00BREAK00

1) COUNTY: Cheboygan

2) STUDY NAME: City of Cheboygan

3) WATERCOURSE: Cheboygan River

4) DOCUMENT TYPE: 100 yr profile

00BREAK00

Johnson & Anderson, Inc.

THIS RUN EXECUTED 01/10/86 12:43:02

100 YEAR w/ X-SECTION PLOTS

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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 APRIL 1985
*************************************************

C
T1      JOB 12202-01     CHEBOYGAN CITY FIS     NGVDatum
T2      100 YEAR FLOOD     4700 CFS
T3           CHEBOYGAN RIVER

J1  ICHECI     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FD

      0.        4.        0.        0.    .000000      .00        .0     4700.    580.360     .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

    -1.000     1.000      .000     5.000    20.000     .000      .000      .000      .000      .000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000    39.000    42.000    43.000     1.000    10.000    11.000    12.000    14.000     8.000

     4.000      .000      .000      .000      .000      .000      .000      .000      .000      .000

NC     .060      .060      .030      .300      .500      .000      .000      .000      .000      .000
       MOUTH OF RIVER / SECTION ONE MOVED 500 FEET DS
X1    1.000    40.000   871.000  1280.000      .000      .000      .000      .000      .000      .000
GR  582.600      .000   582.800    47.000   584.200   152.000   584.000   263.000   582.800   360.000
GR  582.800   389.000   582.200   424.000   581.600   534.000   582.300   639.000   582.100   756.000
GR  582.300   871.000   581.400   875.000   581.300   876.000   580.500   881.000   580.100   886.000
GR  579.600   891.000   578.300   896.000   569.100   921.000   557.900   946.000   553.800   971.000
GR  553.300   996.000   551.400  1021.000   552.900  1046.000   553.400  1071.000   554.900  1096.000
GR  560.000  1121.000   567.700  1146.000   576.100  1171.000   577.400  1196.000   574.100  1221.000
GR  578.100  1251.000   579.100  1256.000   579.700  1261.000   581.400  1266.000   583.100  1267.000
GR  584.900  1280.000   586.400  1376.000   585.800  1472.000   583.900  1562.000   581.100  1627.000

       SECTION ONE (J&A/WS 1985)
X1  500.000      .000      .000      .000   500.000   500.000   500.000      .000      .000      .000

       SECTION TWO (J&A/WS 1985)
X1 1980.000    41.000   533.000   891.000  1480.000  1480.000  1480.000      .000      .000      .000
GR  585.400      .000   584.200   103.000   584.300   165.000   583.800   312.000   583.200   388.000
GR  584.400   405.000   584.100   429.000   584.700   474.000   584.100   533.000   581.400   585.000
GR  580.700   595.000   578.400   600.000   565.300   608.000   564.200   617.000   561.100   632.000
GR  555.800   660.000   554.400   675.000   551.700   705.000   552.100   735.000   551.400   739.000
GR  553.400   759.000   555.400   789.000   564.900   834.000   567.400   845.000   571.800   854.000
GR  579.200   874.000   580.000   879.000   580.600   884.000   581.400   889.000   582.500   891.000
GR  582.800   975.000   582.500  1164.000   582.700  1264.000   583.600  1367.000   585.400  1404.000
GR  583.700  1449.000   583.100  1555.000   583.400  1655.000   583.900  1775.000   582.500  1925.000
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GR     582.900    2141.000       .000       .000       .000       .000       .000       .000       .000       .000

         250 FEET DS BRIDGE / REPEAT OF SECTION TWO / WIDTH X .83 / SEDIMENT
X1    3600.000       .000       .000       .000    1620.000    1620.000    1620.000       .830       .000       .000
X3       .000     559.200       .000       .000       .000       .000       .000       .000       .000       .000

         1' DS BRIDGE / USED SECTION FOUR MOVED FROM 250 FEET US BRIDGE / LOWERED
         INVERT TO DEPTH AT BRIDGE
X1    3820.000     30.000     389.000     563.000     220.000     220.000     220.000       .000       .000       .000
X3      10.000       .000       .000       .000       .000       .000       .000     591.100     586.400       .000
GR     589.300       .000     588.400      35.000     589.300      74.000     588.000     153.000     587.400     182.000
GR     587.600     211.000     585.800     267.000     583.800     308.000     581.800     377.000     581.400     379.000
GR     573.400     384.000     573.000     389.000     571.400     394.000     570.400     404.000     559.200     429.000
GR     559.200     559.000     571.900     563.000     582.700     570.000     585.100     596.000     586.400     655.000
GR     586.800     691.000     586.700     712.000     586.200     735.000     587.500     827.000     587.300     861.000
GR     586.600     890.000     587.100     919.000     588.500     942.000     588.800     979.000     590.000    1077.000

SB       1.150       1.560       2.600       .000      60.000      26.000    3210.000       2.580     561.500     561.500
         1' US BRIDGE / REPEAT 3820
X1    3875.000       .000       .000       .000      55.000      55.000      55.000       .000       .000       .000
X2       .000       .000      1.000     590.800     586.400       .000       .000       .000       .000       .000
X3      10.000       .000       .000       .000       .000       .000       .000     591.100     586.400       .000
BT       9.000       .000     591.100       .000     153.000     595.300       .000     267.000     592.600       .000
BT     559.000     587.200       .000     570.000     586.400       .000     712.000     587.000       .000     890.000
BT     588.000       .000     919.000     588.100       .000    1077.000     590.000       .000       .000       .000

         50 FEET US BRIDGE / USED SECTION FOUR MOVED 150 FEET DS / LOWER BOT. 5'
X1    3925.000      34.000     379.000     570.000      50.000      50.000      50.000       .000       .000       .000
GR     589.300       .000     588.400      35.000     589.300      74.000     588.000     153.000     587.400     182.000
GR     587.600     211.000     585.800     267.000     583.800     308.000     581.800     377.000     581.400     379.000
GR     573.400     384.000     568.000     389.000     566.400     394.000     565.400     404.000     564.800     429.000
GR     564.400     454.000     563.400     497.000     563.500     504.000     565.400     529.000     566.100     554.000
GR     566.600     559.000     571.900     563.000     582.700     570.000     585.100     596.000     586.400     655.000
GR     586.800     691.000     586.700     712.000     586.200     735.000     587.500     827.000     587.300     861.000
GR     586.600     890.000     587.100     919.000     588.500     942.000     588.800     979.000       .000       .000

         SECTION FOUR (J&A/WS 1985)
X1    4075.000       .000       .000       .000     150.000     150.000     150.000       .000       .000       .000

         SECTION FIVE (J&A/WS 1985)
X1    5245.000      24.000     348.000     485.000    1170.000    1170.000    1170.000       .000       .000       .000
GR     590.600       .000     590.200      29.000     589.600     116.000     588.200     208.000     587.000     271.000
GR     581.600     348.000     573.100     356.000     572.200     363.000     570.500     373.000     567.400     398.000
GR     565.800     423.000     565.500     448.000     576.600     465.000     579.000     470.000     580.300     475.000
GR     581.600     480.000     582.900     485.000     583.700     499.000     583.200     557.000     588.500     598.000
GR     588.500     632.000     588.800     704.000     589.400     803.000     590.100     923.000       .000       .000

         SECTION SIX  (J&A/WS 1985)
X1    6645.000      24.000      97.000     224.000    1400.000    1400.000    1400.000       .000       .000       .000
GR     600.400       .000     599.200       5.000     599.300      35.000     599.400      64.000     599.000      84.000
GR     590.300      97.000     582.700     107.000     581.600     108.000     580.700     112.000     569.600     117.000
GR     570.100     122.000     568.300     127.000     568.300     157.000     569.900     182.000     576.100     204.000
GR     576.600     209.000     580.200     214.000     581.600     219.000     586.900     224.000     586.200     260.000
GR     586.000     317.000     598.400     376.000     600.100     421.000     600.600     525.000       .000       .000
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         100 FEET DS DAM TAILRACE / REPEAT OF SECTION SIX
X1    7400.000      .000      .000      .000   775.000   700.000   755.000      .000      .000      .000

         750 FEET DS SPILLWAY / FROM CHART SOUNDINGS /REDUCE FLOW BY AMT THRU
         POWERHOUSE
X1    7760.000     4.000      .000   160.000   360.000   360.000   360.000      .000      .000      .000
X2    1915.000      .000      .000      .000      .000      .000      .000      .000      .000      .000
GR     595.000      .000   575.800    50.000   575.800   110.000   600.000   160.000      .000      .000

         100 FEET DS SPILLWAY /  FROM CHART SOUNDINGS
X1    8410.000     4.000      .000   410.000   400.000   900.000   650.000      .000      .000      .000
GR     596.000      .000   576.000   130.000   576.000   340.000   600.000   410.000      .000      .000

         100 FEET US SPILLWAY /  FROM CHART SOUNDINGS / RESTART W.S. FROM DAM
         RATING CURVE (ADJUSTED TO 1976 FLOOD)
X1    8610.000    13.000    50.000   285.000   200.000   200.000   200.000      .000      .000      .000
X2    4700.000      .000      .000      .000      .000      .000      .000      .000      .000      .000
X5       4.000   591.770   592.570   592.940   593.590      .000      .000      .000      .000      .000
GR     600.000      .000   596.000      .000   596.500    50.000   586.600    50.000   586.600    70.000
GR     581.600    90.000   586.600   110.000   586.600   175.000   586.600   215.000   589.600   255.000
GR     590.600   285.000   596.000   285.000   600.000   300.000      .000      .000      .000      .000

         SECTION EIGHT 475 FEET U/S SPILLWAY (J&A/WS 1985)
X1    8985.000    29.000      .000   463.000   375.000   375.000   375.000      .000      .000      .000
GR     601.900      .000   595.700    16.000   593.100    17.000   593.000    23.000   588.400    26.000
GR     586.600    28.000   583.000    33.000   579.600    38.000   576.600    48.000   576.900    73.000
GR     577.900    98.000   580.700   123.000   583.200   148.000   585.700   173.000   587.200   198.000
GR     586.700   223.000   587.700   248.000   588.200   273.000   588.200   298.000   587.900   323.000
GR     585.400   348.000   583.500   373.000   581.600   398.000   587.300   423.000   590.700   433.000
GR     591.100   438.000   591.600   443.000   592.700   448.000   601.500   463.000      .000      .000

         1  D/S LINCOLN ST BRIDGE- USED U/S FACE SOUNDINGS- NORMAL BRIDGE
X1    9435.000    22.000      .000   341.000   600.000   300.000   450.000      .000      .000      .000
X3       .000      .000      .000      .000      .000   200.000   595.000      .000      .000      .000
GR     592.600      .000   592.600    19.000   591.100    24.000   587.600    29.000   584.500    34.000
GR     581.500    44.000   580.500    69.000   581.100    94.000   582.400   119.000   583.400   144.000
GR     587.600   166.000   588.800   191.000   588.400   216.000   589.200   241.000   588.400   266.000
GR     587.700   291.000   588.600   316.000   590.100   326.000   590.600   331.000   591.500   336.000
GR     592.600   341.000   598.000   370.000      .000      .000      .000      .000      .000      .000

         D/S FACE BRIDGE (J&A/WS 1985)
X1    9436.000    47.000      .000   344.000     1.000     1.000     1.000      .000      .000      .000
X2       .000      .000      .000   604.000   605.000      .000      .000      .000      .000      .000
X3       .000      .000      .000      .000      .000   200.000   595.000      .000      .000      .000
GR     604.000      .000   604.000     2.200   600.500     3.200   600.500     9.700   594.900     9.700
GR     592.600    19.000   591.100    24.000   587.600    29.000   584.500    34.000   581.500    44.000
GR     581.000    58.500   606.600    58.500   606.600    59.800   581.000    59.800   580.500    69.000
GR     581.100    94.000   582.400   119.000   608.400   119.000   608.400   120.300   582.400   120.300
GR     583.400   144.000   587.600   166.000   588.000   179.000   609.300   179.000   609.300   180.300
GR     588.000   180.300   588.800   191.000   588.400   216.000   589.200   239.000   609.100   239.000
GR     609.100   240.300   589.200   240.300   588.400   266.000   587.700   291.000   588.000   299.000
GR     608.100   299.000   608.100   300.300   588.000   300.300   588.600   316.000   590.100   326.000
GR     590.600   331.000   591.500   336.000   592.600   341.000   594.000   344.000   602.300   344.000
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GR    602.300    353.500    606.900    354.900       .000       .000       .000       .000       .000       .000

        U/S FACE BRIDGE
X1   9485.000       .000       .000       .000     49.000     49.000     49.000       .000       .000       .000
XC       .000       .000       .000       .000       .000    185.000    595.000       .000       .000       .000

        1' U/S BRIDGE
X1   9486.000     22.000       .000    341.000      1.000      1.000      1.000       .000       .000       .000
XC       .000       .000       .000       .000       .000    185.000    595.000       .000       .000       .000
GR    592.600       .000    592.600     19.000    591.100     24.000    587.600     29.000    584.500     34.000
GR    581.500     44.000    580.500     69.000    581.100     94.000    582.400    119.000    583.400    144.000
GR    587.600    166.000    588.800    191.000    588.400    216.000    589.200    241.000    588.400    266.000
GR    587.700    291.000    588.600    316.000    590.100    326.000    590.600    331.000    591.500    336.000
GR    592.600    341.000    598.000    370.000       .000       .000       .000       .000       .000       .000

        SECTION TEN / 100 FEET U/S BRIDGE (J&A/WS 1985)
X1   9585.000     17.000      2.000    166.000     99.000     99.000     99.000       .000       .000       .000
XC     10.000       .000       .000       .000       .000       .000       .000       .000       .000       .000
GR    604.600       .000    604.600      2.000    592.700     20.000    583.200     26.000    581.800     31.000
GR    580.900     36.000    579.400     46.000    580.700     71.000    581.500     96.000    583.500    121.000
GR    584.200    151.000    584.900    156.000    587.500    161.000    594.500    166.000    593.200    238.000
GR    594.200    324.000    605.000    391.000       .000       .000       .000       .000       .000       .000

        SECTION ELEVEN (J&A/WS 1985)
X1  11385.000     20.000     36.000    229.000   1900.000   1550.000   1800.000       .000       .000       .000
GR    604.200       .000    598.700     31.000    597.300     36.000    592.800     42.000    591.200     47.000
GR    590.500     52.000    590.200     57.000    586.800     67.000    581.600     92.000    581.500    117.000
GR    581.300    142.000    581.800    167.000    582.900    192.000    585.800    214.000    587.800    219.000
GR    590.700    224.000    591.700    228.000    594.900    229.000    601.100    255.000    605.500    282.000

        SECTION TWELVE (J&A/WS 1985)
X1  13085.000     26.000    194.000    575.000   1700.000   1700.000   1700.000       .000       .000       .000
GR    600.000       .000    597.800     58.000    596.700    122.000    594.900    194.000    590.200    195.000
GR    591.200    199.000    590.600    204.000    589.100    209.000    584.300    219.000    575.600    244.000
GR    569.700    269.000    570.100    294.000    572.700    319.000    574.000    344.000    576.700    369.000
GR    588.800    434.000    591.500    459.000    591.200    484.000    591.700    509.000    591.900    519.000
GR    592.200    524.000    592.400    529.000    592.700    534.000    593.100    534.000    596.900    575.000
GR    603.900    617.000       .000       .000       .000       .000       .000       .000       .000       .000
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

CCHV=    .300 CEHV=    .500
*SECNO 1.000
        MOUTH OF RIVER / SECTION ONE MOVED 500 FEET DS
     1.00     28.96   580.36       .00    580.36    580.37       .01       .00       .00    582.30
    4700.        0.    4700.        0.        0.    6167.        0.        0.        0.    584.90
      .00       .00      .76       .00      .060      .030      .060      .000    551.40    882.75
  .000006        0.       0.        0.         0         0         0       .00    380.19   1262.94

*SECNO 500.000
        SECTION ONE (J&A/WS 1985)
   500.00     28.96   580.36       .00       .00    580.37       .01       .00       .00    582.30
    4700.        0.    4700.        0.        0.    6168.        0.       71.        4.    584.90
      .18       .00      .76       .00      .060      .030      .060      .000    551.40    882.71
  .000006      500.     500.      500.         0         0         0       .00    380.24   1262.95

*SECNO 1980.000
        SECTION TWO (J&A/WS 1985)
  1980.00     28.97   580.37       .00       .00    580.38       .01       .01       .00    584.10
    4700.        0.    4700.        0.        0.    5864.        0.      275.       16.    582.50
      .70       .00      .80       .00      .060      .030      .060      .000    551.40    595.71
  .000005     1480.    1480.     1480.         0         0         0       .00    286.38    882.10

*SECNO 3600.000
        250 FEET DS BRIDGE / REPEAT OF SECTION TWO / WIDTH X .83 / SEDIMENT
  3600.00     21.18   580.38       .00       .00    580.40       .02       .01       .01    584.10
    4700.        0.    4700.        0.        0.    4115.        0.      461.       25.    582.50
     1.09       .00     1.14       .00      .060      .030      .060      .000    559.20    494.43
  .000013     1620.    1620.     1620.         0         0         0       .00    237.77    732.19

*SECNO 3820.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40

        1' DS BRIDGE / USED SECTION FOUR MOVED FROM 250 FEET US BRIDGE / LOWERED
        INVERT TO DEPTH AT BRIDGE
  3820.00     21.18   580.38       .00       .00    580.41       .03       .00       .01    573.00
    4700.        0.    4700.        0.        0.    3338.        0.      480.       26.    571.90
     1.13       .00     1.41       .00      .060      .030      .060      .000    559.20    389.00
  .000017      220.     220.      220.         0         0         0       .00    174.00    563.00
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SECNO	DEPTH	CWSEL	CRIWS	WSELR	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

