1055.85	323.43
.002868	225.	225.	225.	2	15	0	.00	353.14	676.57

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


*SECNO 154.000
  154.00   14.78  1071.98  1068.22      .00  1074.90     2.93     1.78      .04  1075.50
  69000.      0.   69000.       0.       0.    5026.       0.     387.      28.  1075.50
     .07     .00    13.73      .00     .030     .030     .030     .000  1057.20   322.55
 .002344    690.     690.     690.        2       15        0      .00   354.89   677.45


CCHV=    .300 CEHV=    .500
*SECNO 157.830
  157.83   14.95  1072.95  1069.02      .00  1075.81     2.86      .89      .02  1074.00
  69000.      0.   69000.       0.       0.    5081.       0.     432.      31.  1074.00
     .08     .00    13.58      .00     .030     .030     .030     .000  1058.00   322.55
 .002263    385.     385.     385.        2       15        0      .00   354.89   677.45


*SECNO 159.450
  159.45   15.07  1073.37  1069.33      .00  1076.19     2.81      .36      .01  1076.80
  69000.      0.   69000.       0.       0.    5126.       0.     451.      32.  1076.80
     .08     .00    13.46      .00     .030     .030     .030     .000  1058.30   322.43
 .002201    162.     162.     162.        2       15        0      .00   355.14   677.57



SPECIAL BRIDGE

SB  XK       XKOR     COFQ     ROLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
    1.05     1.56     2.90   388.00   325.00    21.00  6322.00     1.00  1058.46  1058.30

*SECNO 160.250
CLASS A LOW FLOW

3420 BRIDGE W.S.=   1072.67 BRIDGE VELOCITY=,     15.17      CALCULATED CHANNEL AREA=,     4522.

 EGPRS    EGLWC     H3      QWEIR     QLOW     BAREA   TRAPEZOID     ELLC     ELTRD
                                                          AREA
     .00  1076.78    .85        0.   69000.    6322.    6322.     1078.00  1082.00


  160.25   15.76  1074.22      .00      .00  1076.78     2.56      .60      .00  1077.00
  69000.      0.   69000.       0.       0.    5370.       0.     461.      33.  1077.00
     .08     .00    12.85      .00     .000     .030     .000     .000  1058.46   321.77
 .001897     80.      80.      80.        0        0        0      .00   356.45   678.23
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 167.800
  167.80    15.65  1075.65  1071.02      .00  1078.25     2.60     1.45      .02  1076.00
  69000.       0.  69000.       0.       0.    5331.       0.     553.      39.  1076.00
     .10      .00    12.94      .00     .030     .030     .030     .000  1060.00   321.85
 .001942     755.     755.     755.        2       19        0      .00   356.30   678.15


CCHV=    .100 CEHV=    .300
*SECNO 169.800
  169.80    15.24  1075.84  1071.89      .00  1078.77     2.94      .42      .10  1078.60
  69000.       0.  69000.       0.       0.    5016.       0.     577.      41.  1078.60
     .10      .00    13.76      .00     .030     .030     .030     .000  1060.60   327.76
 .002275     200.     200.     200.        2       15        0      .00   344.47   672.24


*SECNO 175.800
  175.80    15.08  1077.18  1073.38      .00  1080.18     3.00     1.39      .02  1080.10
  69000.       0.  69000.       0.       0.    4962.       0.     646.      45.  1080.10
     .11      .00    13.91      .00     .030     .030     .030     .000  1062.10   327.92
 .002355     600.     600.     600.        2       15        0      .00   344.16   672.08


*SECNO 181.800
  181.80    15.10  1078.60  1074.77      .00  1081.59     3.00     1.41      .00  1081.50
  69000.       0.  69000.       0.       0.    4967.       0.     714.      50.  1081.50
     .12      .00    13.89      .00     .030     .030     .030     .000  1063.50   327.91
 .002347     600.     600.     600.        2       15        0      .00   344.19   672.09


*SECNO 187.700
  187.70    15.03  1080.00  1076.24      .00  1083.02     3.02     1.42      .01  1082.97
  69000.       0.  69000.       0.       0.    4947.       0.     783.      55.  1082.97
     .14      .00    13.95      .00     .030     .030     .030     .000  1064.97   327.96
 .002377     600.     600.     600.        0       15        0      .00   344.07   672.04


*SECNO 192.800
  192.80    14.97  1081.17  1077.47      .00  1084.22     3.05     1.20      .01  1084.20
  69000.       0.  69000.       0.       0.    4927.       0.     839.      59.  1084.20
     .15      .00    14.00      .00     .030     .030     .030     .000  1066.20   328.02
 .002408     500.     500.     500.        0       15        0      .00   343.95   671.98
```

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

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	15.00	1082.70	1078.97	.00	1085.74	3.04	1.52	.00	1086.20
69000.	0.	69000.	0.	0.	4931.	0.	910.	64.	1086.20
.16	.00	13.99	.00	.030	.030	.030	.000	1067.70	328.01
.002402	630.	630.	630.	1	15	0	.00	343.98	671.99

THIS RUN EXECUTED 10-09-89

****
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
IBM-PC-XT VERSION AUGUST 1985
****

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

(NRBFE.DAT) BASELINE

SUMMARY PRINTOUT

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
123.000	1051.00	.00	.00	1061.67	1058.18	1063.25	.00	41000.00	10.09	4064.35	10.67	391.83
123.000	1051.00	.00	.00	1065.92	1061.13	1068.16	.00	69000.00	12.00	5748.08	14.92	400.52
130.900	1052.60	790.00	2.03	1063.16	1059.78	1064.78	1.52	41000.00	10.20	4019.17	10.56	391.12
130.900	1052.60	790.00	2.03	1067.29	1062.74	1069.60	1.42	69000.00	12.20	5653.51	14.69	399.39
137.900	1054.00	700.00	2.00	1064.53	1061.18	1066.16	1.38	41000.00	10.23	4007.37	10.53	391.06
137.900	1054.00	700.00	2.00	1068.57	1064.14	1070.92	1.31	69000.00	12.32	5602.48	14.57	399.14
144.850	1055.40	700.00	2.00	1065.91	1062.59	1067.55	1.39	41000.00	10.26	3997.54	10.51	391.01
144.850	1055.40	700.00	2.00	1069.89	1065.53	1072.27	1.34	69000.00	12.39	5569.06	14.49	398.97
147.100	1055.85	225.00	2.00	1066.02	1063.67	1068.26	.53	41000.00	12.02	3410.12	10.17	345.56
147.100	1055.85	225.00	2.00	1069.76	1066.87	1073.08	.53	69000.00	14.62	4718.56	13.91	353.14
154.000	1057.20	690.00	1.96	1068.11	1065.01	1070.05	1.76	41000.00	11.18	3667.06	10.91	347.06
154.000	1057.20	690.00	1.96	1071.98	1068.22	1074.90	1.78	69000.00	13.73	5026.43	14.78	354.89
157.830	1058.00	385.00	2.08	1069.02	1065.84	1070.92	.86	41000.00	11.07	3702.74	11.02	347.04
157.830	1058.00	385.00	2.08	1072.95	1069.02	1075.81	.89	69000.00	13.58	5080.94	14.95	354.89
159.450	1058.30	162.00	1.85	1069.41	1066.14	1071.28	.35	41000.00	10.98	3735.58	11.11	347.23
159.450	1058.30	162.00	1.85	1073.37	1069.33	1076.19	.36	69000.00	13.46	5125.62	15.07	355.14
160.250	1058.46	80.00	2.00	1069.94	.00	1071.69	.40	41000.00	10.62	3862.33	11.48	347.91
160.250	1058.46	80.00	2.00	1074.22	.00	1076.78	.60	69000.00	12.85	5370.11	15.76	356.45
167.800	1060.00	755.00	2.04	1071.40	1067.82	1073.17	1.47	41000.00	10.70	3833.31	11.40	347.79
167.800	1060.00	755.00	2.04	1075.65	1071.02	1078.25	1.45	69000.00	12.94	5330.66	15.65	356.30
169.800	1060.60	200.00	3.00	1071.65	1068.59	1073.67	.43	41000.00	11.41	3592.23	11.05	336.10
169.800	1060.60	200.00	3.00	1075.84	1071.89	1078.77	.42	69000.00	13.76	5016.23	15.24	344.47

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
175.800	1062.10	600.00	2.50	1073.05	1070.11	1075.11	1.42	41000.00	11.53	3557.32	10.95	335.89
175.800	1062.10	600.00	2.50	1077.18	1073.38	1080.18	1.39	69000.00	13.91	4962.18	15.08	344.16
181.800	1063.50	600.00	2.33	1074.51	1071.50	1076.55	1.43	41000.00	11.46	3577.21	11.01	336.01
181.800	1063.50	600.00	2.33	1078.60	1074.77	1081.59	1.41	69000.00	13.89	4967.13	15.10	344.19
187.700	1064.97	600.00	2.45	1075.93	1072.98	1077.98	1.43	41000.00	11.51	3562.70	10.96	335.93
187.700	1064.97	600.00	2.45	1080.00	1076.24	1083.02	1.42	69000.00	13.95	4947.43	15.03	344.07
192.800	1066.20	500.00	2.46	1077.12	1074.20	1079.20	1.21	41000.00	11.56	3547.40	10.92	335.84
192.800	1066.20	500.00	2.46	1081.17	1077.47	1084.22	1.20	69000.00	14.00	4927.15	14.97	343.95
199.000	1067.70	630.00	2.38	1078.67	1075.70	1080.72	1.52	41000.00	11.50	3564.46	10.97	335.94
199.000	1067.70	630.00	2.38	1082.70	1078.97	1085.74	1.52	69000.00	13.99	4930.93	15.00	343.98

SUMMARY OF ERRORS AND SPECIAL NOTES

THIS RUN EXECUTED 10-09-89

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**************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
**************************************************
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*  WATER SURFACE PROFILES                          *
*  VERSION OF NOVEMBER 1976                        *
*  UPDATED MAY 1984                                *
*  IBM-PC-XT VERSION AUGUST 1985                   *
*  RUN DATE  10-06-89   TIME  16:14:21             *
****************************************************
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*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616             *
*  (916) 440-2105 (FTS) 448-2105       *
****************************************
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```
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
```

NORTHERN AVENUE AT NEW RIVER
NEAR PHOENIX, ARIZONA
3 SPAN / 4-5 FT. DIA. COLUMNS
WITHOUT DEBRIS BUILDUP

THIS RUN EXECUTED 10-06-89

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*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
*****************************************************
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THIS IS AN ARCHIVAL RUN ALL DATA AND RESULTS ARE SAVED ON UNIT 96

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AC
T1          SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2      100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3      3S4C.DAT (W/O DEBRIS)   DATA FROM CVL CHANNELIZATION PLANS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       2.       0.       0.   .000000     .00       .0       0.  1061.670    .000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

     1.000     .000   -1.000     .000     .000     .000   -1.000     .000     .000     .000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000   42.000   39.000   33.000    1.000    2.000    3.000   11.000   14.000   26.000

    25.000    8.000    4.000     .000     .000     .000     .000     .000     .000     .000

NC      .030     .030     .030     .100     .300     .000     .000     .000     .000     .000
QT     2.000 41000.000 69000.000     .000     .000     .000     .000     .000     .000     .000
X1   123.000   10.000  297.000  703.000     .000     .000     .000     .000     .000     .000
GR  1068.600  297.000 1051.000  315.000 1051.000  368.000 1051.000  421.000 1051.000  500.000
GR  1051.000  527.000 1051.000  580.000 1051.000  633.000 1051.000  685.000 1068.600  703.000

X1   130.900    5.000  300.000  700.000  790.000  790.000  790.000     .000     .000     .000
GR  1067.600  300.000 1052.600  315.000 1052.600  500.000 1052.600  685.000 1067.600  700.000

X1   137.900    5.000  300.000  700.000  700.000  700.000  700.000     .000     .000     .000
GR  1069.000  300.000 1054.000  315.000 1054.000  500.000 1054.000  685.000 1069.000  700.000

X1   144.850    5.000  300.000  700.000  700.000  700.000  700.000     .000     .000     .000
GR -1070.400  300.000 1055.400  315.000 1055.400  500.000 1055.400  685.000 1070.400  700.000

X1   147.100   10.000  319.000  681.000  225.000  225.000  225.000     .000   -1.350     .000
GR  1075.500  319.000 1057.200  337.500 1057.200  383.000 1057.200  430.000 1057.200  476.000
GR  1057.200  500.000 1057.200  568.000 1057.200  614.000 1057.200  662.500 1075.500  681.000
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X1	154.000	10.000	319.000	681.000	690.000	690.000	690.000	.000	.000	.000
GR	1075.500	319.000	1057.200	337.500	1057.200	383.000	1057.200	430.000	1057.200	476.000
GR	1057.200	500.000	1057.200	568.000	1057.200	614.000	1057.200	662.500	1075.500	681.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	157.830	5.000	321.500	678.500	385.000	385.000	385.000	.000	.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
X1	159.450	5.000	319.000	681.000	162.000	162.000	162.000	.000	.000	.000
GR	1076.800	319.000	1058.400	337.500	1058.400	500.000	1058.400	662.500	1076.800	681.000
SB	1.050	1.560	2.900	388.000	325.000	10.000	6346.000	1.000	1058.470	1058.300
X1	160.260	5.000	319.000	681.000	81.000	81.000	81.000	.000	.000	.000
X2	.000	.000	1.000	1077.470	1080.470	.000	.000	1.330	.000	.000
GR	1077.000	319.000	1058.470	337.500	1058.470	500.000	1058.470	662.500	1077.000	681.000
X1	167.800	5.000	321.500	678.500	754.000	754.000	754.000	.000	2.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
NC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
X1	169.800	5.000	325.000	675.000	200.000	200.000	200.000	.000	.000	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	175.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1080.100	325.000	1062.100	343.000	1062.100	500.000	1062.100	657.000	1080.100	675.000
X1	181.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1081.500	325.000	1063.500	343.000	1063.500	500.000	1063.500	657.000	1081.500	675.000
X1	187.700	5.000	325.000	675.000	600.000	600.000	600.000	.000	4.370	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	192.800	5.000	325.000	675.000	500.000	500.000	500.000	.000	.000	.000
GR	1084.200	325.000	1066.200	343.000	1066.200	500.000	1066.200	657.000	1084.200	675.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	199.000	5.000	324.500	675.500	630.000	630.000	630.000	.000	.000	.000
GR	1086.200	324.500	1067.700	343.000	1067.700	500.000	1067.700	657.000	1086.200	675.500
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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