SPECIAL BRIDGE

SB	XR	XLOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.15	1.56	2.60	.00	60.00	26.00	3210.00	2.58	561.50	561.50

*SECNO 3875.000
CLASS A LOW FLOW

3420 BRIDGE W.S.= 580.31 BRIDGE VELOCITY=, 3.03 CALCULATED CHANNEL AREA=, 1553.

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD
.00	580.42	.01	0.	4700.	3210.	3211.	590.80	586.40

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 591.10 ELREA= 586.40

1' US BRIDGE / REPEAT 3820

3875.00	21.19	580.39	.00	.00	580.42	.03	.01	.00	573.00
4700.	0.	4700.	0.	0.	3339.	0.	484.	27.	571.90
1.14	.00	1.41	.00	.000	.030	.000	.000	559.20	389.00
.000017	55.	55.	55.	0	0	0	.00	174.00	563.00

*SECNO 3925.000
50 FEET US BRIDGE / USED SECTION FOUR MOVED 150 FEET DS / LOWER BOT. 5'

3925.00	16.98	580.38	.00	.00	580.43	.04	.00	.01	581.40
4700.	0.	4700.	0.	0.	2781.	0.	487.	27.	582.70
1.15	.00	1.69	.00	.060	.030	.060	.000	563.40	379.63
.000035	50.	50.	50.	0	0	0	.00	188.87	568.50

*SECNO 4075.000
SECTION FOUR (J&A/WS 1985)

4075.00	16.99	580.39	.00	.00	580.43	.04	.01	.00	581.40
4700.	0.	4700.	0.	0.	2781.	0.	497.	28.	582.70
1.18	.00	1.69	.00	.060	.030	.060	.000	563.40	379.63
.000035	150.	150.	150.	0	0	0	.00	188.87	568.50

*SECNO 5245.000
SECTION FIVE (J&A/WS 1985)

5245.00	14.90	580.40	.00	.00	580.59	.19	.09	.07	581.60
4700.	0.	4700.	0.	0.	1346.	0.	552.	32.	582.90
1.27	.00	3.49	.00	.060	.030	.060	.000	565.50	349.13
.000229	1170.	1170.	1170.	2	0	0	.00	126.25	475.38

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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 6645.000
        SECTION SIX  (J&A/WS 1985)
 6645.00    12.48   580.78      .00       .00   581.11      .33       .45       .07   590.30
   4700.       0.    4700.       0.        0.    1012.       0.      590.       35.    586.90
    1.35      .00     4.64      .00      .060     .030     .060      .000   568.30   111.67
 .000478    1400.    1400.    1400.        2        0        0       .00   104.38   216.05

*SECNO 7400.000
        100 FEET DS DAM TAILRACE / REPEAT OF SECTION SIX
 7400.00    12.85   581.15      .00       .00   581.46      .31       .34       .01   590.30
   4700.       0.    4700.       0.        0.    1052.       0.      608.       37.    586.90
    1.40      .00     4.47      .00      .060     .030     .060      .000   568.30   109.99
 .000436     775.     755.     700.        2        0        0       .00   107.41   217.40

*SECNO 7760.000
        750 FEET DS SPILLWAY / FROM CHART SOUNDINGS /REDUCE FLOW BY AMT THRU
        POWERHOUSE
 7760.00     5.53   581.33      .00       .00   581.68      .35       .20       .02   595.00
   1915.       0.    1915.       0.        0.     403.       0.      614.       38.    600.00
    1.42      .00     4.76      .00      .060     .030     .060      .000   575.80    35.61
 .001215     360.     360.     360.        1        0        0       .00    85.80   121.41

*SECNO 8410.000
        100 FEET DS SPILLWAY /  FROM CHART SOUNDINGS
 8410.00     5.89   581.89      .00       .00   581.92      .03       .14       .10   596.00
   1915.       0.    1915.       0.        0.    1397.       0.      628.       41.    600.00
    1.55      .00     1.37      .00      .060     .030     .060      .000   576.00    91.79
 .000084     400.     650.     900.        1        0        0       .00   265.35   357.15

*SECNO 8610.000
 WATER EL=X5 CARD=   592.940
        100 FEET US SPILLWAY /  FROM CHART SOUNDINGS / RESTART W.S. FROM DAM
        RATING CURVE (ADJUSTED TO 1976 FLOOD)
 8610.00    11.34   592.94      .00       .00   593.11      .17       .05       .07   596.50
   4700.       0.    4700.       0.        0.    1425.       0.      634.       42.    596.00
    1.57      .00     3.30      .00      .060     .030     .060      .000   581.60    50.00
 .000424     200.     200.     200.        0        0        0       .00   235.00   285.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 8985.000
        SECTION EIGHT 475 FEET U/S SPILLWAY (J&A/WS 1985)
  8985.00    16.56   593.16      .00       .00   593.19      .02       .03       .04   601.90
    4700.       0.    4700.       0.        0.    3705.       0.      656.       45.   601.50
     1.65      .00     1.27      .00      .060     .030     .060      .000    576.60    16.98
  .000038     375.     375.     375.         2        0        0       .00    431.81   448.79

*SECNO 9435.000

3470 ENCROACHMENT STATIONS=        .0     200.0  TYPE=     1  TARGET=     199.999
        1' D/S LINCOLN ST BRIDGE- USED U/S FACE SOUNDINGS- NORMAL BRIDGE
  9435.00    12.64   593.14      .00       .00   593.27      .12       .03       .05100000.00
    4700.       0.    4700.       0.        0.    1658.       0.      684.       48.   595.00
     1.70      .00     2.84      .00      .060     .030     .060      .000    580.50      .00
  .000206     600.     450.     300.         2        0        0       .00    200.00   200.00

*SECNO 9436.000
3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD=  0 MIN ELTRD=  605.00 MAX ELLC=  604.00

3470 ENCROACHMENT STATIONS=        .0     200.0  TYPE=     1  TARGET=     199.999
        D/S FACE BRIDGE (J&A/WS 1985)
  9436.00    12.64   593.14      .00       .00   593.27      .13       .00       .00100000.00
    4700.       0.    4700.       0.        0.    1614.       0.      684.       48.   602.30
     1.70      .00     2.91      .00      .060     .030     .060      .000    580.50    16.80
  .000277       1.       1.       1.         0        0        0       .00    179.30   200.00

*SECNO 9485.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=        .0     185.0  TYPE=     1  TARGET=     184.999
        U/S FACE BRIDGE
  9485.00    12.65   593.15      .00       .00   593.29      .14       .01       .01100000.00
    4700.       0.    4700.       0.        0.    1548.       0.      686.       48.   602.30
     1.70      .00     3.04      .00      .060     .030     .060      .000    580.50    16.76
  .000293      49.      49.      49.         0        0        0       .00    164.34   185.00
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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 9486.000

3470 ENCROACHMENT STATIONS=        .0      185.0  TYPE=      1  TARGET=      184.999
        1' U/S BRIDGE
  9486.00    12.66   593.16      .00       .00   593.30      .14       .00      .00100000.00
    4700.       0.    4700.       0.        0.    1593.       0.      686.       48.    595.00
     1.70      .00     2.95      .00      .060     .030     .060      .000   580.50      .00
  .000213       1.       1.       1.         1        0        0       .00   185.00   185.00

*SECNO 9585.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      604.60 ELREA=      594.50

        SECTION TEN / 100 FEET U/S BRIDGE (J&A/WS 1985)
  9585.00    13.78   593.18      .00       .00   593.32      .14       .02      .00   604.60
    4700.       0.    4700.       0.        0.    1541.       0.      689.       49.    594.50
     1.71      .00     3.05      .00      .060     .030     .060      .000   579.40    19.27
  .000178      99.      99.      99.         1        0        0       .00   145.78   165.06

*SECNO 11385.000
        SECTION ELEVEN (J&A/WS 1985)
 11385.00    12.21   593.51      .00       .00   593.62      .11       .29      .01   597.30
    4700.       0.    4700.       0.        0.    1767.       0.      758.       55.    594.90
     1.90      .00     2.66      .00      .060     .030     .060      .000   581.30    41.04
  .000149    1900.    1800.    1550.         0        0        0       .00   187.52   228.57

*SECNO 13085.000
        SECTION TWELVE (J&A/WS 1985)
 13085.00    24.00   593.70      .00       .00   593.73      .02       .08      .03   594.90
    4700.       0.    4700.       0.        0.    4066.       0.      871.       66.    596.90
     2.31      .00     1.16      .00      .060     .030     .060      .000   569.70   194.25
  .000021    1700.    1700.    1700.         2        0        0       .00   346.27   540.52
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THIS RUN EXECUTED 01/10/86 12:51:38

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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 APRIL 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

CHEBOYGAN RIVER

SUMMARY PRINTOUT

	SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	OLOSS	QCH	DEPTH	TOPWID
	1.000	.00	551.40	4700.00	580.36	.01	.00	.00	4700.00	28.96	380.19
	500.000	500.00	551.40	4700.00	580.36	.01	.00	.00	4700.00	28.96	380.24
	1980.000	1480.00	551.40	4700.00	580.37	.01	.01	.00	4700.00	28.97	286.38
	3600.000	1620.00	559.20	4700.00	580.38	.02	.01	.01	4700.00	21.18	237.77
	3820.000	220.00	559.20	4700.00	580.38	.03	.00	.01	4700.00	21.18	174.00
	3875.000	55.00	559.20	4700.00	580.39	.03	.01	.00	4700.00	21.19	174.00
	3925.000	50.00	563.40	4700.00	580.38	.04	.00	.01	4700.00	16.98	188.87
	4075.000	150.00	563.40	4700.00	580.39	.04	.01	.00	4700.00	16.99	188.87
	5245.000	1170.00	565.50	4700.00	580.40	.19	.09	.07	4700.00	14.90	126.25
	6645.000	1400.00	568.30	4700.00	580.78	.33	.45	.07	4700.00	12.48	104.38
	7400.000	755.00	568.30	4700.00	581.15	.31	.34	.01	4700.00	12.85	107.41
	7760.000	360.00	575.80	1915.00	581.33	.35	.20	.02	1915.00	5.53	85.80
	8410.000	650.00	576.00	1915.00	581.89	.03	.14	.10	1915.00	5.89	265.35
*	8610.000	200.00	581.60	4700.00	592.94	.17	.05	.07	4700.00	11.34	235.00
	8985.000	375.00	576.60	4700.00	593.16	.02	.03	.04	4700.00	16.56	431.81
	9435.000	450.00	580.50	4700.00	593.14	.12	.03	.05	4700.00	12.64	200.00
	9436.000	1.00	580.50	4700.00	593.14	.13	.00	.00	4700.00	12.64	179.30

SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	QLOSS	QCH	DEPTH	TOPWID
9485.000	49.00	580.50	4700.00	593.15	.14	.01	.01	4700.00	12.65	164.34
9486.000	1.00	580.50	4700.00	593.16	.14	.00	.00	4700.00	12.66	185.00
9585.000	99.00	579.40	4700.00	593.18	.14	.02	.00	4700.00	13.78	145.78
11385.000	1800.00	581.30	4700.00	593.51	.11	.29	.01	4700.00	12.21	187.52
13085.000	1700.00	569.70	4700.00	593.70	.02	.08	.03	4700.00	24.00	346.27

SUMMARY OF ERRORS AND SPECIAL NOTES

NOTE SECNO= 8610.000 PROFILE= 1 WSEL BASED ON X5 CARD

Johnson & Anderson, Inc.

THIS RUN EXECUTED 01/16/86 09:32:06

CHEBOYGAN RIVER
MULTIPLE PROFILE RUN

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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 APRIL 1985
*****************************************

C
T1      JOB 12202-01     CHEBOYGAN CITY FIS     NGVDatum
T2      10 YEAR FLOOD     3750 CFS
T3           CHEBOYGAN RIVER

J1  ICHECK     INO       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0.        2.        0.        0.    .000000      .00       .0        0.    580.360     .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     1.000     .000      .000     5.000    20.000     .000      .000      .000      .000      .000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000    39.000    42.000    43.000     1.000    10.000    11.000    12.000    14.000     8.000

     4.000     .000      .000      .000      .000      .000      .000      .000      .000      .000

NC     .060      .060      .030      .300      .500      .000      .000      .000      .000      .000
OT    4.000   3750.000  4400.000  4700.000  5250.000     .000      .000      .000      .000      .000
        MOUTH OF RIVER / SECTION ONE MOVED 500 FEET DS
X1    1.000     40.000   871.000  1280.000     .000      .000      .000      .000      .000      .000
GR  582.600      .000   582.800    47.000   584.200   152.000   584.000   263.000   582.800   360.000
GR  582.800    389.000  582.200   424.000   581.600   534.000   582.300   639.000   582.100   756.000
GR  582.300    871.000  581.400   875.000   581.300   876.000   580.500   881.000   580.100   886.000
GR  579.600    891.000  578.300   896.000   569.100   921.000   557.900   946.000   553.800   971.000
GR  553.300    996.000  551.400  1021.000   552.900  1046.000   553.400  1071.000   554.900  1096.000
GR  560.000   1121.000  567.700  1146.000   576.100  1171.000   577.400  1196.000   574.100  1221.000
GR  578.100   1251.000  579.100  1256.000   579.700  1261.000   581.400  1266.000   583.100  1267.000
GR  584.900   1280.000  586.400  1376.000   585.800  1472.000   583.900  1562.000   581.100  1627.000

        SECTION ONE (J&A/WS 1985)
X1  500.000      .000      .000      .000   500.000   500.000   500.000      .000      .000      .000

        SECTION TWO (J&A/WS 1985)
X1 1980.000     41.000   533.000   891.000  1480.000  1480.000  1480.000      .000      .000      .000
GR  585.400      .000   584.200   103.000   584.300   165.000   583.800   312.000   583.200   388.000
GR  584.400    405.000  584.100   429.000   584.700   474.000   584.100   533.000   581.400   585.000
GR  580.700    595.000  578.400   600.000   565.300   608.000   564.200   617.000   561.100   632.000
GR  555.800    660.000  554.400   675.000   551.700   705.000   552.100   735.000   551.400   739.000
GR  553.400    759.000  555.400   787.000   564.900   834.000   567.400   845.000   571.800   854.000
GR  579.200    874.000  580.000   879.000   580.600   884.000   581.400   889.000   582.300   891.000
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GR	581.800	975.000	582.500	1164.000	582.700	1264.000	583.600	1367.000	585.400	1404.000

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GR     583.700   1449.000    583.100   1555.000    583.400   1655.000    583.900   1775.000    582.500   1925.000
GR     582.900   2141.000       .000       .000       .000       .000       .000       .000       .000       .000

         250 FEET DS BRIDGE / REPEAT OF SECTION TWO / WIDTH X .83 / SEDIMENT
X1    3600.000       .000       .000       .000   1620.000   1620.000   1620.000       .830       .000       .000
X3       .000    559.200       .000       .000       .000       .000       .000       .000       .000       .000

         1' DS BRIDGE / USED SECTION FOUR MOVED FROM 250 FEET US BRIDGE / LOWERED
         INVERT TO DEPTH AT BRIDGE
X1    3820.000     30.000    389.000    563.000    220.000    220.000    220.000       .000       .000       .000
X3      10.000       .000       .000       .000       .000       .000       .000    591.100    586.400       .000
GR     589.300       .000    588.400     35.000    589.300     74.000    588.000    153.000    587.400    182.000
GR     587.600    211.000    585.800    267.000    583.800    308.000    581.800    377.000    581.400    379.000
GR     573.400    384.000    573.000    389.000    571.400    394.000    570.400    404.000    559.200    429.000
GR     559.200    559.000    571.900    563.000    582.700    570.000    585.100    596.000    586.400    655.000
GR     586.800    691.000    586.700    712.000    586.200    735.000    587.500    827.000    587.300    861.000
GR     586.600    890.000    587.100    919.000    588.500    942.000    588.800    979.000    590.000   1077.000

SB       1.150      1.560      2.600       .000     60.000     26.000   3210.000      2.580    561.500    561.500
         1' US BRIDGE / REPEAT 3820
X1    3875.000       .000       .000       .000     55.000     55.000     55.000       .000       .000       .000
X2       .000       .000      1.000    590.800    586.400       .000       .000       .000       .000       .000
X3      10.000       .000       .000       .000       .000       .000       .000    591.100    586.400       .000
BT       9.000       .000    591.100       .000    153.000    595.300       .000    267.000    592.600       .000
BT     559.000    587.200       .000    570.000    586.400       .000    712.000    587.000       .000    890.000
BT     588.000       .000    919.000    588.100       .000   1077.000    590.000       .000       .000       .000

         50 FEET US BRIDGE / USED SECTION FOUR MOVED 150 FEET DS / LOWER BOT. 5'
X1    3925.000     34.000    379.000    570.000     50.000     50.000     50.000       .000       .000       .000
GR     589.300       .000    588.400     35.000    589.300     74.000    588.000    153.000    587.400    182.000
GR     587.600    211.000    585.800    267.000    583.800    308.000    581.800    377.000    581.400    379.000
GR     573.400    384.000    568.000    389.000    566.400    394.000    565.400    404.000    564.800    429.000
GR     564.400    454.000    563.400    497.000    563.500    504.000    565.400    529.000    566.100    554.000
GR     566.600    559.000    571.900    563.000    582.700    570.000    585.100    596.000    586.400    655.000
GR     586.800    691.000    586.700    712.000    586.200    735.000    587.500    827.000    587.300    861.000
GR     586.600    890.000    587.100    919.000    588.500    942.000    588.800    979.000       .000       .000

         SECTION FOUR (J&A/WS 1985)
X1    4075.000       .000       .000       .000    150.000    150.000    150.000       .000       .000       .000

         SECTION FIVE (J&A/WS 1985)
X1    5245.000     24.000    348.000    485.000   1170.000   1170.000   1170.000       .000       .000       .000
GR     590.600       .000    590.200     29.000    589.600    116.000    588.200    208.000    587.000    271.000
GR     581.600    348.000    573.100    356.000    572.200    363.000    570.500    373.000    567.400    398.000
GR     565.800    423.000    565.500    448.000    576.600    465.000    579.000    470.000    580.300    475.000
GR     581.600    480.000    582.900    485.000    583.700    499.000    583.200    557.000    588.500    598.000
GR     588.500    632.000    588.800    704.000    589.400    803.000    590.100    923.000       .000       .000

         SECTION SIX  (J&A/WS 1985)
X1    6645.000     24.000     97.000    224.000   1400.000   1400.000   1400.000       .000       .000       .000
GR     600.400       .000    599.200      5.000    599.300     35.000    599.400     64.000    599.000     84.000
GR     590.300     97.000    582.700    107.000    581.600    108.000    580.700    112.000    569.600    117.000
GR     570.100    122.000    568.300    127.000    568.300    157.000    569.900    182.000    576.100    204.000
GR     576.600    209.000    580.200    214.000    581.600    219.000    586.900    224.000    586.200    260.000
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GR     586.000     317.000     598.400     376.000     600.100     421.000     600.600     525.000        .000        .000

          100 FEET DS DAM TAILRACE / REPEAT OF SECTION SIX
X1    7400.000        .000        .000        .000     775.000     700.000     755.000        .000        .000        .000

OT        4.000    1130.000    1650.000    1915.000    2405.000        .000        .000        .000        .000        .000
          750 FEET DS SPILLWAY / FROM CHART SOUNDINGS /REDUCE FLOW BY AMT THRU
          POWERHOUSE
X1    7760.000       4.000        .000     160.000     360.000     360.000     360.000        .000        .000        .000
GR     595.000        .000     575.800      50.000     575.800     110.000     600.000     160.000        .000        .000

          100 FEET DS SPILLWAY /  FROM CHART SOUNDINGS
X1    8410.000       4.000        .000     410.000     400.000     900.000     650.000        .000        .000        .000
GR     596.000        .000     576.000     130.000     576.000     340.000     600.000     410.000        .000        .000

OT        4.000    3750.000    4400.000    4700.000    5250.000        .000        .000        .000        .000        .000
          100 FEET US SPILLWAY /  FROM CHART SOUNDINGS / RESTART W.S. FROM DAM
          RATING CURVE (ADJUSTED TO 1976 FLOOD)
X1    8610.000      13.000      50.000     285.000     200.000     200.000     200.000        .000        .000        .000
X5       4.000     591.770     592.570     592.940     593.590        .000        .000        .000        .000        .000
GR     600.000        .000     596.000        .000     596.500      50.000     586.600      50.000     586.600      70.000
GR     581.600      90.000     586.600     110.000     586.600     175.000     586.600     215.000     589.600     255.000
GR     590.600     285.000     596.000     285.000     600.000     300.000        .000        .000        .000        .000

          SECTION EIGHT 475 FEET U/S SPILLWAY (J&A/WS 1985)
X1    8985.000      29.000        .000     463.000     375.000     375.000     375.000        .000        .000        .000
GR     601.900        .000     595.700      16.000     593.100      17.000     593.000      23.000     588.400      26.000
GR     586.600      28.000     583.000      33.000     579.600      38.000     576.600      48.000     576.900      73.000
GR     577.900      98.000     580.700     123.000     583.200     148.000     585.700     173.000     587.200     198.000
GR     586.700     223.000     587.700     248.000     588.200     273.000     588.200     298.000     587.900     323.000
GR     585.400     348.000     583.500     373.000     581.600     398.000     587.300     423.000     590.700     433.000
GR     591.100     438.000     591.600     443.000     592.700     448.000     601.500     463.000        .000        .000

          1' D/S LINCOLN ST BRIDGE- USED U/S FACE SOUNDINGS- NORMAL BRIDGE
X1    9435.000      22.000        .000     341.000     600.000     300.000     450.000        .000        .000        .000
X3       .000        .000        .000        .000        .000     200.000     595.000        .000        .000        .000
GR     592.600        .000     592.600      19.000     591.100      24.000     587.600      29.000     584.500      34.000
GR     581.500      44.000     580.500      69.000     581.100      94.000     582.400     119.000     583.400     144.000
GR     587.600     166.000     588.800     191.000     588.400     216.000     589.200     241.000     588.400     266.000
GR     587.700     291.000     588.600     316.000     590.100     326.000     590.600     331.000     591.500     336.000
GR     592.600     341.000     598.000     370.000        .000        .000        .000        .000        .000        .000

          D/S FACE BRIDGE (J&A/WS 1985)
X1    9436.000      47.000        .000     344.000       1.000       1.000       1.000        .000        .000        .000
X2       .000        .000        .000     604.000     605.000        .000        .000        .000        .000        .000
X3       .000        .000        .000        .000        .000     200.000     595.000        .000        .000        .000
GR     604.000        .000     604.000       2.200     600.500       3.200     600.500       9.700     594.900       9.700
GR     592.600      19.000     591.100      24.000     587.600      29.000     584.500      34.000     581.500      44.000
GR     581.000      58.500     606.600      58.500     606.600      59.800     581.000      59.800     580.500      69.000
GR     581.100      94.000     582.400     119.000     608.400     119.000     608.400     120.300     582.400     120.300
GR     583.400     144.000     587.600     166.000     588.000     179.000     609.300     179.000     609.300     180.300
GR     588.000     180.300     588.800     191.000     588.400     216.000     589.200     239.000     609.100     239.000
GR     609.100     240.300     589.200     240.300     588.400     266.000     587.700     291.000     588.000     299.000
GR     608.100     299.000     608.100     300.300     588.000     300.300     588.600     316.000     590.100     326.000
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GR     590.600     331.000     591.500     336.000     592.600     341.000     594.000     344.000     602.300     344.000
GR     602.300     353.500     606.900     354.900        .000        .000        .000        .000        .000        .000

        U/S FACE BRIDGE
X1    9485.000        .000        .000        .000      49.000      49.000      49.000        .000        .000        .000
X3        .000        .000        .000        .000        .000     185.000     595.000        .000        .000        .000

        1' U/S BRIDGE
X1    9486.000      22.000        .000     341.000       1.000       1.000       1.000        .000        .000        .000
X3        .000        .000        .000        .000        .000     185.000     595.000        .000        .000        .000
GR     592.600        .000     592.600      19.000     591.100      24.000     587.600      29.000     584.500      34.000
GR     581.500      44.000     580.500      69.000     581.100      94.000     582.400     119.000     583.400     144.000
GR     587.600     166.000     588.800     191.000     588.400     216.000     589.200     241.000     588.400     266.000
GR     587.700     291.000     588.600     316.000     590.100     326.000     590.600     331.000     591.500     336.000
GR     592.600     341.000     598.000     370.000        .000        .000        .000        .000        .000        .000

        SECTION TEN / 100 FEET U/S BRIDGE (J&A/WS 1985)
X1    9585.000      17.000       2.000     166.000      99.000      99.000      99.000        .000        .000        .000
X3      10.000        .000        .000        .000        .000        .000        .000        .000        .000        .000
GR     604.600        .000     604.600       2.000     592.700      20.000     583.200      26.000     581.800      31.000
GR     580.900      36.000     579.400      46.000     580.700      71.000     581.500      96.000     583.500     121.000
GR     584.200     151.000     584.900     156.000     587.500     161.000     594.500     166.000     593.200     238.000
GR     594.200     324.000     605.000     391.000        .000        .000        .000        .000        .000        .000

        SECTION ELEVEN (J&A/WS 1985)
X1   11385.000      20.000      36.000     229.000    1900.000    1550.000    1800.000        .000        .000        .000
GR     604.200        .000     598.700      31.000     597.300      36.000     592.800      42.000     591.200      47.000
GR     590.500      52.000     590.200      57.000     586.800      67.000     581.600      92.000     581.500     117.000
GR     581.300     142.000     581.800     167.000     582.900     192.000     585.800     214.000     587.800     219.000
GR     590.700     224.000     591.700     228.000     594.900     229.000     601.100     255.000     605.500     282.000

        SECTION TWELVE (J&A/WS 1985)
X1   13085.000      26.000     194.000     575.000    1700.000    1700.000    1700.000        .000        .000        .000
GR     600.000        .000     597.800      58.000     596.700     122.000     594.900     194.000     590.200     195.000
GR     591.200     199.000     590.600     204.000     589.100     209.000     584.300     219.000     575.600     244.000
GR     569.700     269.000     570.100     294.000     572.700     319.000     574.000     344.000     576.700     369.000
GR     588.800     434.000     591.500     459.000     591.200     484.000     591.700     509.000     591.900     519.000
GR     592.200     524.000     592.400     529.000     592.700     534.000     593.100     534.000     596.900     575.000
GR     603.900     617.000        .000        .000        .000        .000        .000        .000        .000        .000
EJ        .000        .000        .000        .000        .000        .000        .000        .000        .000        .000
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   SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
   O         OLOB      OCH       OROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
   SLOPE     XLOBL     XLCH      XLOBR     INITIAL   IDC       ICONT     CORAR     TOPWID      ENDST

*PROF 1

CCHV=     .300 CEHV=     .500
*SECNO 1.000
         MOUTH OF RIVER / SECTION ONE MOVED 500 FEET DS
     1.00     28.96    580.36       .00    580.36    580.37       .01       .00       .00    582.30
    3750.        0.     3750.        0.        0.     6167.        0.        0.        0.    584.90
      .00       .00       .61       .00      .060      .030      .060      .000    551.40    882.75
  .000004        0.        0.        0.         0         0         0       .00    380.19   1262.94

*SECNO 500.000
         SECTION ONE (J&A/WS 1985)
   500.00     28.96    580.36       .00       .00    580.37       .01       .00       .00    582.30
    3750.        0.     3750.        0.        0.     6167.        0.       71.        4.    584.90
      .23       .00       .61       .00      .060      .030      .060      .000    551.40    882.73
  .000004      500.      500.      500.         0         0         0       .00    380.22   1262.95

*SECNO 1980.000
         SECTION TWO (J&A/WS 1985)
  1980.00     28.97    580.37       .00       .00    580.37       .01       .01       .00    584.10
    3750.        0.     3750.        0.        0.     5863.        0.      275.       16.    582.50
      .87       .00       .64       .00      .060      .030      .060      .000    551.40    595.72
  .000003     1480.     1480.     1480.         0         0         0       .00    286.34    882.06

*SECNO 3600.000
         250 FEET DS BRIDGE / REPEAT OF SECTION TWO / WIDTH X .83 / SEDIMENT
  3600.00     21.17    580.37       .00       .00    580.38       .01       .01       .00    584.10
    3750.        0.     3750.        0.        0.     4114.        0.      461.       25.    582.50
     1.36       .00       .91       .00      .060      .030      .060      .000    559.20    494.44
  .000008     1620.     1620.     1620.         0         0         0       .00    237.70    732.15

*SECNO 3820.000

7495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40

         1' DS BRIDGE / USED SECTION FOUR MOVED FROM 250 FEET US BRIDGE / LOWERED
         INVERT TO DEPTH AT BRIDGE
  3820.00     21.17    580.37       .00       .00    580.39       .02       .00       .00    573.00
    3750.        0.     3750.        0.        0.     3337.        0.      479.       26.    571.90
     1.42       .00      1.12       .00      .060      .030      .060      .000    559.20    389.00
  .000011      220.      220.      220.         0         0         0       .00    174.00    563.00
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   SECNO     DEPTH     CWSEL     CRIWS     WSELR     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


SPECIAL BRIDGE

SB  XR        XRCR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.15      1.56      2.60       .00     60.00     26.00   3210.00      2.58    561.50    561.50

*SECNO 3875.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=    580.33 BRIDGE VELOCITY=,      2.41      CALCULATED CHANNEL AREA=,     1555.

 CGPRS      EGLWC       HS        OWEIR      QLOW      BAREA   TRAPEZOID      ELLC      ELTRD
                                                                  AREA
       .00    580.40       .01        0.     3750.     3210.     3211.      590.80    586.40


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40
        1  US BRIDGE / REPEAT 3820
  3875.00    21.18   580.38      .00       .00   580.40      .02       .01       .00   573.00
    3750.       0.    3750.       0.        0.    3337.       0.      484.       27.    571.90
     1.43      .00     1.12      .00      .000     .030     .000     .000    559.20   389.00
  .000011      55.      55.      55.         0        0        0      .00    174.00   563.00


*SECNO 3925.000
        50 FEET US BRIDGE / USED SECTION FOUR MOVED 150 FEET DS / LOWER BOT. 5'
  3925.00    16.97   580.37      .00       .00   580.40      .03       .00       .00   581.40
    3750.       0.    3750.       0.        0.    2780.       0.      487.       27.    582.70
     1.44      .00     1.35      .00      .060     .030     .060     .000    563.40   379.64
  .000023      50.      50.      50.         0        0        0      .00    188.86   568.49


*SECNO 4075.000
        SECTION FOUR (J&A/WS 1985)
  4075.00    16.98   580.38      .00       .00   580.41      .03       .00       .00   581.40
    3750.       0.    3750.       0.        0.    2779.       0.      497.       28.    582.70
     1.47      .00     1.35      .00      .060     .030     .060     .000    563.40   379.64
  .000023     150.     150.     150.         0        0        0      .00    188.85   568.49


*SECNO 5245.000
        SECTION FIVE (J&A/WS 1985)
  5245.00    14.89   580.39      .00       .00   580.51      .12       .05       .05   581.60
    3750.       0.    3750.       0.        0.    1345.       0.      552.       32.    582.90
     1.59      .00     2.79      .00      .060     .030     .060     .000    565.50   349.13
  .000146    1170.    1170.    1170.         1        0        0      .00    126.23   475.36
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      QCH       OROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     TRIAL     IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 6645.000
       SECTION SIX  (J&A/WS 1985)
 6645.00    12.33   580.63      .00       .00   580.85      .22       .29       .05   590.30
   3750.       0.    3750.       0.        0.     997.       0.      590.      35.    586.90
    1.69      .00     3.76      .00      .060     .030     .060      .000   568.30   112.03
 .000317    1400.    1400.    1400.         2        0        0       .00   103.49   215.52

*SECNO 7400.000
       100 FEET DS DAM TAILRACE / REPEAT OF SECTION SIX
 7400.00    12.57   580.87      .00       .00   581.08      .21       .23       .00   590.30
   3750.       0.    3750.       0.        0.    1023.       0.      607.      37.    586.90
    1.75      .00     3.67      .00      .060     .030     .060      .000   568.30   111.24
 .000297     775.     755.     700.         2        0        0       .00   105.16   216.40

*SECNO 7760.000
       750 FEET DS SPILLWAY / FROM CHART SOUNDINGS /REDUCE FLOW BY AMT THRU
       POWERHOUSE
 7760.00     5.29   581.09      .00       .00   581.22      .14       .12       .02   595.00
   1130.       0.    1130.       0.        0.     382.       0.      613.      38.    600.00
    1.78      .00     2.95      .00      .060     .030     .060      .000   575.80    36.23
 .000493     360.     360.     360.         2        0        0       .00    84.69   120.92

*SECNO 8410.000
       100 FEET DS SPILLWAY /  FROM CHART SOUNDINGS
 8410.00     5.31   581.31      .00       .00   581.32      .01       .06       .04   596.00
   1130.       0.    1130.       0.        0.    1248.       0.      625.      41.    600.00
    1.98      .00      .91      .00      .060     .030     .060      .000   576.00    95.48
 .000042     400.     650.     900.         2        0        0       .00   260.01   355.49

*SECNO 8610.000
 WATER EL=X5 CARD=   591.770
       100 FEET US SPILLWAY /  FROM CHART SOUNDINGS / RESTART W.S. FROM DAM
       RATING CURVE (ADJUSTED TO 1976 FLOOD)
 8610.00    10.17   591.77      .00       .00   591.94      .17       .04       .08   596.50
   3750.       0.    3750.       0.        0.    1150.       0.      631.      42.    596.00
    2.00      .00     3.26      .00      .060     .030     .060      .000   581.60    50.00
 .000545     200.     200.     200.         0        0        0       .00   235.00   285.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 8985.000
        SECTION EIGHT 475 FEET U/S SPILLWAY (J&A/WS 1985)
 8985.00    15.39   591.99      .00       .00   592.01      .02       .04       .04   601.90
   3750.       0.    3750.       0.        0.    3209.       0.      650.       45.    601.50
    2.09      .00     1.17      .00      .060     .030     .060      .000    576.60     23.66
 .000038     375.     375.     375.         2        0        0       .00    421.13    444.78

*SECNO 9435.000

3470 ENCROACHMENT STATIONS=        .0      200.0  TYPE=      1  TARGET=      199.999
        1' D/S LINCOLN ST BRIDGE- USED U/S FACE SOUNDINGS- NORMAL BRIDGE
 9435.00    11.48   591.98      .00       .00   592.09      .11       .03       .04100000.00
   3750.       0.    3750.       0.        0.    1437.       0.      674.       48.    595.00
    2.14      .00     2.61      .00      .060     .030     .060      .000    580.50     21.06
 .000181     600.     450.     300.         2        0        0       .00    178.94    200.00

*SECNO 9436.000
3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD=  0 MIN ELTRD=  605.00 MAX ELLC=  604.00

3470 ENCROACHMENT STATIONS=        .0      200.0  TYPE=      1  TARGET=      199.999
        D/S FACE BRIDGE (J&A/WS 1985)
 9436.00    11.48   591.98      .00       .00   592.09      .11       .00       .00100000.00
   3750.       0.    3750.       0.        0.    1408.       0.      674.       48.    602.30
    2.14      .00     2.66      .00      .060     .030     .060      .000    580.50     21.06
 .000259       1.       1.       1.         0        0        0       .00    175.04    200.00