*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=    .100 CEHV=    .300
*SECNO 123.000
   123.00    10.67  1061.67  1058.18  1061.67  1063.25     1.58      .00      .00  1068.60
   41000.       0.   41000.       0.       0.    4064.       0.       0.       0.  1068.60
      .00      .00    10.09      .00     .030     .030     .030     .000  1051.00   304.09
  .001888       0.       0.       0.        0       13        0      .00   391.83   695.91


*SECNO 130.900
   130.90    10.56  1063.16  1059.78      .00  1064.78     1.62     1.52      .01  1067.60
   41000.       0.   41000.       0.       0.    4019.       0.      73.       7.  1067.60
      .02      .00    10.20      .00     .030     .030     .030     .000  1052.60   304.44
  .001955     790.     790.     790.        0       14        0      .00   391.12   695.56


*SECNO 137.900
   137.90    10.53  1064.53  1061.18      .00  1066.16     1.63     1.38      .00  1069.00
   41000.       0.   41000.       0.       0.    4007.       0.     138.      13.  1069.00
      .04      .00    10.23      .00     .030     .030     .030     .000  1054.00   304.47
  .001974     700.     700.     700.        2       14        0      .00   391.06   695.53


*SECNO 144.850
   144.85    10.51  1065.91  1062.59      .00  1067.55     1.63     1.39      .00  1070.40
   41000.       0.   41000.       0.       0.    3998.       0.     202.      20.  1070.40
      .06      .00    10.26      .00     .030     .030     .030     .000  1055.40   304.49
  .001989     700.     700.     700.        0       14        0      .00   391.01   695.51


*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

   147.10    10.17  1066.02  1063.67      .00  1068.26     2.24      .53      .18  1074.15
   41000.       0.   41000.       0.       0.    3410.       0.     221.      22.  1074.15
      .06      .00    12.02      .00     .030     .030     .030     .000  1055.85   327.22
  .002873     225.     225.     225.        2       15        0      .00   345.56   672.78
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 154.000

154.00	10.91	1068.11	1065.01	.00	1070.05	1.94	1.76	.03	1075.50
41000.	0.	41000.	0.	0.	3667.	0.	277.	27.	1075.50
.08	.00	11.18	.00	.030	.030	.030	.000	1057.20	326.47
.002273	690.	690.	690.	2	15	0	.00	347.06	673.53

CCHV= .300 CEHV= .500

*SECNO 157.830

157.83	11.02	1069.02	1065.84	.00	1070.92	1.90	.86	.01	1074.00
41000.	0.	41000.	0.	0.	3703.	0.	310.	30.	1074.00
.09	.00	11.07	.00	.030	.030	.030	.000	1058.00	326.48
.002202	385.	385.	385.	2	15	0	.00	347.04	673.52

*SECNO 159.450

159.45	10.97	1069.37	1066.24	.00	1071.29	1.92	.36	.01	1076.80
41000.	0.	41000.	0.	0.	3688.	0.	324.	31.	1076.80
.10	.00	11.12	.00	.030	.030	.030	.000	1058.40	326.46
.002230	162.	162.	162.	1	15	0	.00	347.07	673.54

SPECIAL BRIDGE

SB XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
1.05	1.56	2.90	388.00	325.00	10.00	6346.00	1.00	1058.47	1058.30

*SECNO 160.260

CLASS A LOW FLOW

3420 BRIDGE W.S.= 1069.27 BRIDGE VELOCITY=, 11.56 CALCULATED CHANNEL AREA=, 3518.

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD
.00	1071.49	.26	0.	41000.	6346.	6346.	1077.47	1080.47

160.26	11.16	1069.63	.00	.00	1071.49	1.85	.20	.00	1077.00
41000.	0.	41000.	0.	0.	3752.	0.	331.	32.	1077.00
.10	.00	10.93	.00	.000	.030	.000	.000	1058.47	326.36
.002110	81.	81.	81.	0	0	0	.00	347.29	673.64

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

*SECNO 167.800

167.80	11.24	1071.24	1067.81	.00	1073.07	1.83	1.57	.01	1076.00
41000.	0.	41000.	0.	0.	3779.	0.	396.	38.	1076.00
.12	.00	10.85	.00	.030	.030	.030	.000	1060.00	326.26
.002062	754.	754.	754.	2	19	0	.00	347.48	673.74

CCHV= .100 CEHV= .300

*SECNO 169.800

169.80	10.91	1071.51	1068.62	.00	1073.59	2.08	.45	.07	1078.60
41000.	0.	41000.	0.	0.	3546.	0.	413.	40.	1078.60
.12	.00	11.56	.00	.030	.030	.030	.000	1060.60	332.09
.002437	200.	200.	200.	2	15	0	.00	335.83	667.91

*SECNO 175.800

175.80	10.87	1072.97	1070.10	.00	1075.06	2.09	1.47	.00	1080.10
41000.	0.	41000.	0.	0.	3532.	0.	461.	44.	1080.10
.14	.00	11.61	.00	.030	.030	.030	.000	1062.10	332.13
.002467	600.	600.	600.	2	15	0	.00	335.75	667.87

*SECNO 181.800

181.80	10.97	1074.47	1071.50	.00	1076.53	2.05	1.46	.00	1081.50
41000.	0.	41000.	0.	0.	3566.	0.	510.	49.	1081.50
.15	.00	11.50	.00	.030	.030	.030	.000	1063.50	332.03
.002392	600.	600.	600.	2	15	0	.00	335.95	667.97

*SECNO 187.700

187.70	10.94	1075.91	1072.97	.00	1077.97	2.07	1.44	.00	1082.97
41000.	0.	41000.	0.	0.	3554.	0.	559.	54.	1082.97
.16	.00	11.54	.00	.030	.030	.030	.000	1064.97	332.06
.002419	600.	600.	600.	2	15	0	.00	335.87	667.94

*SECNO 192.800

192.80	10.91	1077.11	1074.20	.00	1079.19	2.08	1.21	.00	1084.20
41000.	0.	41000.	0.	0.	3545.	0.	600.	57.	1084.20
.18	.00	11.57	.00	.030	.030	.030	.000	1066.20	332.09
.002439	500.	500.	500.	0	15	0	.00	335.82	667.91

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

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	10.97	1078.67	1075.70	.00	1080.72	2.06	1.52	.01	1086.20
41000.	0.	41000.	0.	0.	3564.	0.	651.	62.	1086.20
.19	.00	11.50	.00	.030	.030	.030	.000	1067.70	332.03
.002398	630.	630.	630.	2	15	0	.00	335.93	667.97

THIS RUN EXECUTED 10-06-89

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  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
*****************************************************


T1          SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2      100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3      3S4C.DAT (W/O DEBRIS)   DATA FROM CVL CHANNELIZATION PLANS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       3.       0.       0.   .000000     .00       .0       0.  1065.920    .000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    15.000    .000   -1.000    .000     .000     .000   -1.000    .000     .000     .000
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNGH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=    .100 CEHV=    .300
*SECNO 123.000
  123.00    14.92  1065.92  1061.13  1065.92  1068.16     2.24      .00      .00  1068.60
  69000.       0.   69000.       0.       0.    5748.       0.       0.       0.   1068.60
     .00      .00    12.00      .00     .030     .030     .030     .000  1051.00   299.74
 .001752       0.       0.       0.        0       13        0      .00   400.52   700.26


*SECNO 130.900
  130.90    14.69  1067.29  1062.74      .00  1069.60     2.31     1.42      .02  1067.60
  69000.       0.   69000.       0.       0.    5654.       0.     103.       7.   1067.60
     .02      .00    12.20      .00     .030     .030     .030     .000  1052.60   300.30
 .001845     790.     790.     790.        1       14        0      .00   399.39   699.70


*SECNO 137.900
  137.90    14.57  1068.57  1064.14      .00  1070.92     2.36     1.31      .01  1069.00
  69000.       0.   69000.       0.       0.    5602.       0.     194.      14.   1069.00
     .03      .00    12.32      .00     .030     .030     .030     .000  1054.00   300.43
 .001899     700.     700.     700.        2       14        0      .00   399.14   699.57


*SECNO 144.850
  144.85    14.49  1069.89  1065.53      .00  1072.27     2.38     1.34      .01  1070.40
  69000.       0.   69000.       0.       0.    5569.       0.     284.      20.   1070.40
     .05      .00    12.39      .00     .030     .030     .030     .000  1055.40   300.52
 .001936     700.     700.     700.        1       19        0      .00   398.97   699.48


*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

  147.10    13.91  1069.76  1066.87      .00  1073.08     3.32      .53      .28  1074.15
  69000.       0.   69000.       0.       0.    4719.       0.     310.      22.   1074.15
     .05      .00    14.62      .00     .030     .030     .030     .000  1055.85   323.43
 .002868     225.     225.     225.        2       15        0      .00   353.14   676.57
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   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 154.000
   154.00    14.78  1071.98  1068.22      .00  1074.90     2.93     1.78      .04  1075.50
   69000.       0.  69000.       0.       0.    5026.       0.     387.      28.  1075.50
      .07      .00    13.73      .00     .030     .030     .030     .000  1057.20   322.55
  .002344     690.     690.     690.        2       15        0      .00   354.89   677.45


CCHV=    .300 CEHV=    .500
*SECNO 157.830
   157.83    14.95  1072.95  1069.02      .00  1075.81     2.86      .89      .02  1074.00
   69000.       0.  69000.       0.       0.    5081.       0.     432.      31.  1074.00
      .08      .00    13.58      .00     .030     .030     .030     .000  1058.00   322.55
  .002263     385.     385.     385.        2       15        0      .00   354.89   677.45


*SECNO 159.450
   159.45    14.91  1073.31  1069.43      .00  1076.18     2.88      .37      .01  1076.80
   69000.       0.  69000.       0.       0.    5071.       0.     451.      32.  1076.80
      .08      .00    13.61      .00     .030     .030     .030     .000  1058.40   322.50
  .002278     162.     162.     162.        1       15        0      .00   354.99   677.50


SPECIAL BRIDGE

SB  XK       XKOR     COFQ     RDLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
     1.05     1.56     2.90   388.00   325.00    10.00  6346.00     1.00  1058.47  1058.30

*SECNO 160.260
CLASS A LOW FLOW

3420 BRIDGE W.S.=   1073.09 BRIDGE VELOCITY=,     14.23      CALCULATED CHANNEL AREA=,     4820.

 EGPRS     EGLWC      H3      QWEIR     QLOW     BAREA  TRAPEZOID     ELLC     ELTRD
                                                          AREA
      .00  1076.47     .42        0.   69000.    6346.    6346.    1077.47  1080.47


   160.26    15.26  1073.73      .00      .00  1076.47     2.74      .29      .00  1077.00
   69000.       0.  69000.       0.       0.    5191.       0.     460.      33.  1077.00
      .08      .00    13.29      .00     .000     .030     .000     .000  1058.47   322.27
  .002113      81.      81.      81.        0        0        0      .00   355.47   677.73
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 167.800

167.80	15.35	1075.35	1071.04	.00	1078.06	2.71	1.58	.01	1076.00
69000.	0.	69000.	0.	0.	5225.	0.	551.	39.	1076.00
.10	.00	13.21	.00	.030	.030	.030	.000	1060.00	322.15
.002071	754.	754.	754.	2	15	0	.00	355.70	677.85

CCHV= .100 CEHV= .300

*SECNO 169.800

169.80	14.96	1075.56	1071.88	.00	1078.61	3.05	.45	.10	1078.60
69000.	0.	69000.	0.	0.	4920.	0.	574.	41.	1078.60
.10	.00	14.02	.00	.030	.030	.030	.000	1060.60	328.04
.002420	200.	200.	200.	2	15	0	.00	343.91	671.96

*SECNO 175.800

175.80	14.90	1077.00	1073.37	.00	1080.08	3.08	1.46	.01	1080.10
69000.	0.	69000.	0.	0.	4901.	0.	641.	45.	1080.10
.11	.00	14.08	.00	.030	.030	.030	.000	1062.10	328.10
.002450	600.	600.	600.	2	15	0	.00	343.80	671.90

*SECNO 181.800

181.80	15.00	1078.50	1074.77	.00	1081.54	3.04	1.45	.00	1081.50
69000.	0.	69000.	0.	0.	4935.	0.	709.	50.	1081.50
.12	.00	13.98	.00	.030	.030	.030	.000	1063.50	328.00
.002396	600.	600.	600.	2	15	0	.00	344.00	672.00

*SECNO 187.700

187.70	14.96	1079.93	1076.24	.00	1082.98	3.05	1.44	.00	1082.97
69000.	0.	69000.	0.	0.	4922.	0.	777.	55.	1082.97
.14	.00	14.02	.00	.030	.030	.030	.000	1064.97	328.04
.002416	600.	600.	600.	2	15	0	.00	343.92	671.96