*SECNO 9485.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=        .0      185.0  TYPE=      1  TARGET=      184.999
        U/S FACE BRIDGE
 9485.00    11.49   591.99      .00       .00   592.11      .12       .01       .00100000.00
   3750.       0.    3750.       0.        0.    1360.       0.      675.       48.    602.30
    2.14      .00     2.76      .00      .060     .030     .060      .000    580.50     21.03
 .000266      49.      49.      49.         0        0        0       .00    160.07    185.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 9486.000

3470 ENCROACHMENT STATIONS=        .0      185.0  TYPE=     1  TARGET=     184.999
        1' U/S BRIDGE
  9486.00    11.50   592.00      .00       .00   592.11       .11       .00       .00100000.00
    3750.       0.    3750.       0.        0.    1389.        0.      675.       48.    595.00
     2.14      .00     2.70      .00      .060     .030      .060      .000   580.50    21.03
  .000181       1.       1.       1.         0        0         0       .00   163.97   185.00

*SECNO 9585.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      604.60 ELREA=      594.50

        SECTION TEN / 100 FEET U/S BRIDGE (J&A/WS 1985)
  9585.00    12.61   592.01      .00       .00   592.13       .12       .02       .00   604.60
    3750.       0.    3750.       0.        0.    1373.        0.      678.       48.    594.50
     2.15      .00     2.73      .00      .060     .030      .060      .000   579.40    20.43
  .000162     99.      99.      99.         0        0         0       .00   143.80   164.23

*SECNO 11385.000
        SECTION ELEVEN (J&A/WS 1985)
 11385.00    11.02   592.32      .00       .00   592.41       .09       .28       .01   597.30
    3750.       0.    3750.       0.        0.    1542.        0.      739.       55.    594.90
     2.36      .00     2.43      .00      .060     .030      .060      .000   581.30    43.53
  .000146   1900.    1800.    1550.         0        0         0       .00   184.67   228.19

*SECNO 13085.000
        SECTION TWELVE (J&A/WS 1985)
 13085.00    22.79   592.49      .00       .00   592.50       .02       .07       .02   594.90
    3750.       0.    3750.       0.        0.    3650.        0.      840.       65.    596.90
     2.82      .00     1.03      .00      .060     .030      .060      .000   569.70   194.51
  .000018   1700.    1700.    1700.         2        0         0       .00   335.91   530.42
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PROFILE FOR STREAM CHEBOYGAN RIVER

PLOTTED POINTS (BY PRIORITY)-E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

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ELEVATION   550.      555.      560.      565.      570.      575.      580.      585.      590.      595.
    SECNO   CUMDIS

     1.00      0.  C  I      .         .         .         .         .         .EM  L    R         .         .         .
             100.  C  I      .         .         .         .         .         .EM  L    R         .         .         .
             200.  C  I      .         .         .         .         .         .EM  L    R         .         .         .
             300.  C  I      .         .         .         .         .         .EM  L    R         .         .         .
             400.  C  I      .         .         .         .         .         .EM  L    R         .         .         .
  500.00     500.  C  I      .         .         .         .         .         .EM  L    R         .         .         .
             600.  C  I      .         .         .         .         .         .EM  L   R.         .         .         .
             700.  C  I      .         .         .         .         .         .E M L   R.         .         .         .
             800.  C  I      .         .         .         .         .         .E M L   R.         .         .         .
             900.  C  I      .         .         .         .         .         .E M  L  R.         .         .         .
            1000.  C  I      .         .         .         .         .         .E M  L R .         .         .         .
            1100.  C  I      .         .         .         .         .         .E  M L R .         .         .         .
            1200.  C  I      .         .         .         .         .         .E  M L R .         .         .         .
            1300.  C  I      .         .         .         .         .         .E  M  L  .         .         .         .
            1400.  C  I      .         .         .         .         .         .E  M  L  .         .         .         .
            1500.  C  I      .         .         .         .         .         .E   M L  .         .         .         .
            1600.  C  I      .         .         .         .         .         .E   MRL  .         .         .         .
            1700.  C  I      .         .         .         .         .         .E   MR L .         .         .         .
            1800.  C  I      .         .         .         .         .         .E   MR L .         .         .         .
            1900.  C  I      .         .         .         .         .         .E   RM L .         .         .         .
  1980.00   2000.  C  I      .         .         .         .         .         .E   RM L .         .         .         .
            2100.  C   I     .         .         .         .         .         .E   RM L .         .         .         .
            2200.  C    I    .         .         .         .         .         .E   RM L .         .         .         .
            2300.  C     I   .         .         .         .         .         .E   RM L .         .         .         .
            2400.  C      I  .         .         .         .         .         .E   RM L .         .         .         .
            2500.  C       I .         .         .         .         .         .E   RM L .         .         .         .
            2600.  C        I.         .         .         .         .         .E   RM L .         .         .         .
            2700.  C         I         .         .         .         .         .E   RM L .         .         .         .
            2800.  C         .I        .         .         .         .         .E   RM L .         .         .         .
            2900.  C         .I        .         .         .         .         .E   RM L .         .         .         .
            3000.  C         . I       .         .         .         .         .E   RM L .         .         .         .
            3100.  C         .  I      .         .         .         .         .E   RM L .         .         .         .
            3200.  C         .   I     .         .         .         .         .E   RM L .         .         .         .
            3300.  C         .    I    .         .         .         .         .E   RM L .         .         .         .
            3400.  C         .     I   .         .         .         .         .E   RM L .         .         .         .
            3500.  C         .      I  .         .         .         .         .E   RM L .         .         .         .
  3600.00   3600.  C         .       I .         .         .         .         .E   RM L .         .         .         .
            3700.  C         .       I .         .         .         .    R  L .E         . M       .         .         .
            3800.  C         .       I .         .         .      R L .         .E         .      M  .         .         .
  3820.00   3900.  C         .       I .         .         .    R L   .         .E         .        M.         .         .
  3875.00   4000.  C         .       I .         .         .    R L   .         .E         .        M.         .         .
  3925.00   4100.  C         .         .      I  .         .         .         .E L R     .       M .         .         .
  4075.00   4200.  C         .         .      I  .         .         .         .E L R     .       M .         .         .
            4300.  C         .         .      I  .         .         .         .E L R     .       M .         .         .
            4400.  C         .         .       I .         .         .         .E L R     .       M .         .         .
            4500.  C         .         .       I .         .         .         .E L  R    .       M .         .         .
            4600.  C         .         .       I .         .         .         .E L  R    .       M .         .         .
            4700.  C         .         .        I.         .         .         .E L  R    .        M.         .         .
            4800.  C         .         .        I.         .         .         .E L  R    .        M.         .         .
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          4900.  C          .         .        I.         .         .        .E L  R   .         M.         .         .
          5000.  C          .         .         I         .         .        .E L  R   .         M.         .         .
          5100.  C          .         .         I         .         .        .E L  R   .          M         .         .
          5200.  C          .         .         I         .         .        .E L  R   .          M         .         .
5245.00   5300.  C          .         .        .I         .         .        .E L  R   .          M         .         .
          5400.  C          .         .        .I         .         .        .E  L R   .          . M       .         .
          5500.  C          .         .        . I        .         .        .E    LR  .          .  M      .         .
          5600.  C          .         .        . I        .         .        .E     LR .          .    M    .         .
          5700.  C          .         .        .  I       .         .        .E      L .          .     M   .         .
          5800.  C          .         .        .  I       .         .        .E       L.          .      M. .         .
          5900.  C          .         .        .  I       .         .        .E       R.L         .       M.         .
          6000.  C          .         .        .   I      .         .        .E        R L        .        .M        .
          6100.  C          .         .        .   I      .         .        .E        R  L       .         . M      .
          6200.  C          .         .        .    I     .         .        .E        .R  L      .         .  M     .
          6300.  C          .         .        .    I     .         .        .WE       . R   L    .         .    M   .
          6400.  C          .         .        .    I     .         .        .WE       . R    L   .         .     M  .
          6500.  C          .         .        .     I    .         .        .WE       .  R    L. .         .      M.
          6600.  C          .         .        .     I    .         .        .WE       .  R     L.          .       M.
6645.00   6700.  C          .         .        .      I   .         .        .WE       .   R     .L         .        M
          6800.  C          .         .        .      I   .         .        .WE       .   R     .L         .        M
          6900.  C          .         .        .      I   .         .        .WE       .   R     .L         .        M
          7000.  C          .         .        .      I   .         .        .WE       .   R     .L         .        M
          7100.  C          .         .        .      I   .         .        . E       .   R     .L         .        M
          7200.  C          .         .        .      I   .         .        . E       .   R     .L         .        M
          7300.  C          .         .        .      I   .         .        . E       .   R     .L         .        M
7400.00   7400.  C          .         .        .      I   .         .        . E       .   R     .L         .        M
          7500.  C          .         .        .        .I          .        . E       .         .R L       .       M .
          7600.  C          .         .        .         .    I     .        . E       .         .      L R .    M    .
          7700.  C          .         .        .         .        I.         . E       .         .        L . M   R   .
7760.00   7800.  C          .         .        .         .         . I       . E       .         .         L         R
          7900.  C          .         .        .         .         . I       . E       .         .         L         R
          8000.  C          .         .        .         .         . I       . WE      .         .         .L        R
          8100.  C          .         .        .         .         . I       . WE      .         .         .L        R
          8200.  C          .         .        .         .         . I       . WE      .         .         .L        R
          8300.  C          .         .        .         .         . I       .  E      .         .         . L       R
          8400.  C          .         .        .         .         . I       .  E      .         .         . L       R
8410.00   8500.  C          .         .        .         .         . I       .  E      .         .         . L       R
          8600.  C          .         .        .         .         .       I .         .  E      .         .  L  R   .
8610.00   8700.  C          .         .        .         .         .         .  I      .         .  E      . RL      M
          8800.  C          .         .        .         .         .         .I        .         .  E      .    RL   M
          8900.  C          .         .        .         .         .       I .         .         .  E      .       RLM
8985.00   9000.  C          .         .        .         .         . I       .         .         .  E      .         L
          9100.  C          .         .        .         .         .   I     .         .         .  E      .         L
          9200.  C          .         .        .         .         .     I   .         .         .  E      .      R  L
          9300.  C          .         .        .         .         .       I .         .         .  E      .   R   M L
          9400.  C          .         .        .         .         .         I         .         .  E      .R     M  L
9435.00   9500.  C          .         .        .         .         .         .I        .         .  E      R     M   L
9436.00   9600.  C          .         .        .         .         .         .I        .         .  E      .         L
9485.00   9700.  C          .         .        .         .         .         .I        .         .  E      .         L
9486.00   9800.  C          .         .        .         .         .         .I        .         .  E      R     M   L
9585.00   9900.  C          .         .        .         .         .        I.         .         .  E    R.          L
         10000.  C          .         .        .         .         .        I.         .         .  E    R.          L
         10100.  C          .         .        .         .         .        I.         .         .  E    R.          L
         10200.  C          .         .        .         .         .        I.         .         .  E    R.          L
         10300.  C          .         .        .         .         .         I         .         .  E    R.          L
         10400.  C          .         .        .         .         .         I         .         .  E    R.          L
         10500.  C          .         .        .         .         .         I         .         .  E    R.          L
         10600.  C          .         .        .         .         .         I         .         .  E    R.          L
         10700.  C          .         .        .         .         .         I         .         .  WE   R.          L
         10800.  C          .         .        .         .         .         .I        .         .  WE   R.          L
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          10900.  C        .        .        .        .        .        .[       .        .   WE   R.         L
          11000.  C        .        .        .        .        .        .I       .        .   WE   R.         L
          11100.  C        .        .        .        .        .        .1       .        .   WE    R        LM
          11200.  C        .        .        .        .        .        . 1      .        .   WE    R        LM
          11300.  C        .        .        .        .        .        . 1      .        .   WE    R       L M
11385.00  11400.  C        .        .        .        .        .        .  1     .        .    E    R    L   M
          11500.  C        .        .        .        .        .        .1       .        .    E    R   L    M
          11600.  C        .        .        .        .        .        I        .        .    E    R   L    M
          11700.  C        .        .        .        .        .       I.        .        .    E    .R  L    M
          11800.  C        .        .        .        .        .      J  .       .        .    E    .R L     M
          11900.  C        .        .        .        .        .     I   .       .        .    E    .R L     M
          12000.  C        .        .        .        .        .   I     .       .        .    E    .R L     M
          12100.  C        .        .        .        .        .  I      .       .        .    E    .R L     M
          12200.  C        .        .        .        .        . I       .       .        .    E    . L      M
          12300.  C        .        .        .        .        I         .       .        .    E    . L      M
          12400.  C        .        .        .        .       I.         .       .        .    E    . L      M
          12500.  C        .        .        .        .      [ .         .       .        .    E    .LR      M
          12600.  C        .        .        .        .    I   .         .       .        .    E    .L R     M
          12700.  C        .        .        .        .   I    .         .       .        .    E    .L R     M
          12800.  C        .        .        .        .  I     .         .       .        .    E    .L R     M
          12900.  C        .        .        .        . I      .         .       .        .    E    L  R     M
          13000.  C        .        .        .        .I       .         .       .        .    E    L   R    M
13085.00  13100.  C        .        .        .       I.        .         .       .        .    E    L   R    M
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THIS RUN EXECUTED 01/16/86 09:34:39

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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 APRIL 1985
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T1      JOB 12202-01    CHEBOYGAN CITY FIS
T2      50 YEAR FLOOD   4400 CFS
T3      CHEBOYGAN RIVER
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J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0.	3.	0.	0.	.000000	.00	.0	0.	580.360	.000
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	2.000	.000	-1.000	.000	.000	.000	.000	.000	.000	.000

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   SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
   O         OLOB      OCH       OROB      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

CCHV=     .300 CEHV=     .500
*SECNO 1.000
        MOUTH OF RIVER / SECTION ONE MOVED 500 FEET DS
     1.00     28.96    580.36       .00    580.36    580.37       .01       .00       .00    582.30
    4400.        0.     4400.        0.        0.     6167.        0.        0.        0.    584.90
      .00       .00       .71       .00      .060      .030      .060      .000    551.40    882.75
  .000005        0.        0.        0.         0         0         0       .00    380.19   1262.94

*SECNO 500.000
        SECTION ONE (J&A/WS 1985)
   500.00     28.96    580.36       .00       .00    580.37       .01       .00       .00    582.30
    4400.        0.     4400.        0.        0.     6168.        0.       71.        4.    584.90
      .19       .00       .71       .00      .060      .030      .060      .000    551.40    882.72
  .000005      500.      500.      500.         0         0         0       .00    380.23   1262.95

*SECNO 1980.000
        SECTION TWO (J&A/WS 1985)
  1980.00     28.97    580.37       .00       .00    580.38       .01       .01       .00    584.10
    4400.        0.     4400.        0.        0.     5863.        0.      275.       16.    582.50
      .74       .00       .75       .00      .060      .030      .060      .000    551.40    595.72
  .000004     1480.     1480.     1480.         0         0         0       .00    286.37    882.09

*SECNO 3600.000
        250 FEET DS BRIDGE / REPEAT OF SECTION TWO / WIDTH X .83 / SEDIMENT
  3600.00     21.18    580.38       .00       .00    580.39       .02       .01       .00    584.10
    4400.        0.     4400.        0.        0.     4115.        0.      461.       25.    582.50
     1.16       .00      1.07       .00      .060      .030      .060      .000    559.20    494.43
  .000011     1620.     1620.     1620.         0         0         0       .00    237.75    732.18

*SECNO 3820.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40

        1' DS BRIDGE / USED SECTION FOUR MOVED FROM 250 FEET US BRIDGE / LOWERED
        INVERT TO DEPTH AT BRIDGE
  3820.00     21.17    580.37       .00       .00    580.40       .03       .00       .00    573.00
    4400.        0.     4400.        0.        0.     3337.        0.      480.       26.    571.90
     1.21       .00      1.32       .00      .060      .030      .060      .000    559.20    389.00
  .000015      220.      220.      220.         0         0         0       .00    174.00    563.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELE     EG        HV        HL        QLOSS   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


SPECIAL BRIDGE

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.15      1.56      2.60       .00     60.00     26.00   3210.00      2.58    561.50    561.50

*SECNO 3875.000
CLASS A LOW FLOW

3470 BRIDGE W.S.=    580.32 BRIDGE VELOCITY=,      2.83      CALCULATED CHANNEL AREA=,     1553.

 EGPRS      EGLWC       H3        QWEIR      QLOW      BAREA   TRAPEZOID      ELLC      ELTRD
                                                                  AREA
       .00    580.41       .01        0.     4400.     3210.     3211.      590.80    586.40


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40

        1' US BRIDGE / REPEAT 3820
  3875.00    21.18   580.38      .00       .00   580.41      .03       .01       .00   573.00
    4400.       0.    4400.       0.        0.    3339.       0.      484.       27.    571.90
     1.22      .00     1.32      .00      .000     .030     .000     .000    559.20   389.00
  .000015      55.      55.      55.         0        0        0      .00    174.00   563.00


*SECNO 3925.000
        50 FEET US BRIDGE / USED SECTION FOUR MOVED 150 FEET DS / LOWER BOT. 5'
  3925.00    16.98   580.38      .00       .00   580.42      .04       .00       .01   581.40
    4400.       0.    4400.       0.        0.    2781.       0.      487.       27.    582.70
     1.23      .00     1.58      .00      .060     .030     .060     .000    563.40   379.63
  .000031      50.      50.      50.         0        0        0      .00    188.86   568.50


*SECNO 4075.000
        SECTION FOUR (J&A/WS 1985)
  4075.00    16.98   580.38      .00       .00   580.42      .04       .00       .00   581.40
    4400.       0.    4400.       0.        0.    2780.       0.      497.       28.    582.70
     1.26      .00     1.58      .00      .060     .030     .060     .000    563.40   379.64
  .000031     150.     150.     150.         0        0        0      .00    188.86   568.50


*SECNO 5245.000
        SECTION FIVE (J&A/WS 1985)
  5245.00    14.89   580.39      .00       .00   580.56      .17       .07       .06   581.60
    4400.       0.    4400.       0.        0.    1345.       0.      552.       32.    582.90
     1.36      .00     3.27      .00      .060     .030     .060     .000    565.50   349.13
  .000201    1170.    1170.    1170.         2        0        0      .00    126.23   475.36
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
  0         OLOB      OCH       OROB      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 6645.000
        SECTION SIX  (J&A/WS 1985)
 6645.00     12.42    580.72       .00       .00    581.02       .30       .40       .07    590.30
   4400.        0.     4400.        0.        0.     1007.        0.      590.       35.    586.90
    1.44       .00      4.37       .00      .060      .030      .060      .000    568.30    111.89
 .000424     1400.     1400.     1400.         2         0         0       .00    103.98    215.87

*SECNO 7400.000
        100 FEET DS DAM TAILRACE / REPEAT OF SECTION SIX
 7400.00     12.76    581.06       .00       .00    581.33       .28       .31       .01    590.30
   4400.        0.     4400.        0.        0.     1042.        0.      608.       37.    586.90
    1.49       .00      4.22       .00      .060      .030      .060      .000    568.30    110.41
 .000391      775.      755.      700.         2         0         0       .00    106.65    217.06

*SECNO 7760.000
        750 FEET DS SPILLWAY / FROM CHART SOUNDINGS /REDUCE FLOW BY AMT THRU
        POWERHOUSE
 7760.00      5.44    581.24       .00       .00    581.51       .27       .17       .00    595.00
   1650.        0.     1650.        0.        0.      395.        0.      614.       38.    600.00
    1.52       .00      4.17       .00      .060      .030      .060      .000    575.80     35.84
 .000952      360.      360.      360.         2         0         0       .00     85.40    121.24

*SECNO 8410.000
        100 FEET DS SPILLWAY /  FROM CHART SOUNDINGS
 8410.00      5.67    581.67       .00       .00    581.70       .02       .11       .07    596.00
   1650.        0.     1650.        0.        0.     1343.        0.      627.       41.    600.00
    1.67       .00      1.23       .00      .060      .030      .060      .000    576.00     93.11
 .000071      400.      650.      900.         0         0         0       .00    263.44    356.55

*SECNO 8610.000
 WATER EL=XS CARD=   592.570
        100 FEET US SPILLWAY /  FROM CHART SOUNDINGS / RESTART W.S. FROM DAM
        RATING CURVE (ADJUSTED TO 1976 FLOOD)
 8610.00     10.97    592.57       .00       .00    592.74       .17       .05       .07    596.50
   4400.        0.     4400.        0.        0.     1338.        0.      633.       42.    596.00
    1.68       .00      3.29       .00      .060      .030      .060      .000    581.60     50.00
 .000457      200.      200.      200.         0         0         0       .00    235.00    285.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS   BANK ELEV
  O         OLOB      OCH       OROB      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 8985.000
        SECTION EIGHT 475 FEET U/S SPILLWAY (J&A/WS 1985)
  8985.00    16.19   592.79      .00       .00   592.82       .02       .03       .04   601.90
    4400.       0.    4400.       0.        0.    3547.        0.      654.       45.   601.50
     1.77      .00     1.24      .00      .060     .030      .060      .000   576.60    23.14
  .000038     375.     375.     375.         2        0         0       .00   425.02   448.16

*SECNO 9435.000

3470 ENCROACHMENT STATIONS=         .0      200.0  TYPE=      1  TARGET=      199.999
        1' D/S LINCOLN ST BRIDGE- USED U/S FACE SOUNDINGS- NORMAL BRIDGE
  9435.00    12.28   592.78      .00       .00   592.90       .12       .03       .05100000.00
    4400.       0.    4400.       0.        0.    1584.        0.      680.       48.   595.00
     1.81      .00     2.78      .00      .060     .030      .060      .000   580.50      .00
  .000209     600.     450.     300.         2        0         0       .00   200.00   200.00

*SECNO 9436.000
3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD=  0 MIN ELTRD=  605.00 MAX ELLC=  604.00

3470 ENCROACHMENT STATIONS=         .0      200.0  TYPE=      1  TARGET=      199.999
        D/S FACE BRIDGE (J&A/WS 1985)
  9436.00    12.27   592.77      .00       .00   592.90       .13       .00       .00100000.00
    4400.       0.    4400.       0.        0.    1548.        0.      680.       48.   602.30
     1.81      .00     2.84      .00      .060     .030      .060      .000   580.50    18.28
  .000272       1.       1.       1.         0        0         0       .00   177.82   200.00

*SECNO 9485.000
3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=         .0      185.0  TYPE=      1  TARGET=      184.999
        U/S FACE BRIDGE
  9485.00    12.28   592.78      .00       .00   592.92       .14       .01       .01100000.00
    4400.       0.    4400.       0.        0.    1488.        0.      682.       48.   602.30
     1.82      .00     2.96      .00      .060     .030      .060      .000   580.50    18.25
  .000286      49.      49.      49.         0        0         0       .00   162.85   185.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 9486.000

3470 ENCROACHMENT STATIONS=        .0      185.0  TYPE=      1  TARGET=      184.999
        1' U/S BRIDGE
  9486.00     12.29    592.79       .00       .00    592.92       .13       .00       .00100000.00
    4400.        0.     4400.        0.        0.     1524.        0.      682.       48.     595.00
     1.82       .00      2.89       .00      .060      .030      .060      .000    580.50       .00
  .000215        1.        1.        1.         0         0         0       .00    185.00    185.00

*SECNO 9585.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      604.60 ELREA=      594.50

        SECTION TEN / 100 FEET U/S BRIDGE (J&A/WS 1985)
  9585.00     13.41    592.81       .00       .00    592.94       .14       .02       .00    604.60
    4400.        0.     4400.        0.        0.     1488.        0.      686.       48.     594.50
     1.83       .00      2.96       .00      .060      .030      .060      .000    579.40     19.82
  .000173       99.       99.       99.         0         0         0       .00    144.97    164.80

*SECNO 11385.000
        SECTION ELEVEN (J&A/WS 1985)
 11385.00     11.84    593.14       .00       .00    593.24       .10       .29       .01    597.30
    4400.        0.     4400.        0.        0.     1697.        0.      751.       55.     594.90
     2.02       .00      2.59       .00      .060      .030      .060      .000    581.30     41.54
  .000149     1900.     1800.     1550.         1         0         0       .00    186.91    228.45

*SECNO 13085.000
        SECTION TWELVE (J&A/WS 1985)
 13085.00     23.62    593.32       .00       .00    593.34       .02       .07       .03    594.90
    4400.        0.     4400.        0.        0.     3934.        0.      861.       66.     596.90
     2.44       .00      1.12       .00      .060      .030      .060      .000    569.70    194.34
  .000020     1700.     1700.     1700.         2         0         0       .00    342.05    536.38
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THIS RUN EXECUTED 01/16/86 09:35:42

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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 APRIL 1985
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T1       JOB 12202-01     CHEBOYGAN CITY FIS
T2       100 YEAR FLOOD    4700 CFS
T3       CHEBOYGAN RIVER

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0.        4.        0.        0.   .000000       .00        .0        0.   580.360      .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

    3.000      .000    -1.000      .000      .000      .000      .000      .000      .000      .000
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   SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK  ELEV
   Q         OLOB      OCH       OROB      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 3

CCHV=     .300 CEHV=     .500
*SECNO 1.000
         MOUTH OF RIVER / SECTION ONE MOVED 500 FEET DS
     1.00     28.96    580.36       .00    580.36    580.37       .01       .00       .00    582.30
    4700.        0.     4700.        0.        0.     6167.        0.        0.        0.    584.90
      .00       .00       .76       .00      .060      .030      .060      .000    551.40    882.75
  .000006        0.        0.        0.         0         0         0       .00    380.19   1262.94

*SECNO 500.000
         SECTION ONE (J&A/WS 1985)
   500.00     28.96    580.36       .00       .00    580.37       .01       .00       .00    582.30
    4700.        0.     4700.        0.        0.     6168.        0.       71.        4.    584.90
      .18       .00       .76       .00      .060      .030      .060      .000    551.40    882.71
  .000006      500.      500.      500.         0         0         0       .00    380.24   1262.95

*SECNO 1980.000
         SECTION TWO (J&A/WS 1985)
  1980.00     28.97    580.37       .00       .00    580.38       .01       .01       .00    584.10
    4700.        0.     4700.        0.        0.     5864.        0.      275.       16.    582.50
      .70       .00       .80       .00      .060      .030      .060      .000    551.40    595.71
  .000005     1480.     1480.     1480.         0         0         0       .00    286.38    882.10

*SECNO 3600.000
         250 FEET DS BRIDGE / REPEAT OF SECTION TWO / WIDTH X .83 / SEDIMENT
  3600.00     21.18    580.38       .00       .00    580.40       .02       .01       .01    584.10
    4700.        0.     4700.        0.        0.     4115.        0.      461.       25.    582.50
     1.09       .00      1.14       .00      .060      .030      .060      .000    559.20    494.43
  .000013     1620.     1620.     1620.         0         0         0       .00    237.77    732.19

*SECNO 3820.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40

         1' DS BRIDGE / USED SECTION FOUR MOVED FROM 250 FEET US BRIDGE / LOWERED
         INVERT TO DEPTH AT BRIDGE
  3820.00     21.18    580.38       .00       .00    580.41       .03       .00       .01    573.00
    4700.        0.     4700.        0.        0.     3338.        0.      480.       26.    571.90
     1.13       .00      1.41       .00      .060      .030      .060      .000    559.20    389.00
  .000017      220.      220.      220.         0         0         0       .00    174.00    563.00
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
 Q         OLOB      OCH       OROB      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


SPECIAL BRIDGE

CR  XF        XHOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.15      1.56      2.60       .00     60.00     26.00   3210.00      2.58    561.50    561.50

*SECNO 3875.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=     580.31 BRIDGE VELOCITY=,      3.03      CALCULATED CHANNEL AREA=,     1553.

 EGPRS     EGLWC       H3        OWEIR     QLOW      BAREA   TRAPEZOID      ELLC      ELTRD
                                                              AREA
       .00    580.42      .01        0.     4700.     3210.     3211.      590.80    586.40


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40
        1' US BRIDGE / REPEAT 3820
  3875.00    21.19   580.39      .00       .00   580.42      .03       .01       .00   573.00
    4700.       0.    4700.       0.        0.    3339.       0.      484.       27.    571.90
     1.14      .00     1.41      .00      .000     .030     .000      .000    559.20   389.00
  .000017      55.      55.      55.         0        0        0       .00    174.00   563.00


*SECNO 3925.000
        50 FEET US BRIDGE / USED SECTION FOUR MOVED 150 FEET DS / LOWER BOT. 5'
  3925.00    16.98   580.38      .00       .00   580.43      .04       .00       .01   581.40
    4700.       0.    4700.       0.        0.    2781.       0.      487.       27.    582.70
     1.15      .00     1.69      .00      .060     .030     .060      .000    563.40   379.63
  .000035      50.      50.      50.         0        0        0       .00    188.87   568.50


*SECNO 4075.000
        SECTION FOUR (J&A/WS 1985)
  4075.00    16.99   580.39      .00       .00   580.43      .04       .01       .00   581.40
    4700.       0.    4700.       0.        0.    2781.       0.      497.       28.    582.70
     1.18      .00     1.69      .00      .060     .030     .060      .000    563.40   379.63
  .000035     150.     150.     150.         0        0        0       .00    188.87   568.50


*SECNO 5245.000
        SECTION FIVE (J&A/WS 1985)
  5245.00    14.90   580.40      .00       .00   580.59      .19       .09       .07   581.60
    4700.       0.    4700.       0.        0.    1346.       0.      552.       32.    582.90
     1.27      .00     3.49      .00      .060     .030     .060      .000    565.50   349.13
  .000229    1170.    1170.    1170.         2        0        0       .00    126.25   475.38
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 6645.000
        SECTION SIX  (J&A/WS 1985)
  6645.00    12.48   580.78      .00       .00   581.11       .33       .45       .07   590.30
   4700.        0.    4700.       0.        0.    1012.        0.      590.       35.    586.90
    1.35      .00     4.64      .00      .060     .030      .060      .000   568.30   111.67
  .000478   1400.    1400.    1400.         2        0         0       .00   104.38   216.05

*SECNO 7400.000
        100 FEET DS DAM TAILRACE / REPEAT OF SECTION SIX
  7400.00    12.85   581.15      .00       .00   581.46       .31       .34       .01   590.30
   4700.        0.    4700.       0.        0.    1052.        0.      608.       37.    586.90
    1.40      .00     4.47      .00      .060     .030      .060      .000   568.30   109.99
  .000436    775.     755.     700.         2        0         0       .00   107.41   217.40

*SECNO 7760.000
        750 FEET DS SPILLWAY / FROM CHART SOUNDINGS /REDUCE FLOW BY AMT THRU
        POWERHOUSE
  7760.00     5.53   581.33      .00       .00   581.68       .35       .20       .02   595.00
   1915.        0.    1915.       0.        0.     403.        0.      614.       38.    600.00
    1.42      .00     4.76      .00      .060     .030      .060      .000   575.80    35.61
  .001215    360.     360.     360.         1        0         0       .00    85.80   121.41

*SECNO 8410.000
        100 FEET DS SPILLWAY /  FROM CHART SOUNDINGS
  8410.00     5.89   581.89      .00       .00   581.92       .03       .14       .10   596.00
   1915.        0.    1915.       0.        0.    1397.        0.      628.       41.    600.00
    1.55      .00     1.37      .00      .060     .030      .060      .000   576.00    91.79
  .000084    400.     650.     900.         1        0         0       .00   265.35   357.15

*SECNO 8610.000
 WATER EL=XS CARD=   592.940
        100 FEET US SPILLWAY /  FROM CHART SOUNDINGS / RESTART W.S. FROM DAM
        RATING CURVE (ADJUSTED TO 1976 FLOOD)
  8610.00    11.34   592.94      .00       .00   593.11       .17       .05       .07   596.50
   4700.        0.    4700.       0.        0.    1425.        0.      634.       42.    596.00
    1.57      .00     3.30      .00      .060     .030      .060      .000   581.60    50.00
  .000424    200.     200.     200.         0        0         0       .00   235.00   285.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 8985.000
        SECTION EIGHT 475 FEET U/S SPILLWAY (J&A/WS 1985)
  8985.00    16.56   593.16      .00       .00   593.19      .02       .03       .04   601.90
   4700.        0.    4700.       0.        0.    3705.       0.      656.       45.   601.50
    1.65      .00     1.27      .00      .060     .030     .060      .000   576.60    16.98
 .000038     375.     375.     375.         2        0        0       .00   431.81   448.79

*SECNO 9435.000

3470 ENCROACHMENT STATIONS=        .0      200.0  TYPE=      1  TARGET=      199.999
        1' D/S LINCOLN ST BRIDGE- USED U/S FACE SOUNDINGS- NORMAL BRIDGE
  9435.00    12.64   593.14      .00       .00   593.27      .12       .03       .05100000.00
   4700.        0.    4700.       0.        0.    1658.       0.      684.       48.   595.00
    1.70      .00     2.84      .00      .060     .030     .060      .000   580.50      .00
 .000206     600.     450.     300.         2        0        0       .00   200.00   200.00

*SECNO 9436.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD=  0 MIN ELTRD=  605.00 MAX ELLC=  604.00

3470 ENCROACHMENT STATIONS=        .0      200.0  TYPE=      1  TARGET=      199.999
        D/S FACE BRIDGE (J&A/WS 1985)
  9436.00    12.64   593.14      .00       .00   593.27      .13       .00       .00100000.00
   4700.        0.    4700.       0.        0.    1614.       0.      684.       48.   602.30
    1.70      .00     2.91      .00      .060     .030     .060      .000   580.50    16.80
 .000277       1.       1.       1.         0        0        0       .00   179.30   200.00

*SECNO 9485.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=        .0      185.0  TYPE=      1  TARGET=      184.999
        U/S FACE BRIDGE
  9485.00    12.65   593.15      .00       .00   593.29      .14       .01       .01100000.00
   4700.        0.    4700.       0.        0.    1548.       0.      686.       48.   602.30
    1.70      .00     3.04      .00      .060     .030     .060      .000   580.50    16.76
 .000293      49.      49.      49.         0        0        0       .00   164.34   185.00
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   SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
   D         OLOB      OCH       OROB      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 9486.000

3470 ENCROACHMENT STATIONS=        .0      185.0  TYPE=      1  TARGET=      184.999
        1' U/S BRIDGE
  9486.00     12.66    593.16       .00       .00    593.30       .14       .00       .00100000.00
    4700.        0.     4700.        0.        0.     1593.        0.      686.       48.     595.00
     1.70       .00      2.95       .00      .060      .030      .060      .000    580.50       .00
  .000213        1.        1.        1.         1         0         0       .00    185.00    185.00

*SECNO 9585.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      604.60 ELREA=      594.50

        SECTION TEN / 100 FEET U/S BRIDGE (J&A/WS 1985)
  9585.00     13.78    593.18       .00       .00    593.32       .14       .02       .00    604.60
    4700.        0.     4700.        0.        0.     1541.        0.      689.       49.     594.50
     1.71       .00      3.05       .00      .060      .030      .060      .000    579.40     19.27
  .000178       99.       99.       99.         1         0         0       .00    145.78    165.06