*SECNO 192.800

192.80	14.94	1081.14	1077.47	.00	1084.20	3.06	1.21	.00	1084.20
69000.	0.	69000.	0.	0.	4913.	0.	834.	59.	1084.20
.15	.00	14.04	.00	.030	.030	.030	.000	1066.20	328.06
.002431	500.	500.	500.	0	15	0	.00	343.87	671.94

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

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	14.99	1082.69	1078.97	.00	1085.73	3.04	1.52	.01	1086.20
69000.	0.	69000.	0.	0.	4931.	0.	905.	64.	1086.20
.16	.00	13.99	.00	.030	.030	.030	.000	1067.70	328.01
.002402	630.	630.	630.	2	15	0	.00	343.98	671.99

THIS RUN EXECUTED 10-06-89

****
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
IBM-PC-XT VERSION AUGUST 1985
****

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

3S4C.DAT (W/O DEBRIS)

SUMMARY PRINTOUT

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
123.000	1051.00	.00	.00	1061.67	1058.18	1063.25	.00	41000.00	10.09	4064.35	10.67	391.83
123.000	1051.00	.00	.00	1065.92	1061.13	1068.16	.00	69000.00	12.00	5748.08	14.92	400.52
130.900	1052.60	790.00	2.03	1063.16	1059.78	1064.78	1.52	41000.00	10.20	4019.17	10.56	391.12
130.900	1052.60	790.00	2.03	1067.29	1062.74	1069.60	1.42	69000.00	12.20	5653.51	14.69	399.39
137.900	1054.00	700.00	2.00	1064.53	1061.18	1066.16	1.38	41000.00	10.23	4007.37	10.53	391.06
137.900	1054.00	700.00	2.00	1068.57	1064.14	1070.92	1.31	69000.00	12.32	5602.48	14.57	399.14
144.850	1055.40	700.00	2.00	1065.91	1062.59	1067.55	1.39	41000.00	10.26	3997.54	10.51	391.01
144.850	1055.40	700.00	2.00	1069.89	1065.53	1072.27	1.34	69000.00	12.39	5569.06	14.49	398.97
147.100	1055.85	225.00	2.00	1066.02	1063.67	1068.26	.53	41000.00	12.02	3410.12	10.17	345.56
147.100	1055.85	225.00	2.00	1069.76	1066.87	1073.08	.53	69000.00	14.62	4718.56	13.91	353.14
154.000	1057.20	690.00	1.96	1068.11	1065.01	1070.05	1.76	41000.00	11.18	3667.06	10.91	347.06
154.000	1057.20	690.00	1.96	1071.98	1068.22	1074.90	1.78	69000.00	13.73	5026.43	14.78	354.89
157.830	1058.00	385.00	2.08	1069.02	1065.84	1070.92	.86	41000.00	11.07	3702.74	11.02	347.04
157.830	1058.00	385.00	2.08	1072.95	1069.02	1075.81	.89	69000.00	13.58	5080.94	14.95	354.89
159.450	1058.40	162.00	2.47	1069.37	1066.24	1071.29	.36	41000.00	11.12	3688.48	10.97	347.07
159.450	1058.40	162.00	2.47	1073.31	1069.43	1076.18	.37	69000.00	13.61	5070.71	14.91	354.99
160.260	1058.47	81.00	.86	1069.63	.00	1071.49	.20	41000.00	10.93	3752.20	11.16	347.29
160.260	1058.47	81.00	.86	1073.73	.00	1076.47	.29	69000.00	13.29	5191.43	15.26	355.47
167.800	1060.00	754.00	2.03	1071.24	1067.81	1073.07	1.57	41000.00	10.85	3779.08	11.24	347.48
167.800	1060.00	754.00	2.03	1075.35	1071.04	1078.06	1.58	69000.00	13.21	5224.54	15.35	355.70
169.800	1060.60	200.00	3.00	1071.51	1068.62	1073.59	.45	41000.00	11.56	3546.01	10.91	335.83
169.800	1060.60	200.00	3.00	1075.56	1071.88	1078.61	.45	69000.00	14.02	4919.80	14.96	343.91

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
175.800	1062.10	600.00	2.50	1072.97	1070.10	1075.06	1.47	41000.00	11.61	3532.40	10.87	335.75
175.800	1062.10	600.00	2.50	1077.00	1073.37	1080.08	1.46	69000.00	14.08	4900.58	14.90	343.80
181.800	1063.50	600.00	2.33	1074.47	1071.50	1076.53	1.46	41000.00	11.50	3566.22	10.97	335.95
181.800	1063.50	600.00	2.33	1078.50	1074.77	1081.54	1.45	69000.00	13.98	4935.13	15.00	344.00
187.700	1064.97	600.00	2.45	1075.91	1072.97	1077.97	1.44	41000.00	11.54	3553.88	10.94	335.87
187.700	1064.97	600.00	2.45	1079.93	1076.24	1082.98	1.44	69000.00	14.02	4922.07	14.96	343.92
192.800	1066.20	500.00	2.46	1077.11	1074.20	1079.19	1.21	41000.00	11.57	3544.82	10.91	335.82
192.800	1066.20	500.00	2.46	1081.14	1077.47	1084.20	1.21	69000.00	14.04	4912.79	14.94	343.87
199.000	1067.70	630.00	2.38	1078.67	1075.70	1080.72	1.52	41000.00	11.50	3563.84	10.97	335.93
199.000	1067.70	630.00	2.38	1082.69	1078.97	1085.73	1.52	69000.00	13.99	4930.89	14.99	343.98

SUMMARY OF ERRORS AND SPECIAL NOTES

THIS RUN EXECUTED 10-06-89

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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*  WATER SURFACE PROFILES                          *
*  VERSION OF NOVEMBER 1976                        *
*  UPDATED MAY 1984                                *
*  IBM-PC-XT VERSION AUGUST 1985                   *
*  RUN DATE  10-06-89   TIME  16:15:51             *
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*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616             *
*  (916) 440-2105 (FTS) 448-2105       *
***************************************
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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
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Northern Avenue at New River
near Phoenix, Arizona
3 Span / 4-5 ft. Dia. Columns
With Debris Buildup

THIS RUN EXECUTED-10-06-89

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*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
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WHAT IS THIS FIRST RUN FOR?

THIS IS AN ARCHIVAL RUN ALL DATA AND RESULTS ARE SAVED ON UNIT 96

AC

T1 SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.

T2 100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER

T3 3S4CD.DAT (W/ DEBRIS) DATA FROM CVL CHANNELIZATION PLANS

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0.	2.	0.	0.	.000000	.00	.0	0.	1061.670	.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1.000	.000	-1.000	.000	.000	.000	-1.000	.000	.000	.000

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38.000	42.000	39.000	33.000	1.000	2.000	3.000	11.000	14.000	26.000
25.000	8.000	4.000	.000	.000	.000	.000	.000	.000	.000

NC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
QT	2.000	41000.000	69000.000	.000	.000	.000	.000	.000	.000	.000
X1	123.000	10.000	297.000	703.000	.000	.000	.000	.000	.000	.000
GR	1068.600	297.000	1051.000	315.000	1051.000	368.000	1051.000	421.000	1051.000	500.000
GR	1051.000	527.000	1051.000	580.000	1051.000	633.000	1051.000	685.000	1068.600	703.000
X1	130.900	5.000	300.000	700.000	790.000	790.000	790.000	.000	.000	.000
GR	1067.600	300.000	1052.600	315.000	1052.600	500.000	1052.600	685.000	1067.600	700.000
X1	137.900	5.000	300.000	700.000	700.000	700.000	700.000	.000	.000	.000
GR	1069.000	300.000	1054.000	315.000	1054.000	500.000	1054.000	685.000	1069.000	700.000
X1	144.850	5.000	300.000	700.000	700.000	700.000	700.000	.000	.000	.000
GR	1070.400	300.000	1055.400	315.000	1055.400	500.000	1055.400	685.000	1070.400	700.000
X1	147.100	10.000	319.000	681.000	225.000	225.000	225.000	.000	-1.350	.000
GR	1075.500	319.000	1057.200	337.500	1057.200	383.000	1057.200	430.000	1057.200	476.000
GR	1057.200	500.000	1057.200	568.000	1057.200	614.000	1057.200	662.500	1075.500	681.000

X1	154.000	10.000	319.000	681.000	690.000	690.000	690.000	.000	.000	.000
GR	1075.500	319.000	1057.200	337.500	1057.200	383.000	1057.200	430.000	1057.200	476.000
GR	1057.200	500.000	1057.200	568.000	1057.200	614.000	1057.200	662.500	1075.500	681.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	157.830	5.000	321.500	678.500	385.000	385.000	385.000	.000	.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
X1	159.450	5.000	319.000	681.000	162.000	162.000	162.000	.000	.000	.000
GR	1076.800	319.000	1058.400	337.500	1058.400	500.000	1058.400	662.500	1076.800	681.000
SB	1.050	1.560	2.900	388.000	325.000	20.000	6156.000	1.000	1058.470	1058.300
X1	160.260	5.000	319.000	681.000	81.000	81.000	81.000	.000	.000	.000
X2	.000	.000	1.000	1077.470	1080.470	.000	.000	1.330	.000	.000
GR	1077.000	319.000	1058.470	337.500	1058.470	500.000	1058.470	662.500	1077.000	681.000
X1	167.800	5.000	321.500	678.500	754.000	754.000	754.000	.000	2.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
NC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
X1	169.800	5.000	325.000	675.000	200.000	200.000	200.000	.000	.000	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	175.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1080.100	325.000	1062.100	343.000	1062.100	500.000	1062.100	657.000	1080.100	675.000
X1	181.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1081.500	325.000	1063.500	343.000	1063.500	500.000	1063.500	657.000	1081.500	675.000
X1	187.700	5.000	325.000	675.000	600.000	600.000	600.000	.000	4.370	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	192.800	5.000	325.000	675.000	500.000	500.000	500.000	.000	.000	.000
GR	1084.200	325.000	1066.200	343.000	1066.200	500.000	1066.200	657.000	1084.200	675.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	199.000	5.000	324.500	675.500	630.000	630.000	630.000	.000	.000	.000
GR	1086.200	324.500	1067.700	343.000	1067.700	500.000	1067.700	657.000	1086.200	675.500
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300

*SECNO 123.000

123.00	10.67	1061.67	1058.18	1061.67	1063.25	1.58	.00	.00	1068.60
41000.	0.	41000.	0.	0.	4064.	0.	0.	0.	1068.60
.00	.00	10.09	.00	.030	.030	.030	.000	1051.00	304.09
.001888	0.	0.	0.	0	13	0	.00	391.83	695.91

*SECNO 130.900

130.90	10.56	1063.16	1059.78	.00	1064.78	1.62	1.52	.01	1067.60
41000.	0.	41000.	0.	0.	4019.	0.	73.	7.	1067.60
.02	.00	10.20	.00	.030	.030	.030	.000	1052.60	304.44
.001955	790.	790.	790.	0	14	0	.00	391.12	695.56

*SECNO 137.900

137.90	10.53	1064.53	1061.18	.00	1066.16	1.63	1.38	.00	1069.00
41000.	0.	41000.	0.	0.	4007.	0.	138.	13.	1069.00
.04	.00	10.23	.00	.030	.030	.030	.000	1054.00	304.47
.001974	700.	700.	700.	2	14	0	.00	391.06	695.53

*SECNO 144.850

144.85	10.51	1065.91	1062.59	.00	1067.55	1.63	1.39	.00	1070.40
41000.	0.	41000.	0.	0.	3998.	0.	202.	20.	1070.40
.06	.00	10.26	.00	.030	.030	.030	.000	1055.40	304.49
.001989	700.	700.	700.	0	14	0	.00	391.01	695.51

*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

147.10	10.17	1066.02	1063.67	.00	1068.26	2.24	.53	.18	1074.15
41000.	0.	41000.	0.	0.	3410.	0.	221.	22.	1074.15
.06	.00	12.02	.00	.030	.030	.030	.000	1055.85	327.22
.002873	225.	225.	225.	2	15	0	.00	345.56	672.78

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


*SECNO 154.000
   154.00    10.91  1068.11  1065.01      .00  1070.05     1.94     1.76      .03  1075.50
   41000.       0.  41000.       0.       0.    3667.       0.     277.      27.   1075.50
      .08      .00    11.18      .00     .030     .030     .030     .000  1057.20   326.47
  .002273     690.     690.     690.        2       15        0      .00   347.06   673.53


CCHV=    .300 CEHV=    .500
*SECNO 157.830
   157.83    11.02  1069.02  1065.84      .00  1070.92     1.90      .86      .01  1074.00
   41000.       0.  41000.       0.       0.    3703.       0.     310.      30.   1074.00
      .09      .00    11.07      .00     .030     .030     .030     .000  1058.00   326.48
  .002202     385.     385.     385.        2       15        0      .00   347.04   673.52


*SECNO 159.450
   159.45    10.97  1069.37  1066.24      .00  1071.29     1.92      .36      .01  1076.80
   41000.       0.  41000.       0.       0.    3688.       0.     324.      31.   1076.80
      .10      .00    11.12      .00     .030     .030     .030     .000  1058.40   326.46
  .002230     162.     162.     162.        1       15        0      .00   347.07   673.54


SPECIAL BRIDGE

SB  XK       XKOR     COFQ     RDLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
     1.05     1.56     2.90   388.00   325.00    20.00  6156.00     1.00  1058.47  1058.30

*SECNO 160.260
CLASS A LOW FLOW

3420 BRIDGE W.S.=   1069.02 BRIDGE VELOCITY=,     12.22     CALCULATED CHANNEL AREA=,     3328.

 EGPRS    EGLWC    H3       QWEIR    QLOW     BAREA   TRAPEZOID    ELLC     ELTRD
                                                         AREA
      .00  1071.66      .53       0.   41000.    6156.    6156.   1077.47  1080.47


   160.26    11.43  1069.90      .00      .00  1071.66     1.77      .37      .00  1077.00
   41000.       0.  41000.       0.       0.    3844.       0.     331.      32.   1077.00
      .10      .00    10.67      .00     .000     .030     .000     .000  1058.47   326.09
  .001952      81.      81.      81.        0        0        0      .00   347.81   673.91
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   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 167.800
   167.80    11.37  1071.37  1067.82      .00  1073.16     1.78     1.48      .01  1076.00
   41000.       0.  41000.       0.       0.    3825.       0.     397.      38.  1076.00
      .12      .00    10.72      .00     .030     .030     .030     .000  1060.00   326.13
  .001984     754.     754.     754.        3       14        0      .00   347.74   673.87


CCHV=    .100 CEHV=    .300
*SECNO 169.800
   169.80    11.03  1071.63  1068.59      .00  1073.66     2.03      .43      .07  1078.60
   41000.       0.  41000.       0.       0.    3585.       0.     414.      40.  1078.60
      .12      .00    11.44      .00     .030     .030     .030     .000  1060.60   331.97
  .002352     200.     200.     200.        2       19        0      .00   336.06   668.03


*SECNO 175.800
   175.80    10.94  1073.04  1070.11      .00  1075.10     2.07     1.43      .01  1080.10
   41000.       0.  41000.       0.       0.    3553.       0.     463.      44.  1080.10
      .14      .00    11.54      .00     .030     .030     .030     .000  1062.10   332.06
  .002420     600.     600.     600.        2       15        0      .00   335.87   667.94


*SECNO 181.800
   181.80    11.00  1074.50  1071.50      .00  1076.54     2.04     1.44      .00  1081.50
   41000.       0.  41000.       0.       0.    3575.       0.     512.      49.  1081.50
      .15      .00    11.47      .00     .030     .030     .030     .000  1063.50   332.00
  .002373     600.     600.     600.        2       15        0      .00   336.00   668.00


*SECNO 187.700
   187.70    10.95  1075.92  1072.98      .00  1077.98     2.06     1.43      .00  1082.97
   41000.       0.  41000.       0.       0.    3562.       0.     561.      54.  1082.97
      .17      .00    11.51      .00     .030     .030     .030     .000  1064.97   332.04
  .002402     600.     600.     600.        1       15        0      .00   335.92   667.96


*SECNO 192.800
   192.80    10.92  1077.12  1074.20      .00  1079.19     2.07     1.21      .01  1084.20
   41000.       0.  41000.       0.       0.    3547.       0.     602.      57.  1084.20
      .18      .00    11.56      .00     .030     .030     .030     .000  1066.20   332.08
  .002435     500.     500.     500.        0       15        0      .00   335.83   667.92
```

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

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	10.97	1078.67	1075.70	.00	1080.72	2.05	1.52	.01	1086.20
41000.	0.	41000.	0.	0.	3564.	0.	654.	62.	1086.20
.19	.00	11.50	.00	.030	.030	.030	.000	1067.70	332.03
.002397	630.	630.	630.	2	15	0	.00	335.93	667.97

THIS RUN EXECUTED 10-06-89

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
*****************************************************
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T1          SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2      100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3      3S4CD.DAT (W/ DEBRIS)   DATA FROM CVL CHANNELIZATION PLANS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       3.       0.       0.   .000000     .00       .0       0.  1065.920    .000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    15.000    .000   -1.000    .000     .000     .000   -1.000    .000     .000     .000
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```
  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS    BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA    LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=    .100 CEHV=    .300
*SECNO 123.000
  123.00    14.92  1065.92  1061.13  1065.92  1068.16     2.24      .00      .00  1068.60
  69000.       0.  69000.       0.       0.    5748.       0.       0.       0.  1068.60
     .00      .00    12.00      .00     .030     .030     .030     .000  1051.00   299.74
 .001752       0.       0.       0.        0       13        0      .00   400.52   700.26


*SECNO 130.900
  130.90    14.69  1067.29  1062.74      .00  1069.60     2.31     1.42      .02  1067.60
  69000.       0.  69000.       0.       0.    5654.       0.     103.       7.  1067.60
     .02      .00    12.20      .00     .030     .030     .030     .000  1052.60   300.30
 .001845     790.     790.     790.        1       14        0      .00   399.39   699.70


*SECNO 137.900
  137.90    14.57  1068.57  1064.14      .00  1070.92     2.36     1.31      .01  1069.00
  69000.       0.  69000.       0.       0.    5602.       0.     194.      14.  1069.00
     .03      .00    12.32      .00     .030     .030     .030     .000  1054.00   300.43
 .001899     700.     700.     700.        2       14        0      .00   399.14   699.57


*SECNO 144.850
  144.85    14.49  1069.89  1065.53      .00  1072.27     2.38     1.34      .01  1070.40
  69000.       0.  69000.       0.       0.    5569.       0.     284.      20.  1070.40
     .05      .00    12.39      .00     .030     .030     .030     .000  1055.40   300.52
 .001936     700.     700.     700.        1       19        0      .00   398.97   699.48


*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

  147.10    13.91  1069.76  1066.87      .00  1073.08     3.32      .53      .28  1074.15
  69000.       0.  69000.       0.       0.    4719.       0.     310.      22.  1074.15
     .05      .00    14.62      .00     .030     .030     .030     .000  1055.85   323.43
 .002868     225.     225.     225.        2       15        0      .00   353.14   676.57
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   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*SECNO 154.000
   154.00    14.78  1071.98  1068.22      .00  1074.90     2.93     1.78      .04  1075.50
   69000.       0.  69000.       0.       0.    5026.       0.     387.      28.   1075.50
      .07      .00    13.73      .00     .030     .030     .030     .000  1057.20   322.55
  .002344     690.     690.     690.        2       15        0      .00   354.89   677.45


CCHV=    .300 CEHV=    .500
*SECNO 157.830
   157.83    14.95  1072.95  1069.02      .00  1075.81     2.86      .89      .02  1074.00
   69000.       0.  69000.       0.       0.    5081.       0.     432.      31.   1074.00
      .08      .00    13.58      .00     .030     .030     .030     .000  1058.00   322.55
  .002263     385.     385.     385.        2       15        0      .00   354.89   677.45


*SECNO 159.450
   159.45    14.91  1073.31  1069.43      .00  1076.18     2.88      .37      .01  1076.80
   69000.       0.  69000.       0.       0.    5071.       0.     451.      32.   1076.80
      .08      .00    13.61      .00     .030     .030     .030     .000  1058.40   322.50
  .002278     162.     162.     162.        1       15        0      .00   354.99   677.50


SPECIAL BRIDGE

SB  XK       XKOR     COFQ     RDLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
     1.05     1.56     2.90   388.00   325.00    20.00  6156.00     1.00  1058.47  1058.30

*SECNO 160.260
CLASS A LOW FLOW

3420 BRIDGE W.S.=   1072.64 BRIDGE VELOCITY=,     15.16     CALCULATED CHANNEL AREA=,     4524.

 EGPRS     EGLWC      H3      QWEIR     QLOW     BAREA  TRAPEZOID     ELLC     ELTRD
                                                          AREA
      .00  1076.74     .84        0.   69000.    6156.    6156.    1077.47  1080.47


   160.26    15.68  1074.15      .00      .00  1076.74     2.59      .56      .00  1077.00
   69000.       0.  69000.       0.       0.    5342.       0.     461.      33.   1077.00
      .08      .00    12.92      .00     .000     .030     .000     .000  1058.47   321.84
  .001929      81.      81.      81.        0        0        0      .00   356.31   678.16
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   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*SECNO 167.800
   167.80   15.60  1075.60  1071.02      .00  1078.22     2.62     1.47      .01  1076.00
   69000.      0.  69000.      0.       0.    5315.       0.     553.      39.  1076.00
      .10     .00    12.98     .00     .030     .030     .030     .000  1060.00   321.90
  .001961    754.     754.    754.        3       19        0      .00   356.21   678.10


CCHV=    .100 CEHV=    .300
*SECNO 169.800
   169.80   15.19  1075.79  1071.89      .00  1078.75     2.96      .42      .10  1078.60
   69000.      0.  69000.      0.       0.    5001.       0.     576.      41.  1078.60
      .10     .00    13.80     .00     .030     .030     .030     .000  1060.60   327.81
  .002297    200.     200.    200.        2       15        0      .00   344.38   672.19


*SECNO 175.800
   175.80   15.05  1077.15  1073.37      .00  1080.16     3.01     1.40      .02  1080.10
   69000.      0.  69000.      0.       0.    4952.       0.     645.      45.  1080.10
      .11     .00    13.93     .00     .030     .030     .030     .000  1062.10   327.95
  .002370    600.     600.    600.        2       15        0      .00   344.10   672.05


*SECNO 181.800
   181.80   15.08  1078.58  1074.77      .00  1081.58     3.00     1.42      .00  1081.50
   69000.      0.  69000.      0.       0.    4963.       0.     713.      50.  1081.50
      .12     .00    13.90     .00     .030     .030     .030     .000  1063.50   327.92
  .002354    600.     600.    600.        2       15        0      .00   344.16   672.08


*SECNO 187.700
   187.70   15.02  1079.99  1076.24      .00  1083.01     3.03     1.42      .01  1082.97
   69000.      0.  69000.      0.       0.    4943.       0.     782.      55.  1082.97
      .14     .00    13.96     .00     .030     .030     .030     .000  1064.97   327.98
  .002384    600.     600.    600.        1       15        0      .00   344.04   672.02


*SECNO 192.800
   192.80   14.97  1081.17  1077.47      .00  1084.22     3.05     1.20      .01  1084.20
   69000.      0.  69000.      0.       0.    4925.       0.     838.      59.  1084.20
      .15     .00    14.01     .00     .030     .030     .030     .000  1066.20   328.03
  .002412    500.     500.    500.        0       15        0      .00   343.94   671.97
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME_	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	14.99	1082.69	1078.97	.00	1085.74	3.04	1.52	.00	1086.20
69000.	0.	69000.	0.	0.	4930.	0.	909.	64.	1086.20
.16	.00	14.00	.00	.030	.030	.030	.000	1067.70	328.01
.002403	630.	630.	630.	1	15	0	.00	343.97	671.99

THIS RUN EXECUTED 10-06-89

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

3S4CD.DAT (W/ DEBRIS)

SUMMARY PRINTOUT

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
123.000	1051.00	.00	.00	1061.67	1058.18	1063.25	.00	41000.00	10.09	4064.35	10.67	391.83
123.000	1051.00	.00	.00	1065.92	1061.13	1068.16	.00	69000.00	12.00	5748.08	14.92	400.52
130.900	1052.60	790.00	2.03	1063.16	1059.78	1064.78	1.52	41000.00	10.20	4019.17	10.56	391.12
130.900	1052.60	790.00	2.03	1067.29	1062.74	1069.60	1.42	69000.00	12.20	5653.51	14.69	399.39
137.900	1054.00	700.00	2.00	1064.53	1061.18	1066.16	1.38	41000.00	10.23	4007.37	10.53	391.06
137.900	1054.00	700.00	2.00	1068.57	1064.14	1070.92	1.31	69000.00	12.32	5602.48	14.57	399.14
144.850	1055.40	700.00	2.00	1065.91	1062.59	1067.55	1.39	41000.00	10.26	3997.54	10.51	391.01
144.850	1055.40	700.00	2.00	1069.89	1065.53	1072.27	1.34	69000.00	12.39	5569.06	14.49	398.97
147.100	1055.85	225.00	2.00	1066.02	1063.67	1068.26	.53	41000.00	12.02	3410.12	10.17	345.56
147.100	1055.85	225.00	2.00	1069.76	1066.87	1073.08	.53	69000.00	14.62	4718.56	13.91	353.14
154.000	1057.20	690.00	1.96	1068.11	1065.01	1070.05	1.76	41000.00	11.18	3667.06	10.91	347.06
154.000	1057.20	690.00	1.96	1071.98	1068.22	1074.90	1.78	69000.00	13.73	5026.43	14.78	354.89
157.830	1058.00	385.00	2.08	1069.02	1065.84	1070.92	.86	41000.00	11.07	3702.74	11.02	347.04
157.830	1058.00	385.00	2.08	1072.95	1069.02	1075.81	.89	69000.00	13.58	5080.94	14.95	354.89
159.450	1058.40	162.00	2.47	1069.37	1066.24	1071.29	.36	41000.00	11.12	3688.48	10.97	347.07
159.450	1058.40	162.00	2.47	1073.31	1069.43	1076.18	.37	69000.00	13.61	5070.71	14.91	354.99
160.260	1058.47	81.00	.86	1069.90	.00	1071.66	.37	41000.00	10.67	3843.72	11.43	347.81
160.260	1058.47	81.00	.86	1074.15	.00	1076.74	.56	69000.00	12.92	5341.79	15.68	356.31
167.800	1060.00	754.00	2.03	1071.37	1067.82	1073.16	1.48	41000.00	10.72	3824.82	11.37	347.74
167.800	1060.00	754.00	2.03	1075.60	1071.02	1078.22	1.47	69000.00	12.98	5314.87	15.60	356.21
169.800	1060.60	200.00	3.00	1071.63	1068.59	1073.66	.43	41000.00	11.44	3585.05	11.03	336.06
169.800	1060.60	200.00	3.00	1075.79	1071.89	1078.75	.42	69000.00	13.80	5000.92	15.19	344.38

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
175.800	1062.10	600.00	2.50	1073.04	1070.11	1075.10	1.43	41000.00	11.54	3553.31	10.94	335.87
175.800	1062.10	600.00	2.50	1077.15	1073.37	1080.16	1.40	69000.00	13.93	4952.01	15.05	344.10
181.800	1063.50	600.00	2.33	1074.50	1071.50	1076.54	1.44	41000.00	11.47	3575.45	11.00	336.00
181.800	1063.50	600.00	2.33	1078.58	1074.77	1081.58	1.42	69000.00	13.90	4962.81	15.08	344.16
187.700	1064.97	600.00	2.45	1075.92	1072.98	1077.98	1.43	41000.00	11.51	3561.96	10.95	335.92
187.700	1064.97	600.00	2.45	1079.99	1076.24	1083.01	1.42	69000.00	13.96	4942.56	15.02	344.04
192.800	1066.20	500.00	2.46	1077.12	1074.20	1079.19	1.21	41000.00	11.56	3546.87	10.92	335.83
192.800	1066.20	500.00	2.46	1081.17	1077.47	1084.22	1.20	69000.00	14.01	4924.50	14.97	343.94
199.000	1067.70	630.00	2.38	1078.67	1075.70	1080.72	1.52	41000.00	11.50	3564.05	10.97	335.93
199.000	1067.70	630.00	2.38	1082.69	1078.97	1085.74	1.52	69000.00	14.00	4930.21	14.99	343.97

SUMMARY OF ERRORS AND SPECIAL NOTES

THIS RUN EXECUTED 10-06-89

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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* WATER SURFACE PROFILES                          *
* VERSION OF NOVEMBER 1976                        *
* UPDATED MAY 1984                                *
* IBM-PC-XT VERSION AUGUST 1985                   *
* RUN DATE  10-09-89   TIME  08:12:45              *
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* U.S. ARMY CORPS OF ENGINEERS        *
* THE HYDROLOGIC ENGINEERING CENTER   *
* 609 SECOND STREET, SUITE D          *
* DAVIS, CALIFORNIA 95616             *
  * (916) 440-2105 (FTS) 448-2105
*************************************
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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
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Northern Avenue at New River
near Phoenix, Arizona
4 Span / 3-5 ft. Dia. Columns
Without Debris Buildup

THIS RUN EXECUTED 10-09-89

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*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
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THIS IS THE RUN USED FOR SCOUR ?

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THIS IS AN ARCHIVAL RUN ALL DATA AND RESULTS ARE SAVED ON UNIT   96

AC
T1            SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2       100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3      4S3C.DAT (W/O DEBRIS)   DATA FROM CVL CHANNELIZATION PLANS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       2.       0.       0.   .000000     .00       .0       0.  1061.670    .000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH     FN      ALLDC    IBW      CHNIM    ITRACE

     1.000     .000   -1.000     .000     .000     .000   -1.000    .000     .000     .000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000   42.000   39.000   33.000    1.000    2.000    3.000   11.000   14.000   26.000


    25.000    8.000    4.000     .000     .000     .000     .000     .000     .000     .000


NC      .030      .030      .030      .100      .300      .000      .000      .000      .000      .000
QT     2.000 41000.000 69000.000      .000      .000      .000      .000      .000      .000      .000
X1   123.000    10.000   297.000   703.000      .000      .000      .000      .000      .000      .000
GR  1068.600   297.000  1051.000   315.000  1051.000   368.000  1051.000   421.000  1051.000   500.000
GR  1051.000   527.000  1051.000   580.000  1051.000   633.000  1051.000   685.000  1068.600   703.000

X1   130.900     5.000   300.000   700.000   790.000   790.000   790.000      .000      .000      .000
GR  1067.600   300.000  1052.600   315.000  1052.600   500.000  1052.600   685.000  1067.600   700.000

X1   137.900     5.000   300.000   700.000   700.000   700.000   700.000      .000      .000      .000
GR  1069.000   300.000  1054.000   315.000  1054.000   500.000  1054.000   685.000  1069.000   700.000

X1   144.850     5.000   300.000   700.000   700.000   700.000   700.000      .000      .000      .000
GR  1070.400   300.000  1055.400   315.000  1055.400   500.000  1055.400   685.000  1070.400   700.000

X1   147.100    10.000   319.000   681.000   225.000   225.000   225.000      .000    -1.350      .000
GR  1075.500   319.000  1057.200   337.500  1057.200   383.000  1057.200   430.000  1057.200   476.000
GR  1057.200   500.000  1057.200   568.000  1057.200   614.000  1057.200   662.500  1075.500   681.000
```