*SECNO 11385.000
        SECTION ELEVEN (J&A/WS 1985)
 11385.00     12.21    593.51       .00       .00    593.62       .11       .29       .01    597.30
    4700.        0.     4700.        0.        0.     1767.        0.      758.       55.     594.90
     1.90       .00      2.66       .00      .060      .030      .060      .000    581.30     41.04
  .000149     1900.     1800.     1550.         0         0         0       .00    187.52    228.57

*SECNO 13085.000
        SECTION TWELVE (J&A/WS 1985)
 13085.00     24.00    593.70       .00       .00    593.73       .02       .08       .03    594.90
    4700.        0.     4700.        0.        0.     4066.        0.      871.       66.     596.90
     2.31       .00      1.16       .00      .060      .030      .060      .000    569.70    194.25
  .000021     1700.     1700.     1700.         2         0         0       .00    346.27    540.52
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THIS RUN EXECUTED 01/16/86 09:36:45

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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 APRIL 1985
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T1      JOB 12202-01    CHEBOYGAN CITY FIS
T2      500 YEAR FLOOD   5250 CFS
T3      CHEBOYGAN RIVER
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J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ	
	0.	5.	0.	0.	.000000	.00	.0	0.	580.360	.000	
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE	
	15.000	.000	-1.000	.000	.000	.000	.000	.000	.000	.000	

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   SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
   O         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 4

CCHV=     .300 CEHV=     .500
*SECNO 1.000
         MOUTH OF RIVER / SECTION ONE MOVED 500 FEET DS
     1.00     28.96    580.36       .00    580.36    580.37       .01       .00       .00    582.30
    5250.        0.     5250.        0.        0.     6167.        0.        0.        0.    584.90
      .00       .00       .85       .00      .060      .030      .060      .000    551.40    882.75
  .000007        0.        0.        0.         0         0         0       .00    380.19   1262.94

*SECNO 500.000
         SECTION ONE (J&A/WS 1985)
   500.00     28.96    580.36       .00       .00    580.37       .01       .00       .00    582.30
    5250.        0.     5250.        0.        0.     6168.        0.       71.        4.    584.90
      .16       .00       .85       .00      .060      .030      .060      .000    551.40    882.70
  .000007      500.      500.      500.         0         0         0       .00    380.25   1262.95

*SECNO 1980.000
         SECTION TWO (J&A/WS 1985)
  1980.00     28.97    580.37       .00       .00    580.39       .01       .01       .00    584.10
    5250.        0.     5250.        0.        0.     5865.        0.      275.       16.    582.50
      .62       .00       .90       .00      .060      .030      .060      .000    551.40    595.71
  .000006     1480.     1480.     1480.         0         0         0       .00    286.42    882.12

*SECNO 3600.000
         250 FEET DS BRIDGE / REPEAT OF SECTION TWO / WIDTH X .83 / SEDIMENT
  3600.00     21.18    580.38       .00       .00    580.41       .03       .02       .01    584.10
    5250.        0.     5250.        0.        0.     4116.        0.      461.       25.    582.50
      .98       .00      1.28       .00      .060      .030      .060      .000    559.20    494.42
  .000016     1620.     1620.     1620.         0         0         0       .00    237.81    732.33

*SECNO 3820.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40

         1' DS BRIDGE / USED SECTION FOUR MOVED FROM 250 FEET US BRIDGE / LOWERED
         INVERT TO DEPTH AT BRIDGE
  3820.00     21.18    580.38       .00       .00    580.42       .04       .00       .01    573.00
    5250.        0.     5250.        0.        0.     3339.        0.      480.       26.    571.90
     1.01       .00      1.57       .00      .060      .030      .060      .000    559.20    389.00
  .000021      220.      220.      220.         0         0         0       .00    174.00    563.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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


SPECIAL BRIDGE

SB  XI        XIOR      COFO      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.15      1.56      2.60       .00     60.00     26.00   3210.00      2.58    561.50    561.50

*SECNO 3875.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=    580.30 BRIDGE VELOCITY=,      3.39      CALCULATED CHANNEL AREA=,     1551.

 EGPRS     EGLWC       HI        QWEIR     QLOW      BAREA   TRAPEZOID      ELLC      ELTRD
                                                              AREA
       .00    580.43      .01        0.     5250.     3210.     3211.      590.80    586.40


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      591.10 ELREA=      586.40

        1' US BRIDGE / REPEAT 3820
  3875.00    21.19   580.39      .00       .00   580.43      .04       .01       .00   573.00
    5250.       0.    5250.       0.        0.    3340.       0.      484.      27.    571.90
     1.02      .00     1.57      .00      .000     .030     .000      .000   559.20   389.00
  .000021      55.      55.      55.         0        0        0       .00   174.00   563.00


*SECNO 3925.000
        50 FEET US BRIDGE / USED SECTION FOUR MOVED 150 FEET DS / LOWER BOT. 5'
  3925.00    16.99   580.39      .00       .00   580.44      .06       .00       .01   581.40
    5250.       0.    5250.       0.        0.    2783.       0.      487.      27.    582.70
     1.03      .00     1.89      .00      .060     .030     .060      .000   563.40   379.63
  .000044      50.      50.      50.         0        0        0       .00   188.88   568.51


*SECNO 4075.000
        SECTION FOUR (J&A/WS 1985)
  4075.00    16.99   580.39      .00       .00   580.45      .06       .01       .00   581.40
    5250.       0.    5250.       0.        0.    2782.       0.      497.      28.    582.70
     1.05      .00     1.89      .00      .060     .030     .060      .000   563.40   379.63
  .000044     150.     150.     150.         0        0        0       .00   188.87   568.50


*SECNO 5245.000
        SECTION FIVE (J&A/WS 1985)
  5245.00    14.91   580.41      .00       .00   580.65      .24       .11       .09   581.60
    5250.       0.    5250.       0.        0.    1347.       0.      552.      32.    582.90
     1.14      .00     3.90      .00      .060     .030     .060      .000   565.50   349.12
  .000285    1170.    1170.    1170.         2        0        0       .00   126.30   475.42
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   SECNO     DEPTH     CWSEL     CRIWS     WSELA     EG        HV        HL        OLOSS    BANK ELEV
   Q         OLOB      OCH       OROB      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 6645.000
        SECTION SIX  (J&A/WS 1985)
  6645.00    12.58   580.88      .00       .00   581.28       .41       .55       .09   590.30
    5250.       0.    5250.       0.        0.    1023.       0.      590.       36.    586.90
     1.21      .00     5.13      .00      .060     .030      .060      .000   568.30   111.22
  .000582    1400.    1400.    1400.         2        0         0       .00   105.19   216.41

*SECNO 7400.000
        100 FEET DS DAM TAILRACE / REPEAT OF SECTION SIX
  7400.00    13.04   581.34      .00       .00   581.71       .37       .41       .01   590.30
    5250.       0.    5250.       0.        0.    1073.       0.      609.       37.    586.90
     1.26      .00     4.90      .00      .060     .030      .060      .000   568.30   109.16
  .000519     775.     755.     700.         2        0         0       .00   108.90   218.07

*SECNO 7760.000
        750 FEET DS SPILLWAY / FROM CHART SOUNDINGS /REDUCE FLOW BY AMT THRU
        POWERHOUSE
  7760.00     5.72   581.52      .00       .00   582.03       .51       .25       .07   595.00
    2405.       0.    2405.       0.        0.     420.       0.      615.       38.    600.00
     1.27      .00     5.72      .00      .060     .030      .060      .000   575.80    35.08
  .001685     360.     360.     360.         1        0         0       .00    86.76   121.84

*SECNO 8410.000
        100 FEET DS SPILLWAY /  FROM CHART SOUNDINGS
  8410.00     6.31   582.31      .00       .00   582.35       .04       .17       .14   596.00
    2405.       0.    2405.       0.        0.    1512.       0.      629.       41.    600.00
     1.39      .00     1.59      .00      .060     .030      .060      .000   576.00    89.01
  .000104     400.     650.     900.         2        0         0       .00   269.38   358.39

*SECNO 8610.000
 WATER EL=X5 CARD=   593.590
        100 FEET US SPILLWAY /  FROM CHART SOUNDINGS / RESTART W.S. FROM DAM
        RATING CURVE (ADJUSTED TO 1976 FLOOD)
  8610.00    11.99   593.59      .00       .00   593.76       .17       .05       .07   596.50
    5250.       0.    5250.       0.        0.    1578.       0.      636.       42.    596.00
     1.40      .00     3.33      .00      .060     .030      .060      .000   581.60    50.00
  .000379     200.     200.     200.         0        0         0       .00   235.00   285.00
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   SECNO     DEPTH     CWSEL     CRIWS     WSELH     EG        HV        HL        OLOSS    BANK ELEV
   O         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 8985.000
        SECTION EIGHT 475 FEET U/S SPILLWAY (J&A/WS 1985)
  8985.00    17.21    593.81      .00       .00    593.84      .03       .03       .04    601.90
    5250.       0.     5250.       0.        0.     3986.       0.      660.       45.    601.50
     1.48      .00      1.32      .00      .060      .030     .060      .000    576.60     16.73
  .000038     375.      375.     375.         2         0         0       .00    433.17    449.89

*SECNO 9435.000

3470 ENCROACHMENT STATIONS=         .0      200.0  TYPE=      1  TARGET=      199.999
        1' D/S LINCOLN ST BRIDGE- USED U/S FACE SOUNDINGS- NORMAL BRIDGE
  9435.00    13.29    593.79      .00       .00    593.92      .13       .03       .05100000.00
    5250.       0.     5250.       0.        0.     1787.       0.      690.       48.    595.00
     1.52      .00      2.94      .00      .060      .030     .060      .000    580.50       .00
  .000202     600.      450.     300.         2         0         0       .00    200.00    200.00

*SECNO 9436.000
3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD=  0 MIN ELTRD=  605.00 MAX ELLC=  604.00

3470 ENCROACHMENT STATIONS=         .0      200.0  TYPE=      1  TARGET=      199.999
        D/S FACE BRIDGE (J&A/WS 1985)
  9436.00    13.29    593.79      .00       .00    593.93      .14       .00       .00100000.00
    5250.       0.     5250.       0.        0.     1731.       0.      690.       48.    602.30
     1.52      .00      3.03      .00      .060      .030     .060      .000    580.50     14.19
  .000285       1.        1.       1.         0         0         0       .00    181.91    200.00

*SECNO 9485.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=         .0      185.0  TYPE=      1  TARGET=      184.999
        U/S FACE BRIDGE
  9485.00    13.29    593.79      .00       .00    593.95      .16       .01       .01100000.00
    5250.       0.     5250.       0.        0.     1655.       0.      692.       48.    602.30
     1.53      .00      3.17      .00      .060      .030     .060      .000    580.50     14.15
  .000305      49.       49.      49.         0         0         0       .00    166.95    185.00
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  SECNO     DEPTH     CWSEL     CRIWS     WSELH     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 9486.000

3470 ENCROACHMENT STATIONS=        .0      185.0  TYPE=      1  TARGET=      184.999
       1' U/S BRIDGE
 9486.00     13.31    593.81       .00       .00    593.95       .15       .00       .00100000.00
   5250.        0.     5250.        0.        0.     1712.        0.      692.       48.     595.00
    1.53       .00      3.07       .00      .060      .030      .060      .000    580.50       .00
 .000211        1.        1.        1.         1         0         0       .00    185.00    185.00

*SECNO 9585.000

3495 OVERBANK  AREA ASSUMED NON-EFFECTIVE,ELLEA=      604.60 ELREA=       594.50

        SECTION TEN / 100 FEET U/S BRIDGE (J&A/WS 1985)
 9585.00     14.42    593.82       .00       .00    593.98       .16       .02       .01    604.60
   5250.        0.     5250.        0.        0.     1636.        0.      696.       49.     594.50
    1.54       .00      3.21       .00      .060      .030      .060      .000    579.40     18.30
 .000185       99.       99.       97.         1         0         0       .00    147.22    165.52

*SECNO 11385.000
        SECTION ELEVEN (J&A/WS 1985)
11385.00     12.87    594.17       .00       .00    594.29       .12       .30       .01    597.30
   5250.        0.     5250.        0.        0.     1889.        0.      769.       56.     594.90
    1.72       .00      2.78       .00      .060      .030      .060      .000    581.30     40.18
 .000151     1900.     1800.     1550.         0         0         0       .00    188.59    228.77

*SECNO 13085.000
        SECTION TWELVE (J&A/WS 1985)
13085.00     24.68    594.38       .00       .00    594.40       .02       .08       .03    594.90
   5250.        0.     5250.        0.        0.     4301.        0.      889.       66.     596.90
    2.10       .00      1.22       .00      .060      .030      .060      .000    569.70    194.11
 .000022     1700.     1700.     1700.         2         0         0       .00    353.68    547.79
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THIS RUN EXECUTED 01/16/86 09:37:49

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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 APRIL 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

CHEBOYGAN RIVER

SUMMARY PRINTOUT

SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	OLOSS	QCH	DEPTH	TOPWID
1.000	.00	551.40	3750.00	580.36	.01	.00	.00	3750.00	28.96	380.19
1.000	.00	551.40	4400.00	580.36	.01	.00	.00	4400.00	28.96	380.19
1.000	.00	551.40	4700.00	580.36	.01	.00	.00	4700.00	28.96	380.19
1.000	.00	551.40	5250.00	580.36	.01	.00	.00	5250.00	28.96	380.19
500.000	500.00	551.40	3750.00	580.36	.01	.00	.00	3750.00	28.96	380.22
500.000	500.00	551.40	4400.00	580.36	.01	.00	.00	4400.00	28.96	380.23
500.000	500.00	551.40	4700.00	580.36	.01	.00	.00	4700.00	28.96	380.24
500.000	500.00	551.40	5250.00	580.36	.01	.00	.00	5250.00	28.96	380.25
1980.000	1480.00	551.40	3750.00	580.37	.01	.01	.00	3750.00	28.97	286.34
1980.000	1480.00	551.40	4400.00	580.37	.01	.01	.00	4400.00	28.97	286.37
1980.000	1480.00	551.40	4700.00	580.37	.01	.01	.00	4700.00	28.97	286.38
1980.000	1480.00	551.40	5250.00	580.37	.01	.01	.00	5250.00	28.97	286.42
3600.000	1620.00	559.20	3750.00	580.37	.01	.01	.00	3750.00	21.17	237.70
3600.000	1620.00	559.20	4400.00	580.38	.02	.01	.00	4400.00	21.18	237.75
3600.000	1620.00	559.20	4700.00	580.38	.02	.01	.01	4700.00	21.18	237.77
3600.000	1620.00	559.20	5250.00	580.38	.03	.02	.01	5250.00	21.18	237.81
3820.000	220.00	559.20	3750.00	580.37	.02	.00	.00	3750.00	21.17	174.00
3820.000	220.00	559.20	4400.00	580.37	.03	.00	.00	4400.00	21.17	174.00
3820.000	220.00	559.20	4700.00	580.38	.03	.00	.01	4700.00	21.18	174.00
3820.000	220.00	559.20	5250.00	580.38	.04	.00	.01	5250.00	21.18	174.00
3875.000	55.00	559.20	3750.00	580.38	.02	.01	.00	3750.00	21.18	174.00
3875.000	55.00	559.20	4400.00	580.38	.03	.01	.00	4400.00	21.18	174.00
3875.000	55.00	559.20	4700.00	580.39	.03	.01	.00	4700.00	21.19	174.00
3875.000	55.00	559.20	5250.00	580.39	.04	.01	.00	5250.00	21.19	174.00
3925.000	50.00	563.40	3750.00	580.37	.03	.00	.00	3750.00	16.97	188.86
3925.000	50.00	563.40	4400.00	580.38	.04	.00	.01	4400.00	16.98	188.86
3925.000	50.00	563.40	4700.00	580.38	.04	.00	.01	4700.00	16.98	188.87
3925.000	50.00	563.40	5250.00	580.39	.06	.00	.01	5250.00	16.99	188.88

	SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	OLOSS	OCH	DEPTH	TOPWID
	4075.000	150.00	563.40	3750.00	580.38	.03	.00	.00	3750.00	16.98	188.85
	4075.000	150.00	563.40	4400.00	580.38	.04	.00	.00	4400.00	16.98	188.86
	4075.000	150.00	563.40	4700.00	580.39	.04	.01	.00	4700.00	16.99	188.87
	4075.000	150.00	563.40	5250.00	580.39	.06	.01	.00	5250.00	16.99	188.87
	5245.000	1170.00	565.50	3750.00	580.39	.12	.05	.05	3750.00	14.89	126.23
	5245.000	1170.00	565.50	4400.00	580.39	.17	.07	.06	4400.00	14.89	126.23
	5245.000	1170.00	565.50	4700.00	580.40	.19	.09	.07	4700.00	14.90	126.25
	5245.000	1170.00	565.50	5250.00	580.41	.24	.11	.09	5250.00	14.91	126.30
	6645.000	1400.00	568.30	3750.00	580.63	.22	.29	.05	3750.00	12.33	103.49
	6645.000	1400.00	568.30	4400.00	580.72	.30	.40	.07	4400.00	12.42	103.98
	6645.000	1400.00	568.30	4700.00	580.78	.33	.45	.07	4700.00	12.48	104.38
	6645.000	1400.00	568.30	5250.00	580.88	.41	.55	.09	5250.00	12.58	105.19
	7400.000	755.00	568.30	3750.00	580.87	.21	.23	.00	3750.00	12.57	105.16
	7400.000	755.00	568.30	4400.00	581.06	.28	.31	.01	4400.00	12.76	106.65
	7400.000	755.00	568.30	4700.00	581.15	.31	.34	.01	4700.00	12.85	107.41
	7400.000	755.00	568.30	5250.00	581.34	.37	.41	.01	5250.00	13.04	108.90
	7760.000	360.00	575.80	1130.00	581.09	.14	.12	.02	1130.00	5.29	84.69
	7760.000	360.00	575.80	1650.00	581.24	.27	.17	.00	1650.00	5.44	85.40
	7760.000	360.00	575.80	1915.00	581.33	.35	.20	.02	1915.00	5.53	85.80
	7760.000	360.00	575.80	2405.00	581.52	.51	.25	.07	2405.00	5.72	86.76
	8410.000	650.00	576.00	1130.00	581.31	.01	.06	.04	1130.00	5.31	260.01
	8410.000	650.00	576.00	1650.00	581.67	.02	.11	.07	1650.00	5.67	263.44
	8410.000	650.00	576.00	1915.00	581.89	.03	.14	.10	1915.00	5.89	265.35
	8410.000	650.00	576.00	2405.00	582.31	.04	.17	.14	2405.00	6.31	269.38
*	8610.000	200.00	581.60	3750.00	591.77	.17	.04	.08	3750.00	10.17	235.00
*	8610.000	200.00	581.60	4400.00	592.57	.17	.05	.07	4400.00	10.97	235.00
*	8610.000	200.00	581.60	4700.00	592.94	.17	.05	.07	4700.00	11.34	235.00
*	8610.000	200.00	581.60	5250.00	593.59	.17	.05	.07	5250.00	11.99	235.00
	8985.000	375.00	576.60	3750.00	591.99	.02	.04	.04	3750.00	15.39	421.13
	8985.000	375.00	576.60	4400.00	592.79	.02	.03	.04	4400.00	16.19	425.02
	8985.000	375.00	576.60	4700.00	593.16	.02	.03	.04	4700.00	16.56	431.81
	8985.000	375.00	576.60	5250.00	593.81	.03	.03	.04	5250.00	17.21	433.17
	9435.000	450.00	580.50	3750.00	591.98	.11	.03	.04	3750.00	11.48	178.94
	9435.000	450.00	580.50	4400.00	592.78	.12	.03	.05	4400.00	12.28	200.00
	9435.000	450.00	580.50	4700.00	593.14	.12	.03	.05	4700.00	12.64	200.00
	9435.000	450.00	580.50	5250.00	593.79	.13	.03	.05	5250.00	13.29	200.00
	9436.000	1.00	580.50	3750.00	591.98	.11	.00	.00	3750.00	11.48	175.04
	9436.000	1.00	580.50	4400.00	592.77	.13	.00	.00	4400.00	12.27	177.82
	9436.000	1.00	580.50	4700.00	593.14	.13	.00	.00	4700.00	12.64	179.30
	9436.000	1.00	580.50	5250.00	593.79	.14	.00	.00	5250.00	13.29	181.91

SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	OLOSS	OLH	DEPTH	TOPWID
9485.000	49.00	580.50	3750.00	591.99	.12	.01	.00	3750.00	11.49	160.07
9485.000	49.00	580.50	4400.00	592.78	.14	.01	.01	4400.00	12.28	162.85
9485.000	49.00	580.50	4700.00	593.15	.14	.01	.01	4700.00	12.65	164.34
9485.000	49.00	580.50	5250.00	593.79	.16	.01	.01	5250.00	13.29	166.95
9486.000	1.00	580.50	3750.00	592.00	.11	.00	.00	3750.00	11.50	163.97
9486.000	1.00	580.50	4400.00	592.79	.13	.00	.00	4400.00	12.29	185.00
9486.000	1.00	580.50	4700.00	593.16	.14	.00	.00	4700.00	12.66	185.00
9486.000	1.00	580.50	5250.00	593.81	.15	.00	.00	5250.00	13.31	185.00
9585.000	99.00	579.40	3750.00	592.01	.12	.02	.00	3750.00	12.61	143.80
9585.000	99.00	579.40	4400.00	592.81	.14	.02	.00	4400.00	13.41	144.97
9585.000	99.00	579.40	4700.00	593.18	.14	.02	.00	4700.00	13.78	145.78
9585.000	99.00	579.40	5250.00	593.82	.16	.02	.01	5250.00	14.42	147.22
11385.000	1800.00	581.30	3750.00	592.32	.09	.28	.01	3750.00	11.02	184.67
11385.000	1800.00	581.30	4400.00	593.14	.10	.29	.01	4400.00	11.84	186.91
11385.000	1800.00	581.30	4700.00	593.51	.11	.29	.01	4700.00	12.21	187.52
11385.000	1800.00	581.30	5250.00	594.17	.12	.30	.01	5250.00	12.87	188.59
13085.000	1700.00	569.70	3750.00	592.49	.02	.07	.02	3750.00	22.79	335.91
13085.000	1700.00	569.70	4400.00	593.32	.02	.07	.03	4400.00	23.62	342.05
13085.000	1700.00	569.70	4700.00	593.70	.02	.08	.03	4700.00	24.00	346.27
13085.000	1700.00	569.70	5250.00	594.38	.02	.08	.03	5250.00	24.68	353.68

SUMMARY OF ERRORS AND SPECIAL NOTES

```
NOTE     SECNO=  8610.000  PROFILE= 1  WSEL BASED ON X5 CARD
NOTE     SECNO=  8610.000  PROFILE= 2  WSEL BASED ON X5 CARD
NOTE     SECNO=  8610.000  PROFILE= 3  WSEL BASED ON X5 CARD
NOTE     SECNO=  8610.000  PROFILE= 4  WSEL BASED ON X5 CARD
```

00BREAK00

1) COUNTY: Cheboygan

2) STUDY NAME: City of Cheboygan

3) WATERCOURSE: Cheboygan River

4) DOCUMENT TYPE: report

00BREAK00

Bruce

RECEIVED
JAN 21 1986
ENGINEERING-WATER
MANAGEMENT

City of Cheboygan, Michigan FIS
Cheboygan River
Study Engineer: JOHNSON & ANDERSON, INC.

HYDRAULIC ANALYSIS

A. Introduction

This hydraulic analysis is for the Cheboygan River within the Corporate Limits of the City of Cheboygan. The study begins at the mouth of the river and terminates approximately 4575 feet upstream of the Cheboygan Dam. Total study length is 13,085 feet.

This analysis is being performed in conjunction with the Cheboygan Flood Insurance Study. The modelling was performed by Ole Anderson, P.E.

B. Available Information

The primary source of prior information for the Cheboygan River is the 1981 National Dam Safety Program Inspection Report performed for the MDNR and Detroit District of the COE by Mead and Hunt, Inc. That report contained initial flood flow estimates, powerhouse, lock and spillway information and dam elevation rating curves.

An additional source of information was the 1977 edition of Nautical Chart 14886 of the Inland Route, Michigan. That chart provided additional river depth information which supplemented field surveyed data.

During the study, cross section information was obtained for nine valley sections, two bridges and one dam. The field survey was performed in September 1985 by Westshore Engineering and Surveying, Inc. of Muskegon, MI under subcontract to Johnson & Anderson.

Aerial photography performed by Abrams Aerial Survey in May, 1984 was used to provide base mapping from which stream distances were measured.

The higher water surface of Lake Huron at the 100 year stage superceeded 100 year riverine flood elevations from the river mouth to the base of the dam, therefore, the flood outline to be traced by Abrams in that area is due to the higher lake flooding.

C. Hydrology

Stream flows were determined by a streamgage analysis performed by Johnson Anderson, reviewed and approved by the MDNR in a letter dated March 12, 1985. Q_{10}=3750,Q_{50}=4400,Q_{100}=4700,Q_{500}=5250.

D. Starting Conditions

The mean annual flood elevation for Lake Huron at Mackinaw City, MI was used as the starting elevation for all four flows studied. The arithmetic mean of annual peaks from 1915-1983 of 579.41 adjusted by 0.95 feet to Cheboygan NGVD yielded 580.36 as a starting water surface.

The water surface was restarted above the Cheboygan Dam using a hand calculated elevation for each flood. The rating curve in the dam safety study was suspect, because changes had been made to both the power house and spillway since the 1951 Michigan DOC report which was the basis of the dam safety study rating curve. Based on data supplied by Phil Leege, the engineer at Proctor & Gamble responsible for operation of the power house, the turbine race is now rated at 1600 cfs at 13.5' head with each of two side races rated at 685 cfs at 13.5' head.

The spillways were calibrated based on the April 8, 1976 flow of 3700 cfs which was measured 1000' upstream of the dam on that date for the Cheboygan River Water Quality Station 04-132052. The recorded water surface was 592.60, all spillway gates were full open as were flow gates through the power house. The calculations which are attached, determined a discharge coefficient for the spillways. For each recurrence interval flood flow,

discharge thru the power house was determined from the attached rating curve, the balance of the flow was through the spillway gates, and by using the the relationship determined in the previous step, the dam pond water surface was determined.

E. Method of Analysis

The standard HEC-2 program was run on our in house IBM-AT or IBM-XT. The State Street drawbridge was modeled using the special bridge routine i.e., there were piers and the channel could be easily approximated by a trapezoid. The Lincoln Street bridge, however, had a very irregular bottom and was modeled using the normal bridge routine. In either case the losses are so small that use of either method would not effect the water surface measurably.

A single roughness factor of 0.030 was used for the channel, and 0.060 was used for the overbanks. Overbank roughness is inconsequential as the flow is contained in the channel. Channel roughness is impacted by the fact that most of the river has been dredged.

F. Floodway

The 10 through 500 year floods are contained within the channel, therefore no encroached floodway was investigated, the natural floodway at each cross section will be the same as the designated floodway.

G. Assumed Dam Operating Policy

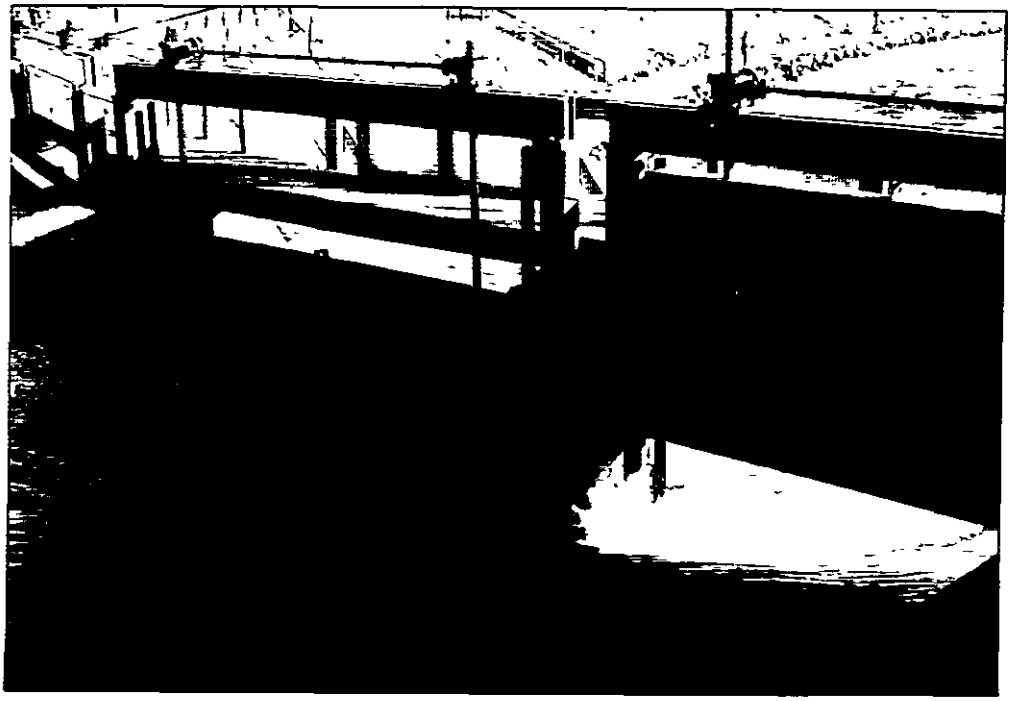
The Cheboygan Dam is operated by the MDNR, Waterways Division under the supervision of Carl Dunster (Phone 616-627-9011) so as to maintain Mullett Lake at the following levels:

April 15 to October 15	593.6	NGVD
October 15 to January 1	593.1	
January 1 to April 15	592.65	

The pond elevation above the dam will be held lower than the Mullett Lake level to account for losses in the river hydraulics, often the pond is held at 592.6 to maintain the lake at 593.6. Fine adjustment of flow through the dam complex is done by the automatic ring gates in the power house which are controlled through a computer link to a pond level sensor and an automatic gate controller. When the power house is unable maintain pond level because the ring gates are full open, the MDNR is notified and they will open as many spillway gates as necessary for the power house to again control the pond level.

During a flood flow, losses in the river become larger so that it is necessary to lower the dam pond further to try maintain the lake at legal level. At flows of the 10 year magnitude and beyond, it is necessary to allow full flow through the power house and hold all six spillway gates wide open in order to keep the lake at a reasonable level.

It is further assumed that there will be no attempt to divert flow through the lock structure as there are no provisions to do so.



CHEBOYGAN DAM SPILLWAY

OCTOBER 1985

11-18-85
O ANDERSON
12202-01

CHEBOYGAN DAM - CALIBRATE SPILLWAY COEFFICIENT

ON 4/8/76 A FLOW OF 3700 CFS WAS MEASURED 1000' U/S OF CHEBOYGAN DAM. RECORDED W.S. WAS 592.60 AND PER CARL DUNSTER (WATERWAYS DIV. MONR CHEBOYGAN) ALL SPILLWAY GATES WERE OPEN & FULL FLOW WAS ALLOWED THRU THE POWER HOUSE.

FLOW THRU POWERHOUSE (PER RATING CURVE - DAM SAFETY REPORT)

PROBABLE TAILWATER = RECORDED AT MACKINAW CITY + (IGLD-NGVD) + LOSSES IN RIVER

$= 579.9 + 1.0 + 0.6 = \underline{581.5}$

HEADWATER = 592.6 (RECORDED)

HEAD ON POWERHOUSE = 592.6 - 581.5 = 11.1 FEET * (PRIOR TO IMPROVEMENTS)

= 2030 CFS THRU POWERHOUSE

LEAVES 3700 - 2030 = 1670 CFS THRU SPILLWAYS

TREAT AS WEIR $Q = CLH^{3/2}$

TOTAL LENGTH OF 6 BAYS = 91.26'

CREST = 589.0 H = 592.60 - 589.00 = 3.60'

$C = \frac{Q}{LH^{3/2}} = \frac{1670}{91.26 \times (3.60)^{3/2}} = \underline{2.68}$ - WITHIN REASON - GIVEN ALL POSIBLE LOSSES THRU WEIR STRUCTURE

$Q = 2.68 \times 91.26 \times H^{3/2} = \boxed{244.5\ H^{3/2} = Q}$ SPILLWAY ONLY

1-3-86
J. ANDERSON
12202-01

CHEBOYGAN DAM HEADWATER / REVISED POWERHOUSE RATING CURVE

10 YEAR AT Q = 3750 CFS

TAILWATER = 580.6 HEADWATER ≈ 591.6 H = 11.0'

Q THRU POWERHOUSE = 2620 3750 - 2620 = 1130 OVER SPILLWAY

$Q = 244.5\ H^{3/2}$ $H = \left(\frac{Q}{244.5}\right)^{2/3} = 2.77' + 589.0 = \boxed{591.77}$

SILL ELEV

50 YEAR AT Q = 4400 CFS

TAILWATER = 580.8 HEADWATER ≈ 592.6 H = 11.8'

Q THRU POWERHOUSE = 2750 4400 - 2750 = 1650 OVER SPILLWAY

$H = \left(\frac{Q}{244.5}\right)^{2/3} = 3.57 + 589.0 = \boxed{592.57}$

00 YEAR AT Q = 4700 CFS

TAILWATER = 580.9 HEADWATER ≈ 593.0 H = 12.1'

Q THRU POWERHOUSE = 2785 4700 - 2785 = 1915 OVER SPILLWAY

$H = \left(\frac{Q}{244.5}\right)^{2/3} = 3.94 + 589.0 = \boxed{592.94}$

500 YEAR AT Q = 5250 CFS

TAILWATER = 581.1 HEADWATER ≈ 593.6 H = 12.5'

Q THRU POWERHOUSE = 2845 5250 - 2845 = 2405 OVER SPILLWAY

$H = \left(\frac{Q}{244.5}\right)^{2/3} = 4.59 + 589.0 = \boxed{593.59}$

NOTE - TAILWATER FROM HEC-2 RUN W/ LAKE AT MEAN ANNUAL FLOOD (580.0)