X1	154.000	10.000	319.000	681.000	690.000	690.000	690.000	.000	.000	.000
GR	1075.500	319.000	1057.200	337.500	1057.200	383.000	1057.200	430.000	1057.200	476.000
GR	1057.200	500.000	1057.200	568.000	1057.200	614.000	1057.200	662.500	1075.500	681.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	157.830	5.000	321.500	678.500	385.000	385.000	385.000	.000	.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
X1	159.450	5.000	319.000	681.000	162.000	162.000	162.000	.000	.000	.000
GR	1076.800	319.000	1058.400	337.500	1058.400	500.000	1058.400	662.500	1076.800	681.000
SB	1.050	1.560	2.900	388.000	325.000	15.000	6251.000	1.000	1058.470	1058.300
X1	160.260	5.000	319.000	681.000	81.000	81.000	81.000	.000	.000	.000
X2	.000	.000	1.000	1077.470	1080.470	.000	.000	1.330	.000	.000
GR	1077.000	319.000	1058.470	337.500	1058.470	500.000	1058.470	662.500	1077.000	681.000
X1	167.800	5.000	321.500	678.500	754.000	754.000	754.000	.000	2.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
NC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
X1	169.800	5.000	325.000	675.000	200.000	200.000	200.000	.000	.000	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	175.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1080.100	325.000	1062.100	343.000	1062.100	500.000	1062.100	657.000	1080.100	675.000
X1	181.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1081.500	325.000	1063.500	343.000	1063.500	500.000	1063.500	657.000	1081.500	675.000
X1	187.700	5.000	325.000	675.000	600.000	600.000	600.000	.000	4.370	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	192.800	5.000	325.000	675.000	500.000	500.000	500.000	.000	.000	.000
GR	1084.200	325.000	1066.200	343.000	1066.200	500.000	1066.200	657.000	1084.200	675.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	199.000	5.000	324.500	675.500	630.000	630.000	630.000	.000	.000	.000
GR	1086.200	324.500	1067.700	343.000	1067.700	500.000	1067.700	657.000	1086.200	675.500
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300

*SECNO 123.000

123.00	10.67	1061.67	1058.18	1061.67	1063.25	1.58	.00	.00	1068.60
41000.	0.	41000.	0.	0.	4064.	0.	0.	0.	1068.60
.00	.00	10.09	.00	.030	.030	.030	.000	1051.00	304.09
.001888	0.	0.	0.	0	13	0	.00	391.83	695.91

*SECNO 130.900

130.90	10.56	1063.16	1059.78	.00	1064.78	1.62	1.52	.01	1067.60
41000.	0.	41000.	0.	0.	4019.	0.	73.	7.	1067.60
.02	.00	10.20	.00	.030	.030	.030	.000	1052.60	304.44
.001955	790.	790.	790.	0	14	0	.00	391.12	695.56

*SECNO 137.900

137.90	10.53	1064.53	1061.18	.00	1066.16	1.63	1.38	.00	1069.00
41000.	0.	41000.	0.	0.	4007.	0.	138.	13.	1069.00
.04	.00	10.23	.00	.030	.030	.030	.000	1054.00	304.47
.001974	700.	700.	700.	2	14	0	.00	391.06	695.53

*SECNO 144.850

144.85	10.51	1065.91	1062.59	.00	1067.55	1.63	1.39	.00	1070.40
41000.	0.	41000.	0.	0.	3998.	0.	202.	20.	1070.40
.06	.00	10.26	.00	.030	.030	.030	.000	1055.40	304.49
.001989	700.	700.	700.	0	14	0	.00	391.01	695.51

*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

147.10	10.17	1066.02	1063.67	.00	1068.26	2.24	.53	.18	1074.15
41000.	0.	41000.	0.	0.	3410.	0.	221.	22.	1074.15
.06	.00	12.02	.00	.030	.030	.030	.000	1055.85	327.22
.002873	225.	225.	225.	2	15	0	.00	345.56	672.78

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


*SECNO 154.000
   154.00    10.91  1068.11  1065.01      .00  1070.05     1.94     1.76      .03  1075.50
   41000.       0.  41000.       0.       0.    3667.       0.     277.      27.   1075.50
      .08      .00    11.18      .00     .030     .030     .030     .000  1057.20   326.47
  .002273     690.     690.     690.        2       15        0      .00   347.06   673.53


CCHV=    .300 CEHV=    .500
*SECNO 157.830
   157.83    11.02  1069.02  1065.84      .00  1070.92     1.90      .86      .01  1074.00
   41000.       0.  41000.       0.       0.    3703.       0.     310.      30.   1074.00
      .09      .00    11.07      .00     .030     .030     .030     .000  1058.00   326.48
  .002202     385.     385.     385.        2       15        0      .00   347.04   673.52


*SECNO 159.450
   159.45    10.97  1069.37  1066.24      .00  1071.29     1.92      .36      .01  1076.80
   41000.       0.  41000.       0.       0.    3688.       0.     324.      31.   1076.80
      .10      .00    11.12      .00     .030     .030     .030     .000  1058.40   326.46
  .002230     162.     162.     162.        1       15        0      .00   347.07   673.54


SPECIAL BRIDGE

SB  XK       XKOR     COFQ     RDLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
     1.05     1.56     2.90   388.00   325.00    15.00  6251.00     1.00  1058.47  1058.30

*SECNO 160.260
CLASS A LOW FLOW

3420 BRIDGE W.S.=   1069.14 BRIDGE VELOCITY=,     11.88     CALCULATED CHANNEL AREA=,     3423.

 EGPRS     EGLWC     H3       QWEIR    QLOW     BAREA   TRAPEZOID     ELLC     ELTRD
                                                          AREA
      .00  1071.57     .39        0.  41000.    6251.    6251.     1077.47  1080.47


   160.26    11.29  1069.76      .00      .00  1071.57     1.81      .28      .00  1077.00
   41000.       0.  41000.       0.       0.    3798.       0.     331.      32.   1077.00
      .10      .00    10.80      .00     .000     .030     .000     .000  1058.47   326.22
  .002029      81.      81.      81.        0        0        0      .00   347.55   673.78
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*SECNO 167.800
  167.80   11.29  1071.29  1067.81      .00  1073.10     1.81     1.53      .00  1076.00
  41000.      0.  41000.       0.       0.    3798.       0.     396.      38.  1076.00
     .12     .00    10.79      .00     .030     .030     .030     .000  1060.00   326.21
 .002029    754.     754.     754.        2       19        0      .00   347.59   673.79


CCHV=    .100 CEHV=    .300
*SECNO 169.800
  169.80   10.96  1071.56  1068.62      .00  1073.62     2.06      .44      .07  1078.60
  41000.      0.  41000.       0.       0.    3562.       0.     413.      40.  1078.60
     .12     .00    11.51      .00     .030     .030     .030     .000  1060.60   332.04
 .002401    200.     200.     200.        2       15        0      .00   335.92   667.96


*SECNO 175.800
  175.80   10.90  1073.00  1070.10      .00  1075.08     2.08     1.45      .01  1080.10
  41000.      0.  41000.       0.       0.    3541.       0.     462.      44.  1080.10
     .14     .00    11.58      .00     .030     .030     .030     .000  1062.10   332.10
 .002448    600.     600.     600.        2       15        0      .00   335.80   667.90


*SECNO 181.800
  181.80   10.99  1074.49  1071.50      .00  1076.53     2.05     1.45      .00  1081.50
  41000.      0.  41000.       0.       0.    3570.       0.     511.      49.  1081.50
     .15     .00    11.48      .00     .030     .030     .030     .000  1063.50   332.01
 .002384    600.     600.     600.        2       15        0      .00   335.97   667.99


*SECNO 187.700
  187.70   10.94  1075.91  1072.98      .00  1077.98     2.06     1.44      .00  1082.97
  41000.      0.  41000.       0.       0.    3556.       0.     560.      54.  1082.97
     .17     .00    11.53      .00     .030     .030     .030     .000  1064.97   332.06
 .002414    600.     600.     600.        2       15        0      .00   335.89   667.94


*SECNO 192.800
  192.80   10.92  1077.12  1074.20      .00  1079.19     2.08     1.21      .00  1084.20
  41000.      0.  41000.       0.       0.    3546.       0.     601.      57.  1084.20
     .18     .00    11.56      .00     .030     .030     .030     .000  1066.20   332.09
 .002437    500.     500.     500.        0       15        0      .00   335.83   667.91
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	10.97	1078.67	1075.70	.00	1080.72	2.05	1.52	.01	1086.20
41000.	0.	41000.	0.	0.	3564.	0.	652.	62.	1086.20
.19	.00	11.50	.00	.030	.030	.030	.000	1067.70	332.03
.002396	630.	630.	630.	2	15	0	.00	335.94	667.97

THIS RUN EXECUTED 10-09-89

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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T1          SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2      100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
 3     4S3C.DAT (W/O DEBRIS)   DATA FROM CVL CHANNELIZATION PLANS
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J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0.	3.	0.	0.	.000000	.00	.0	0.	1065.920	.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15.000	.000	-1.000	.000	.000	.000	-1.000	.000	.000	.000

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

*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300

*SECNO 123.000

123.00	14.92	1065.92	1061.13	1065.92	1068.16	2.24	.00	.00	1068.60
69000.	0.	69000.	0.	0.	5748.	0.	0.	0.	1068.60
.00	.00	12.00	.00	.030	.030	.030	.000	1051.00	299.74
.001752	0.	0.	0.	0	13	0	.00	400.52	700.26

*SECNO 130.900

130.90	14.69	1067.29	1062.74	.00	1069.60	2.31	1.42	.02	1067.60
69000.	0.	69000.	0.	0.	5654.	0.	103.	7.	1067.60
.02	.00	12.20	.00	.030	.030	.030	.000	1052.60	300.30
.001845	790.	790.	790.	1	14	0	.00	399.39	699.70

*SECNO 137.900

137.90	14.57	1068.57	1064.14	.00	1070.92	2.36	1.31	.01	1069.00
69000.	0.	69000.	0.	0.	5602.	0.	194.	14.	1069.00
.03	.00	12.32	.00	.030	.030	.030	.000	1054.00	300.43
.001899	700.	700.	700.	2	14	0	.00	399.14	699.57

*SECNO 144.850

144.85	14.49	1069.89	1065.53	.00	1072.27	2.38	1.34	.01	1070.40
69000.	0.	69000.	0.	0.	5569.	0.	284.	20.	1070.40
.05	.00	12.39	.00	.030	.030	.030	.000	1055.40	300.52
.001936	700.	700.	700.	1	19	0	.00	398.97	699.48

*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

147.10	13.91	1069.76	1066.87	.00	1073.08	3.32	.53	.28	1074.15
69000.	0.	69000.	0.	0.	4719.	0.	310.	22.	1074.15
.05	.00	14.62	.00	.030	.030	.030	.000	1055.85	323.43
.002868	225.	225.	225.	2	15	0	.00	353.14	676.57

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


*SECNO 154.000
   154.00   14.78  1071.98  1068.22      .00  1074.90     2.93     1.78      .04  1075.50
   69000.      0.   69000.       0.       0.    5026.       0.     387.      28.  1075.50
      .07     .00    13.73      .00     .030     .030     .030     .000  1057.20   322.55
  .002344    690.     690.     690.        2       15        0      .00   354.89   677.45


CCHV=    .300 CEHV=    .500
*SECNO 157.830
   157.83   14.95  1072.95  1069.02      .00  1075.81     2.86      .89      .02  1074.00
   69000.      0.   69000.       0.       0.    5081.       0.     432.      31.  1074.00
      .08     .00    13.58      .00     .030     .030     .030     .000  1058.00   322.55
  .002263    385.     385.     385.        2       15        0      .00   354.89   677.45


*SECNO 159.450
   159.45   14.91  1073.31  1069.43      .00  1076.18     2.88      .37      .01  1076.80
   69000.      0.   69000.       0.       0.    5071.       0.     451.      32.  1076.80
      .08     .00    13.61      .00     .030     .030     .030     .000  1058.40   322.50
  .002278    162.     162.     162.        1       15        0      .00   354.99   677.50


SPECIAL BRIDGE

3B  XK       XKOR     COFQ     RDLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
     1.05     1.56     2.90   388.00   325.00    15.00  6251.00     1.00  1058.47  1058.30

'SECNO 160.260
CLASS A LOW FLOW

)420 BRIDGE W.S.=   1072.89 BRIDGE VELOCITY=,     14.66     CALCULATED CHANNEL AREA=,     4677.

 EGPRS    EGLWC    H3       QWEIR    QLOW     BAREA   TRAPEZOID    ELLC     ELTRD
                                                         AREA
      .00  1076.60     .63       0.   69000.    6251.    6251.   1077.47  1080.47


   160.26   15.47  1073.94      .00      .00  1076.60     2.67      .42      .00  1077.00
   69000.      0.   69000.       0.       0.    5266.       0.     460.      33.  1077.00
      .08     .00    13.10      .00     .000     .030     .000     .000  1058.47   322.06
  .002019     81.      81.      81.        0        0        0      .00   355.89   677.94
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS    BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA    LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 167.800
  167.80   15.46  1075.46  1071.05      .00  1078.13     2.67     1.52      .00  1076.00
  69000.      0.  69000.       0.       0.    5263.       0.     552.      39.  1076.00
     .10     .00    13.11      .00     .030     .030     .030     .000  1060.00   322.04
 .002023    754.     754.     754.        2       15        0      .00   355.92   677.96


CCHV=    .100 CEHV=    .300
*SECNO 169.800
  169.80   15.06  1075.66  1071.88      .00  1078.67     3.01      .44      .10  1078.60
  69000.      0.  69000.       0.       0.    4955.       0.     575.      41.  1078.60
     .10     .00    13.92      .00     .030     .030     .030     .000  1060.60   327.94
 .002365    200.     200.     200.        2       15        0      .00   344.12   672.06


*SECNO 175.800
  175.80   14.96  1077.06  1073.37      .00  1080.11     3.05     1.43      .01  1080.10
  69000.      0.  69000.       0.       0.    4923.       0.     643.      45.  1080.10
     .11     .00    14.02      .00     .030     .030     .030     .000  1062.10   328.04
 .002415    600.     600.     600.        2       15        0      .00   343.93   671.96


*SECNO 181.800
  181.80   15.03  1078.53  1074.77      .00  1081.56     3.02     1.44      .00  1081.50
  69000.      0.  69000.       0.       0.    4947.       0.     711.      50.  1081.50
     .12     .00    13.95      .00     .030     .030     .030     .000  1063.50   327.97
 .002378    600.     600.     600.        2       15        0      .00   344.07   672.03


*SECNO 187.700
  187.70   14.99  1079.96  1076.24      .00  1082.99     3.04     1.43      .01  1082.97
  69000.      0.  69000.       0.       0.    4933.       0.     779.      55.  1082.97
     .14     .00    13.99      .00     .030     .030     .030     .000  1064.97   328.01
 .002399    600.     600.     600.        1       15        0      .00   343.99   671.99


*SECNO 192.800
  192.80   14.95  1081.15  1077.47      .00  1084.20     3.06     1.21      .01  1084.20
  69000.      0.  69000.       0.       0.    4918.       0.     836.      59.  1084.20
     .15     .00    14.03      .00     .030     .030     .030     .000  1066.20   328.05
 .002423    500.     500.     500.        0       15        0      .00   343.90   671.95
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	14.98	1082.68	1078.97	.00	1085.73	3.05	1.52	.00	1086.20
69000.	0.	69000.	0.	0.	4926.	0.	907.	64.	1086.20
.16	.00	14.01	.00	.030	.030	.030	.000	1067.70	328.03
.002410	630.	630.	630.	1	15	0	.00	343.95	671.97

THIS RUN EXECUTED 10-09-89

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

4S3C.DAT (W/O DEBRIS)

SUMMARY PRINTOUT

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
123.000	1051.00	.00	.00	1061.67	1058.18	1063.25	.00	41000.00	10.09	4064.35	10.67	391.83
123.000	1051.00	.00	.00	1065.92	1061.13	1068.16	.00	69000.00	12.00	5748.08	14.92	400.52
130.900	1052.60	790.00	2.03	1063.16	1059.78	1064.78	1.52	41000.00	10.20	4019.17	10.56	391.12
130.900	1052.60	790.00	2.03	1067.29	1062.74	1069.60	1.42	69000.00	12.20	5653.51	14.69	399.39
137.900	1054.00	700.00	2.00	1064.53	1061.18	1066.16	1.38	41000.00	10.23	4007.37	10.53	391.06
137.900	1054.00	700.00	2.00	1068.57	1064.14	1070.92	1.31	69000.00	12.32	5602.48	14.57	399.14
144.850	1055.40	700.00	2.00	1065.91	1062.59	1067.55	1.39	41000.00	10.26	3997.54	10.51	391.01
144.850	1055.40	700.00	2.00	1069.89	1065.53	1072.27	1.34	69000.00	12.39	5569.06	14.49	398.97
147.100	1055.85	225.00	2.00	1066.02	1063.67	1068.26	.53	41000.00	12.02	3410.12	10.17	345.56
147.100	1055.85	225.00	2.00	1069.76	1066.87	1073.08	.53	69000.00	14.62	4718.56	13.91	353.14
154.000	1057.20	690.00	1.96	1068.11	1065.01	1070.05	1.76	41000.00	11.18	3667.06	10.91	347.06
154.000	1057.20	690.00	1.96	1071.98	1068.22	1074.90	1.78	69000.00	13.73	5026.43	14.78	354.89
157.830	1058.00	385.00	2.08	1069.02	1065.84	1070.92	.86	41000.00	11.07	3702.74	11.02	347.04
157.830	1058.00	385.00	2.08	1072.95	1069.02	1075.81	.89	69000.00	13.58	5080.94	14.95	354.89
159.450	1058.40	162.00	2.47	1069.37	1066.24	1071.29	.36	41000.00	11.12	3688.48	10.97	347.07
159.450	1058.40	162.00	2.47	1073.31	1069.43	1076.18	.37	69000.00	13.61	5070.71	14.91	354.99
160.260	1058.47	81.00	.86	1069.76	.00	1071.57	.28	41000.00	10.80	3797.79	11.29	347.55
160.260	1058.47	81.00	.86	1073.94	.00	1076.60	.42	69000.00	13.10	5266.37	15.47	355.89
167.800	1060.00	754.00	2.03	1071.29	1067.81	1073.10	1.53	41000.00	10.79	3798.17	11.29	347.59
167.800	1060.00	754.00	2.03	1075.46	1071.05	1078.13	1.52	69000.00	13.11	5263.02	15.46	355.92
169.800	1060.60	200.00	3.00	1071.56	1068.62	1073.62	.44	41000.00	11.51	3562.04	10.96	335.92
169.800	1060.60	200.00	3.00	1075.66	1071.88	1078.67	.44	69000.00	13.92	4955.41	15.06	344.12

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
175.800	1062.10	600.00	2.50	1073.00	1070.10	1075.08	1.45	41000.00	11.58	3540.97	10.90	335.80
175.800	1062.10	600.00	2.50	1077.06	1073.37	1080.11	1.43	69000.00	14.02	4922.95	14.96	343.93
181.800	1063.50	600.00	2.33	1074.49	1071.50	1076.53	1.45	41000.00	11.48	3570.00	10.99	335.97
181.800	1063.50	600.00	2.33	1078.53	1074.77	1081.56	1.44	69000.00	13.95	4947.01	15.03	344.07
187.700	1064.97	600.00	2.45	1075.91	1072.98	1077.98	1.44	41000.00	11.53	3556.05	10.94	335.89
187.700	1064.97	600.00	2.45	1079.96	1076.24	1082.99	1.43	69000.00	13.99	4933.15	14.99	343.99
192.800	1066.20	500.00	2.46	1077.12	1074.20	1079.19	1.21	41000.00	11.56	3545.80	10.92	335.83
192.800	1066.20	500.00	2.46	1081.15	1077.47	1084.20	1.21	69000.00	14.03	4917.70	14.95	343.90
199.000	1067.70	630.00	2.38	1078.67	1075.70	1080.72	1.52	41000.00	11.50	3564.38	10.97	335.94
199.000	1067.70	630.00	2.38	1082.68	1078.97	1085.73	1.52	69000.00	14.01	4925.93	14.98	343.95

SUMMARY OF ERRORS AND SPECIAL NOTES

THIS RUN EXECUTED 10-09-89

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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* WATER SURFACE PROFILES                          *
* VERSION OF NOVEMBER 1976                        *
* UPDATED MAY 1984                                *
* IBM-PC-XT VERSION AUGUST 1985                   *
* RUN DATE  10-09-89   TIME  08:16:29              *
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* U.S. ARMY CORPS OF ENGINEERS        *
* THE HYDROLOGIC ENGINEERING CENTER   *
* 609 SECOND STREET, SUITE D          *
* DAVIS, CALIFORNIA 95616             *
  * (916) 440-2105 (FTS) 448-2105
****************************************
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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
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Northern Avenue at New River
near Phoenix, Arizona
4 Span / 3-5 ft. Dia. Columns
With Debris Buildup

THIS RUN EXECUTED 10-09-89

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**************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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THIS IS AN ARCHIVAL RUN ALL DATA AND RESULTS ARE SAVED ON UNIT 96

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AC
T1          SIMONS, LI & ASSOCIATES, INC. -- BRW, INC.
T2     100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3    4S3CD.DAT (W/ DEBRIS)   DATA FROM CVL CHANNELIZATION PLANS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.      2.       0.       0.   .000000     .00      .0       0.   1061.670   .000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    1.000    .000    -1.000    .000     .000     .000    -1.000    .000     .000     .000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

   38.000   42.000   39.000   33.000    1.000    2.000    3.000   11.000   14.000   26.000

   25.000    8.000    4.000     .000     .000     .000     .000     .000     .000     .000

NC     .030     .030     .030     .100     .300     .000     .000     .000     .000     .000
OT    2.000  41000.000 69000.000    .000     .000     .000     .000     .000     .000     .000
X1  123.000   10.000  297.000  703.000     .000     .000     .000     .000     .000     .000
GR 1068.600  297.000 1051.000  315.000 1051.000  368.000 1051.000  421.000 1051.000  500.000
GR 1051.000  527.000 1051.000  580.000 1051.000  633.000 1051.000  685.000 1068.600  703.000

X1  130.900    5.000  300.000  700.000  790.000  790.000  790.000     .000     .000     .000
GR 1067.600  300.000 1052.600  315.000 1052.600  500.000 1052.600  685.000 1067.600  700.000

X1  137.900    5.000  300.000  700.000  700.000  700.000  700.000     .000     .000     .000
GR 1069.000  300.000 1054.000  315.000 1054.000  500.000 1054.000  685.000 1069.000  700.000

X1  144.850    5.000  300.000  700.000  700.000  700.000  700.000     .000     .000     .000
GR 1070.400  300.000 1055.400  315.000 1055.400  500.000 1055.400  685.000 1070.400  700.000

X1  147.100   10.000  319.000  681.000  225.000  225.000  225.000     .000   -1.350     .000
GR 1075.500  319.000 1057.200  337.500 1057.200  383.000 1057.200  430.000 1057.200  476.000
GR 1057.200  500.000 1057.200  568.000 1057.200  614.000 1057.200  662.500 1075.500  681.000
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X1	154.000	10.000	319.000	681.000	690.000	690.000	690.000	.000	.000	.000
GR	1075.500	319.000	1057.200	337.500	1057.200	383.000	1057.200	430.000	1057.200	476.000
GR	1057.200	500.000	1057.200	568.000	1057.200	614.000	1057.200	662.500	1075.500	681.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	157.830	5.000	321.500	678.500	385.000	385.000	385.000	.000	.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
X1	159.450	5.000	319.000	681.000	162.000	162.000	162.000	.000	.000	.000
GR	1076.800	319.000	1058.400	337.500	1058.400	500.000	1058.400	662.500	1076.800	681.000
SB	1.050	1.560	2.900	388.000	325.000	30.000	5966.000	1.000	1058.470	1058.300
X1	160.260	5.000	319.000	681.000	81.000	81.000	81.000	.000	.000	.000
X2	.000	.000	1.000	1077.470	1080.470	.000	.000	1.330	.000	.000
GR	1077.000	319.000	1058.470	337.500	1058.470	500.000	1058.470	662.500	1077.000	681.000
X1	167.800	5.000	321.500	678.500	754.000	754.000	754.000	.000	2.000	.000
GR	1074.000	321.500	1058.000	337.500	1058.000	500.000	1058.000	662.500	1074.000	678.500
NC	.030	.030	.030	.100	.300	.000	.000	.000	.000	.000
X1	169.800	5.000	325.000	675.000	200.000	200.000	200.000	.000	.000	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	175.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1080.100	325.000	1062.100	343.000	1062.100	500.000	1062.100	657.000	1080.100	675.000
X1	181.800	5.000	325.000	675.000	600.000	600.000	600.000	.000	.000	.000
GR	1081.500	325.000	1063.500	343.000	1063.500	500.000	1063.500	657.000	1081.500	675.000
X1	187.700	5.000	325.000	675.000	600.000	600.000	600.000	.000	4.370	.000
GR	1078.600	325.000	1060.600	343.000	1060.600	500.000	1060.600	657.000	1078.600	675.000
X1	192.800	5.000	325.000	675.000	500.000	500.000	500.000	.000	.000	.000
GR	1084.200	325.000	1066.200	343.000	1066.200	500.000	1066.200	657.000	1084.200	675.000
NC	.030	.030	.030	.300	.500	.000	.000	.000	.000	.000
X1	199.000	5.000	324.500	675.500	630.000	630.000	630.000	.000	.000	.000
GR	1086.200	324.500	1067.700	343.000	1067.700	500.000	1067.700	657.000	1086.200	675.500
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300

*SECNO 123.000

123.00	10.67	1061.67	1058.18	1061.67	1063.25	1.58	.00	.00	1068.60
41000.	0.	41000.	0.	0.	4064.	0.	0.	0.	1068.60
.00	.00	10.09	.00	.030	.030	.030	.000	1051.00	304.09
.001888	0.	0.	0.	0	13	0	.00	391.83	695.91

*SECNO 130.900

130.90	10.56	1063.16	1059.78	.00	1064.78	1.62	1.52	.01	1067.60
41000.	0.	41000.	0.	0.	4019.	0.	73.	7.	1067.60
.02	.00	10.20	.00	.030	.030	.030	.000	1052.60	304.44
.001955	790.	790.	790.	0	14	0	.00	391.12	695.56

*SECNO 137.900

137.90	10.53	1064.53	1061.18	.00	1066.16	1.63	1.38	.00	1069.00
41000.	0.	41000.	0.	0.	4007.	0.	138.	13.	1069.00
.04	.00	10.23	.00	.030	.030	.030	.000	1054.00	304.47
.001974	700.	700.	700.	2	14	0	.00	391.06	695.53

*SECNO 144.850

144.85	10.51	1065.91	1062.59	.00	1067.55	1.63	1.39	.00	1070.40
41000.	0.	41000.	0.	0.	3998.	0.	202.	20.	1070.40
.06	.00	10.26	.00	.030	.030	.030	.000	1055.40	304.49
.001989	700.	700.	700.	0	14	0	.00	391.01	695.51

*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

147.10	10.17	1066.02	1063.67	.00	1068.26	2.24	.53	.18	1074.15
41000.	0.	41000.	0.	0.	3410.	0.	221.	22.	1074.15
.06	.00	12.02	.00	.030	.030	.030	.000	1055.85	327.22
.002873	225.	225.	225.	2	15	0	.00	345.56	672.78

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

*SECNO 154.000

154.00	10.91	1068.11	1065.01	.00	1070.05	1.94	1.76	.03	1075.50
41000.	0.	41000.	0.	0.	3667.	0.	277.	27.	1075.50
.08	.00	11.18	.00	.030	.030	.030	.000	1057.20	326.47
.002273	690.	690.	690.	2	15	0	.00	347.06	673.53

CCHV= .300 CEHV= .500

*SECNO 157.830

157.83	11.02	1069.02	1065.84	.00	1070.92	1.90	.86	.01	1074.00
41000.	0.	41000.	0.	0.	3703.	0.	310.	30.	1074.00
.09	.00	11.07	.00	.030	.030	.030	.000	1058.00	326.48
.002202	385.	385.	385.	2	15	0	.00	347.04	673.52

*SECNO 159.450

159.45	10.97	1069.37	1066.24	.00	1071.29	1.92	.36	.01	1076.80
41000.	0.	41000.	0.	0.	3688.	0.	324.	31.	1076.80
.10	.00	11.12	.00	.030	.030	.030	.000	1058.40	326.46
.002230	162.	162.	162.	1	15	0	.00	347.07	673.54

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.05	1.56	2.90	388.00	325.00	30.00	5966.00	1.00	1058.47	1058.30

*SECNO 160.260

CLASS A LOW FLOW

3420 BRIDGE W.S.= 1068.65 BRIDGE VELOCITY=, 13.08 CALCULATED CHANNEL AREA=, 3108.

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD
.00	1071.85	.79	0.	41000.	5966.	5966.	1077.47	1080.47

160.26	11.69	1070.16	.00	.00	1071.85	1.68	.56	.00	1077.00
41000.	0.	41000.	0.	0.	3937.	0.	331.	32.	1077.00
.10	.00	10.41	.00	.000	.030	.000	.000	1058.47	325.82
.001807	81.	81.	81.	0	0	0	.00	348.35	674.18

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


*SECNO 167.800
   167.80   11.53  1071.53  1067.82      .00  1073.27     1.73     1.39      .02  1076.00
   41000.      0.   41000.       0.       0.    3882.       0.     398.      38.  1076.00
      .12     .00    10.56      .00     .030     .030     .030     .000  1060.00   325.97
  .001892    754.     754.     754.        2       14        0      .00   348.07   674.03


CCHV=    .100 CEHV=    .300
*SECNO 169.800
   169.80   11.18  1071.78  1068.59      .00  1073.75     1.98      .41      .07  1078.60
   41000.      0.   41000.       0.       0.    3634.       0.     416.      40.  1078.60
      .12     .00    11.28      .00     .030     .030     .030     .000  1060.60   331.82
  .002252    200.     200.     200.        2       19        0      .00   336.35   668.18


*SECNO 175.800
   175.80   11.02  1073.12  1070.11      .00  1075.15     2.04     1.38      .02  1080.10
   41000.      0.   41000.       0.       0.    3581.       0.     465.      44.  1080.10
      .14     .00    11.45      .00     .030     .030     .030     .000  1062.10   331.98
  .002361    600.     600.     600.        2       15        0      .00   336.03   668.02


*SECNO 181.800
   181.80   11.04  1074.54  1071.51      .00  1076.57     2.03     1.41      .00  1081.50
   41000.      0.   41000.       0.       0.    3587.       0.     515.      49.  1081.50
      .15     .00    11.43      .00     .030     .030     .030     .000  1063.50   331.97
  .002349    600.     600.     600.        2       15        0      .00   336.07   668.03


*SECNO 187.700
   187.70   10.97  1075.94  1072.98      .00  1077.99     2.05     1.42      .01  1082.97
   41000.      0.   41000.       0.       0.    3568.       0.     564.      54.  1082.97
      .17     .00    11.49      .00     .030     .030     .030     .000  1064.97   332.02
  .002388    600.     600.     600.        0       15        0      .00   335.96   667.98


*SECNO 192.800
   192.80   10.93  1077.13  1074.20      .00  1079.20     2.07     1.20      .01  1084.20
   41000.      0.   41000.       0.       0.    3551.       0.     605.      57.  1084.20
      .18     .00    11.55      .00     .030     .030     .030     .000  1066.20   332.07
  .002426    500.     500.     500.        0       15        0      .00   335.86   667.93
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500

*SECNO 199.000

199.00	10.97	1078.67	1075.70	.00	1080.73	2.05	1.52	.01	1086.20
41000.	0.	41000.	0.	0.	3566.	0.	656.	62.	1086.20
.19	.00	11.50	.00	.030	.030	.030	.000	1067.70	332.03
.002392	630.	630.	630.	2	15	0	.00	335.95	667.97

THIS RUN EXECUTED 10-09-89

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**************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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T1 SIMONS, LI & ASSOCIATES, INC. — BRW, INC.
T2 100-YEAR & SPF ANALYSIS FOR NORTHERN AVENUE @ NEW RIVER
T3 4S3CD.DAT (W/ DEBRIS) DATA FROM CVL CHANNELIZATION PLANS

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0.	3.	0.	0.	.000000	.00	.0	0.	1065.920	.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15.000	.000	-1.000	.000	.000	.000	-1.000	.000	.000	.000

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


*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=    .100 CEHV=    .300
*SECNO 123.000
  123.00    14.92  1065.92  1061.13  1065.92  1068.16     2.24      .00      .00  1068.60
  69000.       0.   69000.       0.       0.    5748.       0.       0.       0.   1068.60
     .00      .00    12.00      .00     .030     .030     .030     .000  1051.00   299.74
 .001752       0.       0.       0.        0       13        0      .00   400.52   700.26


*SECNO 130.900
  130.90    14.69  1067.29  1062.74      .00  1069.60     2.31     1.42      .02  1067.60
  69000.       0.   69000.       0.       0.    5654.       0.     103.       7.   1067.60
     .02      .00    12.20      .00     .030     .030     .030     .000  1052.60   300.30
 .001845     790.     790.     790.        1       14        0      .00   399.39   699.70


*SECNO 137.900
  137.90    14.57  1068.57  1064.14      .00  1070.92     2.36     1.31      .01  1069.00
  69000.       0.   69000.       0.       0.    5602.       0.     194.      14.   1069.00
     .03      .00    12.32      .00     .030     .030     .030     .000  1054.00   300.43
 .001899     700.     700.     700.        2       14        0      .00   399.14   699.57


*SECNO 144.850
  144.85    14.49  1069.89  1065.53      .00  1072.27     2.38     1.34      .01  1070.40
  69000.       0.   69000.       0.       0.    5569.       0.     284.      20.   1070.40
     .05      .00    12.39      .00     .030     .030     .030     .000  1055.40   300.52
 .001936     700.     700.     700.        1       19        0      .00   398.97   699.48


*SECNO 147.100

3301 HV CHANGED MORE THAN HVINS

  147.10    13.91  1069.76  1066.87      .00  1073.08     3.32      .53      .28  1074.15
  69000.       0.   69000.       0.       0.    4719.       0.     310.      22.   1074.15
     .05      .00    14.62      .00     .030     .030     .030     .000  1055.85   323.43
 .002868     225.     225.     225.        2       15        0      .00   353.14   676.57
```

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


*SECNO 154.000
   154.00    14.78  1071.98  1068.22      .00  1074.90     2.93     1.78      .04  1075.50
   69000.       0.  69000.       0.       0.    5026.       0.     387.      28.   1075.50
      .07      .00    13.73      .00     .030     .030     .030     .000  1057.20   322.55
  .002344     690.     690.     690.        2       15        0      .00   354.89   677.45


CCHV=    .300 CEHV=    .500
*SECNO 157.830
   157.83    14.95  1072.95  1069.02      .00  1075.81     2.86      .89      .02  1074.00
   69000.       0.  69000.       0.       0.    5081.       0.     432.      31.   1074.00
      .08      .00    13.58      .00     .030     .030     .030     .000  1058.00   322.55
  .002263     385.     385.     385.        2       15        0      .00   354.89   677.45


*SECNO 159.450
   159.45    14.91  1073.31  1069.43      .00  1076.18     2.88      .37      .01  1076.80
   69000.       0.  69000.       0.       0.    5071.       0.     451.      32.   1076.80
      .08      .00    13.61      .00     .030     .030     .030     .000  1058.40   322.50
  .002278     162.     162.     162.        1       15        0      .00   354.99   677.50


SPECIAL BRIDGE

SB  XK       XKOR     COFQ     RDLEN    BWC      BWP      BAREA    SS       ELCHU    ELCHD
     1.05     1.56     2.90   388.00   325.00    30.00  5966.00     1.00  1058.47  1058.30

*SECNO 160.260
CLASS A LOW FLOW

3420 BRIDGE W.S.=   1071.99 BRIDGE VELOCITY=,     16.43     CALCULATED CHANNEL AREA=,     4172.

 EGPRS     EGLWC     H3       QWEIR    QLOW     BAREA   TRAPEZOID     ELLC     ELTRD
                                                          AREA
      .00  1077.03     1.27        0.  69000.    5966.    5966.     1077.47  1080.47


   160.26    16.11  1074.58      .00      .00  1077.03     2.45      .85      .00  1077.00
   69000.       0.  69000.       0.       0.    5495.       0.     461.      33.   1077.00
      .08      .00    12.56      .00     .000     .030     .000     .000  1058.47   321.41
  .001763      81.      81.      81.        0        0        0      .00   357.17   678.59
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*SECNO 167.800
  167.80   15.91  1075.91  1071.03      .00  1078.42     2.51     1.36      .03  1076.00
  69000.      0.   69000.       0.       0.    5423.       0.     555.      39.  1076.00
     .10     .00    12.72      .00     .030     .030     .030     .000  1060.00   321.59
 .001840    754.     754.     754.        2       14        0      .00   356.81   678.41


CCHV=    .100 CEHV=    .300
*SECNO 169.800
  169.80   15.47  1076.07  1071.91      .00  1078.92     2.84      .40      .10  1078.60
  69000.      0.   69000.       0.       0.    5098.       0.     579.      41.  1078.60
     .10     .00    13.53      .00     .030     .030     .030     .000  1060.60   327.53
 .002161    200.     200.     200.        2       15        0      .00   344.95   672.47


*SECNO 175.800
  175.80   15.24  1077.34  1073.39      .00  1080.28     2.94     1.33      .03  1080.10
  69000.      0.   69000.       0.       0.    5017.       0.     649.      45.  1080.10
     .11     .00    13.75      .00     .030     .030     .030     .000  1062.10   327.76
 .002274    600.     600.     600.        2       15        0      .00   344.48   672.24


*SECNO 181.800
  181.80   15.20  1078.70  1074.78      .00  1081.65     2.95     1.37      .00  1081.50
  69000.      0.   69000.       0.       0.    5003.       0.     718.      50.  1081.50
     .13     .00    13.79      .00     .030     .030     .030     .000  1063.50   327.80
 .002294    600.     600.     600.        2       15        0      .00   344.39   672.20


*SECNO 187.700
  187.70   15.09  1080.06  1076.25      .00  1083.05     2.99     1.39      .01  1082.97
  69000.      0.   69000.       0.       0.    4968.       0.     787.      55.  1082.97
     .14     .00    13.89      .00     .030     .030     .030     .000  1064.97   327.90
 .002345    600.     600.     600.        0       15        0      .00   344.19   672.10


*SECNO 192.800
  192.80   15.02  1081.22  1077.47      .00  1084.25     3.03     1.18      .01  1084.20
  69000.      0.   69000.       0.       0.    4942.       0.     844.      59.  1084.20
     .15     .00    13.96      .00     .030     .030     .030     .000  1066.20   327.98
 .002386    500.     500.     500.        0       15        0      .00   344.04   672.02
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


CCHV=    .300 CEHV=    .500
*SECNO 199.000
  199.00    15.02  1082.72  1078.97      .00  1085.75     3.03     1.50      .00  1086.20
  69000.       0.  69000.       0.       0.    4941.       0.     915.      64.   1086.20
     .16      .00    13.97      .00     .030     .030     .030     .000  1067.70   327.98
 .002388     630.     630.     630.        1       15        0      .00   344.03   672.02
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THIS RUN EXECUTED 10-09-89

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

S3CD.DAT (W/ DEBRIS)

SUMMARY PRINTOUT

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
123.000	1051.00	.00	.00	1061.67	1058.18	1063.25	.00	41000.00	10.09	4064.35	10.67	391.83
123.000	1051.00	.00	.00	1065.92	1061.13	1068.16	.00	69000.00	12.00	5748.08	14.92	400.52
130.900	1052.60	790.00	2.03	1063.16	1059.78	1064.78	1.52	41000.00	10.20	4019.17	10.56	391.12
130.900	1052.60	790.00	2.03	1067.29	1062.74	1069.60	1.42	69000.00	12.20	5653.51	14.69	399.39
137.900	1054.00	700.00	2.00	1064.53	1061.18	1066.16	1.38	41000.00	10.23	4007.37	10.53	391.06
137.900	1054.00	700.00	2.00	1068.57	1064.14	1070.92	1.31	69000.00	12.32	5602.48	14.57	399.14
144.850	1055.40	700.00	2.00	1065.91	1062.59	1067.55	1.39	41000.00	10.26	3997.54	10.51	391.01
144.850	1055.40	700.00	2.00	1069.89	1065.53	1072.27	1.34	69000.00	12.39	5569.06	14.49	398.97
147.100	1055.85	225.00	2.00	1066.02	1063.67	1068.26	.53	41000.00	12.02	3410.12	10.17	345.56
147.100	1055.85	225.00	2.00	1069.76	1066.87	1073.08	.53	69000.00	14.62	4718.56	13.91	353.14
154.000	1057.20	690.00	1.96	1068.11	1065.01	1070.05	1.76	41000.00	11.18	3667.06	10.91	347.06
154.000	1057.20	690.00	1.96	1071.98	1068.22	1074.90	1.78	69000.00	13.73	5026.43	14.78	354.89
157.830	1058.00	385.00	2.08	1069.02	1065.84	1070.92	.86	41000.00	11.07	3702.74	11.02	347.04
157.830	1058.00	385.00	2.08	1072.95	1069.02	1075.81	.89	69000.00	13.58	5080.94	14.95	354.89
159.450	1058.40	162.00	2.47	1069.37	1066.24	1071.29	.36	41000.00	11.12	3688.48	10.97	347.07
159.450	1058.40	162.00	2.47	1073.31	1069.43	1076.18	.37	69000.00	13.61	5070.71	14.91	354.99
160.260	1058.47	81.00	.86	1070.16	.00	1071.85	.56	41000.00	10.41	3937.15	11.69	348.35
160.260	1058.47	81.00	.86	1074.58	.00	1077.03	.85	69000.00	12.56	5495.38	16.11	357.17
167.800	1060.00	754.00	2.03	1071.53	1067.82	1073.27	1.39	41000.00	10.56	3881.65	11.53	348.07
167.800	1060.00	754.00	2.03	1075.91	1071.03	1078.42	1.36	69000.00	12.72	5422.63	15.91	356.81
169.800	1060.60	200.00	3.00	1071.78	1068.59	1073.75	.41	41000.00	11.28	3633.89	11.18	336.35
169.800	1060.60	200.00	3.00	1076.07	1071.91	1078.92	.40	69000.00	13.53	5097.94	15.47	344.95

SECNO	ELMIN	XLCH	K*CHSL	CWSEL	CRIWS	EG	HL	QCH	VCH	AREA	DEPTH	TOPWID
175.800	1062.10	600.00	2.50	1073.12	1070.11	1075.15	1.38	41000.00	11.45	3580.74	11.02	336.03
175.800	1062.10	600.00	2.50	1077.34	1073.39	1080.28	1.33	69000.00	13.75	5016.82	15.24	344.48
181.800	1063.50	600.00	2.33	1074.54	1071.51	1076.57	1.41	41000.00	11.43	3586.69	11.04	336.07
181.800	1063.50	600.00	2.33	1078.70	1074.78	1081.65	1.37	69000.00	13.79	5002.69	15.20	344.39
187.700	1064.97	600.00	2.45	1075.94	1072.98	1077.99	1.42	41000.00	11.49	3568.40	10.97	335.96
187.700	1064.97	600.00	2.45	1080.06	1076.25	1083.05	1.39	69000.00	13.89	4968.35	15.09	344.19
192.800	1066.20	500.00	2.46	1077.13	1074.20	1079.20	1.20	41000.00	11.55	3550.72	10.93	335.86
192.800	1066.20	500.00	2.46	1081.22	1077.47	1084.25	1.18	69000.00	13.96	4941.68	15.02	344.04
199.000	1067.70	630.00	2.38	1078.67	1075.70	1080.73	1.52	41000.00	11.50	3566.43	10.97	335.95
199.000	1067.70	630.00	2.38	1082.72	1078.97	1085.75	1.50	68999.99	13.97	4940.54	15.02	344.03

SUMMARY OF ERRORS AND SPECIAL NOTES

THIS RUN EXECUTED 10-09-89

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
 IBM-PC-XT VERSION AUGUST 1985
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APPENDIX B

SCOUR COMPUTATIONS

ANTIDUNE SCOUR DEPTH: (KENNEDY, 1963)

I) λ = WAVE LENGTH OF ANTIDUNES $= \frac{2\pi V^2}{g}$

II) TWO DIMENSIONAL WAVES BREAK WHEN THE RATIO OF WAVE HEIGHT TO WAVE LENGTH REACHES A VALUE OF APPROXIMATELY 0.14

h_a = ANTIDUNE WAVE HEIGHT FROM CREST TO TROUGH (AMPLITUDE)

THEREFORE:

$$\frac{h_a}{\lambda} = 0.14$$

$$h_a = 0.14 \frac{2\pi}{g} V^2$$

III) BED FORM SCOUR IS USUALLY DEFINED AS $\frac{1}{2} h_a$, THEREFORE, THE ANTIDUNE SCOUR DEPTH IS DEFINED AS:

$$h = \frac{1}{2} h_a = 0.14 \frac{2\pi}{g} V^2$$

$$h = \text{ANTIDUNE SCOUR DEPTH} = \left(\frac{V}{8.56}\right)^2$$

WHERE: V = MAXIMUM VELOCITY IN THE STUDY REACH

100-YEAR EVENT: $V_{MAX.} = 11.6$ ft/sec

$$h = \left(\frac{11.6}{8.56}\right)^2 = 1.84 \text{ ft} \simeq 1.8 \text{ ft}$$

SPF EVENT: $V_{MAX.} = 14.6$ ft/sec

$$h = \left(\frac{14.6}{8.56}\right)^2 = 2.91 \text{ ft} \simeq 2.9 \text{ ft}$$

PIER SCOUR: (C.S.U. EQUATION)

$$Y_s = 2.0\, Y_1 \left(\frac{a}{Y_1}\right)^{0.65} Fr^{0.43}$$

From Highways in river environment eqn. 5.5.25

WHERE: Y_s = LOCAL PIER SCOUR DEPTH, ft.

Y_1 = FLOW DEPTH UPSTREAM OF PIER, ft.

a = PIER WIDTH, ft.

Fr = FROUDE NUMBER = $\dfrac{V}{(gY)^{0.5}}$

HEC-2 HYDRAULICS:

DESCRIPTION	DISCHARGE (cfs)	UPSTREAM FLOW DEPTH (ft)	AVERAGE VELOCITY (ft/sec)	FROUDE NUMBER
3 SPAN / 4-5'ϕ COLUMNS (W/O DEBRIS)	41,000	11.2	10.9	0.577
	69,000	15.3	13.3	0.600
3 SPAN / 4-5'ϕ COLUMNS (W/ DEBRIS)	41,000	11.4	10.7	0.556
	69,000	15.7	12.9	0.575
4 SPAN / 3-5'ϕ COLUMNS (W/O DEBRIS)	41,000	11.3	10.8	0.566
	69,000	15.5	13.1	0.587
4 SPAN / 3-5'ϕ COLUMNS (W/ DEBRIS)	41,000	11.7	10.4	0.537
	69,000	16.1	12.6	0.551

I) 100-YEAR EVENT, W/O DEBRIS

$$Y_p = 2.0\,(11.2)\left(\frac{5}{11.2}\right)^{0.65}(0.577)^{0.43}$$

$$\underline{Y_p = 10.5 \text{ ft}}$$

II) 100-YEAR EVENT, W/ DEBRIS $(a = 2a)$

$$Y_p = 2.0\,(11.4)\left(\frac{10}{11.4}\right)^{0.65}(0.556)^{0.43}$$

$$\underline{Y_p = 16.3 \text{ ft}}$$

III) SPF EVENT, W/O DEBRIS

$$Y_p = 2.0\,(15.3)\left(\frac{5}{15.3}\right)^{0.65}(0.600)^{0.43}$$

$$\underline{Y_p = 11.9 \text{ ft}}$$

IV) SPF EVENT, W/ DEBRIS $(a = 2a)$

$$Y_p = 2.0\,(15.7)\left(\frac{10}{15.7}\right)^{0.65}(0.575)^{0.43}$$

$$\underline{Y_p = 18.5 \text{ ft}}$$

I) 100-YEAR EVENT, W/O DEBRIS

$$Y_p = 2.0\,(11.3)\left(\frac{5}{11.3}\right)^{0.65}(0.566)^{0.43}$$

$$\underline{Y_p = 10.4 \text{ ft}}$$

II) 100-YEAR EVENT, W/ DEBRIS $(a = 2a)$

$$Y_p = 2.0\,(11.7)\left(\frac{10}{11.7}\right)^{0.65}(0.537)^{0.43}$$

$$\underline{Y_p = 16.2 \text{ ft}}$$

III) SPF EVENT, W/O DEBRIS

$$Y_p = 2.0\,(15.5)\left(\frac{5}{15.5}\right)^{0.65}(0.587)^{0.43}$$

$$\underline{Y_p = 11.8 \text{ ft}}$$

IV) SPF EVENT, W/ DEBRIS $(a = 2a)$

$$Y_p = 2.0\,(16.1)\left(\frac{10}{16.1}\right)^{0.65}(0.551)^{0.43}$$

$$\underline{Y_p = 18.3 \text{ ft}}$$