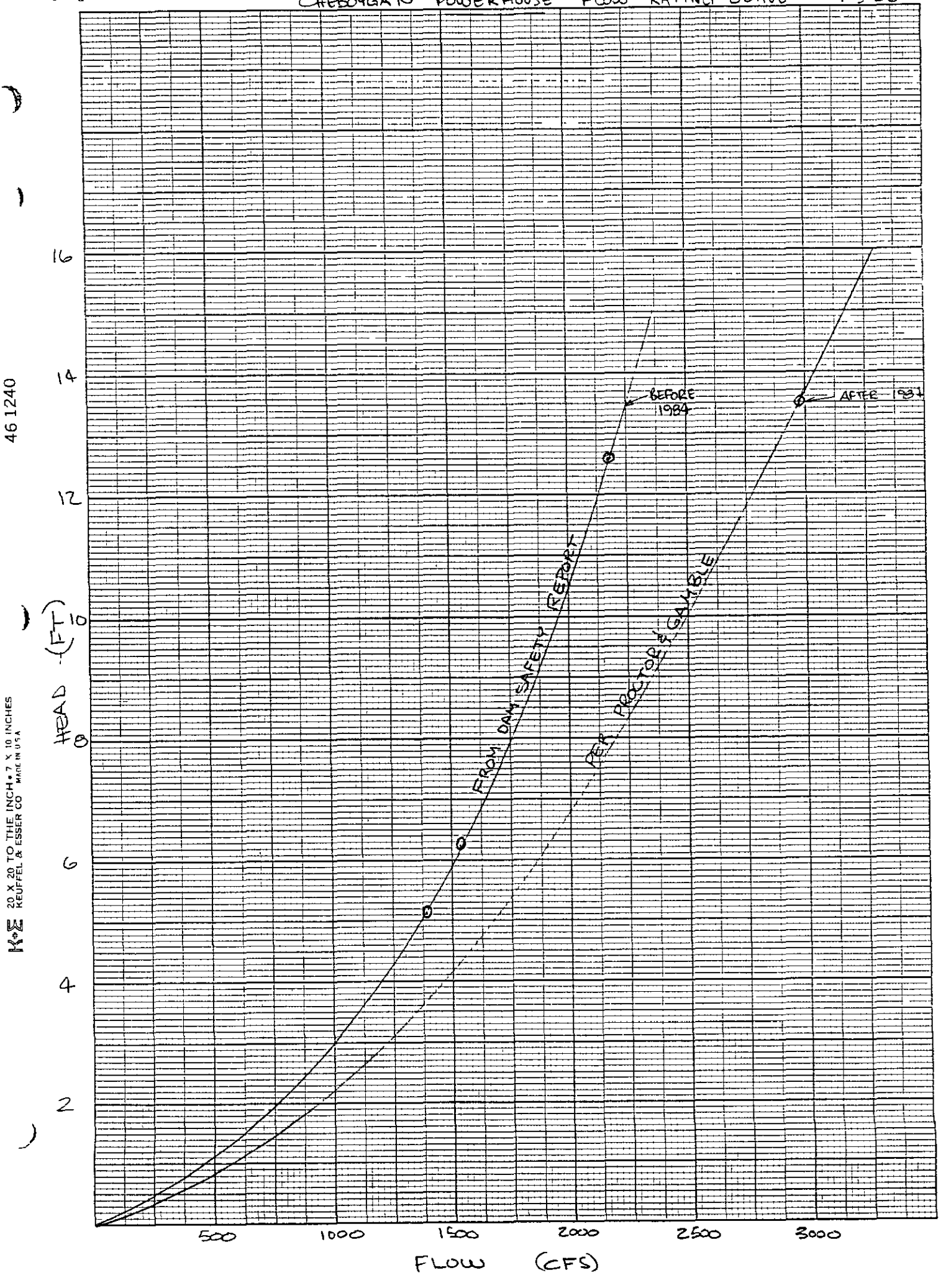
CHECK MAX CAPACITY BEFORE OVERTOPPING

TAILWATER = 581.5 (est) HEADWATER = 596.1 (TOP OF DAM) H = 14.6'

Q THRU POWERHOUSE = 3120 CFS HEAD ON SPILLWAY = 596.1 - 589.0 = 7.1' = H

$Q = 244.5\ H^{3/2} = 4626$ CFS 4626 + 3120 = $\boxed{7746 \text{ CFS AT TOP OF DAM}}$

CHEBOYGAN POWERHOUSE FLOW RATING CURVE 1-3-86



46 1240
K+E 20 X 20 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

00BREAK00

1) COUNTY: Cheboygan

2) STUDY NAME: Grant Twp

3) WATERCOURSE: Black River

4) DOCUMENT TYPE: 10. 50. 100. 500 Natural

00BREAK00

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*****************************************************
*  WATER SURFACE PROFILES                           *
*  VERSION OF NOVEMBER 1976                         *
*  UPDATED MAY 1984                                 *
*  IBM-PC-XT VERSION                                *
*  RUN DATE  03/12/86  TIME  12:04:21               *
*****************************************************
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Johnson & Anderson, Inc.
Consulting Engineers
Drayton Plains, Michigan

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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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GRANT TWP FIS
BLACK RIVER
NATURAL FLOODWAY
10, 50, 100, 500 YEAR

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X     X  XXXXXXX   XXXXX              XXXXX
X     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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THIS RUN EXECUTED 03/12/86 12:04:23

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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 APRIL 1985
*************************************************

FR FREE FORMAT
C
T1 JOB 12202-02   GRANT TWP. PIS
T2 10 YEAR FLOOD WITH WINTER POOL ELEVATION AT ALVERNO POND
T3      BLACK R. ABOVE ALVERNO

J1  ICHECK    IND      NINV     IDIR     STRT     METRIC   HVINS    D        WSEL     FD

      0.       0.       0.       0.   .000000     .00      .0     2350.   610.500    .000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH     FN      ALLDC    IBW     CHNIM    ITRACE

    1.000    .000    -5.000    5.000  200.000    .000     .000    .000     .000     .000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

   38.000   39.000   42.000   43.000    1.000   10.000   11.000   12.000   14.000    8.000

    4.000    .000     .000     .000     .000     .000     .000     .000     .000     .000

NC      .021     .021     .026     .100     .300     .000     .000     .000     .000     .000
        JUST US ALVERNO DAM SYNTHETIC DATA
X1     1.000    4.000    .000   350.000    .000     .000     .000     .000     .000     .000
GR   617.000     .000  600.000    50.000  600.000  300.000  617.000  350.000    .000     .000

        SECTION TWO
X1  3700.000   22.000   54.000  308.000 3700.000 3700.000 3700.000    .000     .000     .000
GR   636.600    .000   632.700   10.000  618.800   40.000  615.900   50.000  615.500   54.000
GR   611.300   64.000  610.100   69.000  608.400   74.000  606.900   79.000  603.400   89.000
GR   595.300  114.000  595.000  139.000  596.300  164.000  598.200  189.000  601.400  214.000
GR   602.300  239.000  605.000  264.000  610.300  289.000  611.300  295.000  615.900  308.000
GR   617.400  325.000  628.300  450.000    .000     .000     .000     .000     .000     .000

NC      .030     .000     .000     .000     .000     .000     .000     .000     .000     .000
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        SECTION THREE
X1   5760.000     30.000     25.000    492.000   2060.000   2060.000   2060.000       .000       .000       .000
GR    618.000       .000    616.600     10.000    614.500     25.000    611.300     45.000    610.800     45.000
GR    610.800     50.000    610.500     55.000    610.300     60.000    609.800     70.000    609.200     95.000
GR    608.800    120.000    608.600    145.000    608.600    170.000    608.400    195.000    608.300    220.000
GR    601.300    245.000    596.000    270.000    595.400    295.000    596.300    320.000    596.500    345.000
GR    599.100    370.000    599.400    395.000    600.200    420.000    606.300    445.000    609.800    470.000
GR    611.300    485.000    615.000    492.000    618.400    510.000    623.100    535.000    624.800    545.000

NC       .021       .030       .029       .000       .000       .000       .000       .000       .000       .000
        SECTION FOUR
X1   8400.000     23.000    125.000    325.000   2640.000   2640.000   2640.000       .000       .000       .000
GR    619.900       .000    615.900     25.000    615.700     75.000    615.400     90.000    612.500    125.000
GR    611.200    135.000    610.000    140.000    608.000    145.000    606.200    150.000    603.900    170.000
GR    601.200    185.000    600.700    210.000    600.600    235.000    605.100    270.000    608.700    285.000
GR    609.700    299.000    610.000    304.000    610.600    310.000    611.200    314.000    613.700    325.000
GR    615.000    339.000    619.100    364.000    625.400    389.000       .000       .000       .000       .000

NC       .030       .000       .000       .000       .000       .000       .000       .000       .000       .000
        SECTION FIVE
X1  10540.000     23.000     75.000    286.000   2140.000   2140.000   2140.000       .000       .000       .000
GR    621.500       .000    619.100     10.000    616.200     25.000    615.000     53.000    613.900     75.000
GR    611.100     87.000    610.600     92.000    610.100     97.000    609.600    102.000    608.100    112.000
GR    606.000    137.000    604.400    162.000    604.100    187.000    603.800    212.000    603.800    237.000
GR    606.300    260.000    607.700    265.000    609.700    270.000    611.100    275.000    616.300    286.000
GR    618.600    300.000    620.100    315.000    621.600    430.000       .000       .000       .000       .000

NC       .021       .000       .000       .000       .000       .000       .000       .000       .000       .000
        CORPS A-A FROM 1965 REPORT
X1  12700.000     14.000    100.000    240.000   2160.000   2160.000   2160.000       .000       .000       .000
GR    625.000       .000    620.000     50.000    614.000    100.000    612.000    103.000    610.000    120.000
GR    607.500    140.000    607.000    160.000    607.000    180.000    607.300    200.000    609.000    220.000
GR    610.000    226.000    613.200    230.000    613.700    240.000    620.000    270.000       .000       .000

NC       .000       .000       .026       .000       .000       .000       .000       .000       .000       .000
        CORPS B-B FROM 1965 REPORT
X1  12850.000    -12.000    100.000    250.000    150.000    150.000    150.000       .000       .000       .000
GR    620.000     70.000    614.000    100.000    606.500    120.000    606.800    140.000    608.900    160.000
GR    607.000    173.000    608.200    185.000    607.500    194.000    610.100    220.000    612.200    240.000
GR    613.700    250.000    620.000    265.000       .000       .000       .000       .000       .000       .000

NC       .000       .046       .000       .000       .000       .000       .000       .000       .000       .000
        CORPS C-C FROM 1965 REPORT
X1  13270.000     11.000    100.000    260.000    420.000    420.000    420.000       .000       .000       .000
GR    620.000     30.000    613.000    100.000    609.100    120.000    609.000    140.000    609.000    160.000
GR    608.500    180.000    608.000    200.000    607.500    220.000    612.000    240.000    614.200    260.000
GR    620.000    270.000       .000       .000       .000       .000       .000       .000       .000       .000

        CORPS C-C FROM 1965 REPORT REPEATED
X1  13700.000       .000       .000       .000    430.000    430.000    430.000       .000       .000       .000
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NC        .000        .000        .033        .000        .000        .000        .000        .000        .000        .000
          SECTION SIX
X1   13870.000      20.000        .000      162.000     170.000     170.000     170.000        .000        .000        .000
GR     617.700        .000     615.300       10.000     611.400      17.000     609.100      22.000     608.000      27.000
GR     606.400      32.000     604.300       57.000     603.400      82.000     601.700     107.000     608.900     130.000
GR     610.000     135.000     611.400      145.000     613.300     162.000     614.400     194.000     615.000     207.000
GR     616.300     245.000     616.300      260.000     616.100     295.000     616.500     345.000     617.100     380.000

          SECTION SIX MODIFIED FOR SILTATION ACROSS 1/2 OF CHANNEL
X1   13920.000      17.000        .000      162.000      50.000      50.000      50.000        .000        .000        .000
GR     617.700        .000     615.300       10.000     611.400      17.000     609.100      22.000     608.000      27.000
GR     606.400      32.000     604.300       57.000     610.000      82.000     611.400     145.000     613.300     162.000
GR     614.400     194.000     615.000      207.000     616.300     245.000     616.300     260.000     616.100     295.000
GR     616.500     345.000     617.100      380.000        .000        .000        .000        .000        .000        .000

          SECTION SIX-A   ALSO USGS AUX GAGE
X1   13970.000      23.000      10.000      169.000      50.000      50.000      50.000        .000        .000        .000
GR     617.700        .000     615.300       10.000     611.400      17.000     610.400      22.000     608.900      27.000
GR     608.100      32.000     605.400       42.000     603.000      67.000     602.300      92.000     602.100     117.000
GR     605.200     127.000     607.600      137.000     610.200     142.000     610.900     147.000     611.400     152.000
GR     613.300     169.000     614.400      201.000     615.000     214.000     616.300     252.000     616.300     267.000
GR     616.100     302.000     616.500      352.000     617.100     387.000        .000        .000        .000        .000

NC        .046        .021        .035        .000        .000        .000        .000        .000        .000        .000
          CORPS D-D FROM 1965 REPORT
X1   15080.000      12.000     100.000      280.000    1110.000    1110.000    1110.000        .000        .000        .000
GR     615.000      81.000     612.500      100.000     611.700     120.000     610.800     140.000     607.700     160.000
GR     607.500     180.000     605.100      200.000     604.900     220.000     606.000     240.000     608.300     260.000
GR     614.000     280.000     615.000      287.000        .000        .000        .000        .000        .000        .000

NC        .000        .046        .000        .000        .000        .000        .000        .000        .000        .000
          SECTION SEVEN
X1   15390.000      27.000      75.000      260.000     310.000     310.000     310.000        .000        .000        .000
GR     621.600        .000     617.500       25.000     615.000      37.000     613.000      75.000     611.400      83.000
GR     610.300      88.000     609.800       93.000     608.700      98.000     608.300     108.000     607.300     133.000
GR     607.500     158.000     607.900      183.000     608.000     208.000     609.200     232.000     609.400     237.000
GR     609.600     242.000     611.400      247.000     614.500     260.000     615.200     291.000     615.200     322.000
GR     615.000     422.000     615.000      472.000     614.400     522.000     614.500     572.000     614.300     622.000
GR     616.800     672.000     619.700      697.000        .000        .000        .000        .000        .000        .000

NC        .042        .021        .026        .000        .000        .000        .000        .000        .000        .000
          SECTION EIGHT WITH MATCHED ELMIN AT THIS STA W/COE REPORT
X1   15900.000      25.000     200.000      376.000     510.000     510.000     510.000        .000       -.300        .000
GR     621.900        .000     617.600       50.000     615.800     100.000     615.200     123.000     612.500     200.000
GR     611.300     224.000     610.600      229.000     610.000     234.000     608.700     239.000     606.300     249.000
GR     602.400     274.000     603.500      299.000     604.900     324.000     607.100     349.000     609.500     361.000
GR     609.800     366.000     610.600      371.000     611.300     376.000     614.200     400.000     615.300     500.000
GR     616.200     600.000     616.500      672.000     615.300     700.000     616.900     800.000     617.900     825.000
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        SECTION EIGHT
X1  17270.000       .000       .000       .000    1370.000    1370.000    1370.000       .000       .000       .000

NC       .000       .000       .000       .300       .500       .000       .000       .000       .000       .000
        REPEAT OF SECTION EIGHT 200 FEET DS BRIDGE
X1  17704.000       .000       .000       .000     434.000     434.000     434.000       .000       .000       .000

        SECTION NINE JUST DS OF NORTH RIVER ROAD BRIDGE
X1  17904.000     20.000     20.000    261.000    200.000    200.000    200.000       .766       .000       .000
GR    626.600     20.000    624.300     21.000    615.840     46.000    611.360     57.000    609.550     62.000
GR    610.000     67.000    609.000     72.000    605.400     82.000    601.100    107.000    600.600    132.000
GR    601.100    157.000    601.500    179.000    606.500    204.000    604.500    215.000    606.200    220.000
GR    608.900    225.000    611.360    230.000    615.500    242.000    621.360    255.000    622.930    261.000

SB      1.050      1.560      2.600       .000     84.000      8.000   2961.000      2.900    601.500    601.500
        SECTION NINE JUST US OF NORTH RIVER ROAD BRIDGE
X1  17960.000       .000       .000       .000     56.000     56.000     56.000       .000       .000       .000
X2       .000       .000      1.000    623.000    624.000       .000       .000       .000       .000       .000
X3     10.000       .000       .000       .000       .000       .000       .000    625.000    625.000       .000

        REPEAT OF SECTION EIGHT 50 FEET US BRIDGE
X1  18010.000     25.000    200.000    376.000     50.000     50.000     50.000       .000       .000       .000
GR    621.900       .000    617.600     50.000    615.800    100.000    615.200    123.000    612.500    200.000
GR    611.300    224.000    610.600    229.000    610.000    234.000    608.700    239.000    606.300    249.000
GR    602.400    274.000    603.500    299.000    604.900    324.000    607.100    349.000    609.500    361.000
GR    609.800    366.000    610.600    371.000    611.300    376.000    614.200    400.000    615.300    500.000
GR    616.200    600.000    616.500    672.000    615.300    700.000    616.900    800.000    617.900    825.000

NC       .000       .042       .000       .100       .300       .000       .000       .000       .000       .000
        SECTION TEN
X1  19840.000     26.000    150.000    370.000   1830.000   1830.000   1830.000       .000       .000       .000
GR    620.700       .000    616.500     40.000    615.500     50.000    613.800    100.000    613.200    150.000
GR    611.300    185.000    610.700    190.000    610.100    195.000    609.800    200.000    608.800    210.000
GR    605.300    235.000    605.200    260.000    604.000    285.000    603.900    310.000    609.100    335.000
GR    609.800    350.000    610.300    360.000    610.900    365.000    611.300    370.000    612.200    370.000
GR    611.800    550.000    612.900    613.000    613.400    682.000    615.500    738.000    615.900    750.000
GR    617.000    870.000       .000       .000       .000       .000       .000       .000       .000       .000

NC       .021       .000       .000       .000       .000       .000       .000       .000       .000       .000
        SECTION ELEVEN
X1  21485.000     33.000     85.000    287.000   1645.000   1645.000   1645.000       .000       .000       .000
GR    619.300       .000    618.800     10.000    617.800     35.000    616.500     60.000    615.500     76.000
GR    614.800     85.000    611.400     95.000    610.600    100.000    610.000    105.000    609.400    110.000
GR    608.700    120.000    602.600    145.000    601.300    170.000    599.800    195.000    601.000    220.000
GR    607.800    245.000    610.100    260.000    610.500    265.000    611.000    270.000    611.300    275.000
GR    612.800    287.000    613.100    449.000    613.900    566.000    614.000    612.000    614.400    635.000
GR    614.900    763.000    613.900    785.000    614.300    885.000    613.800    985.000    614.000   1085.000
GR    615.700   1140.000    616.100   1185.000    616.600   1285.000       .000       .000       .000       .000
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NC        .042       .000       .000       .000       .000       .000       .000       .000       .000       .000
        SECTION TWELVE
X1   23500.000     29.000    679.000    920.000   2015.000   2015.000   2015.000       .000       .000       .000
X3        .000       .000       .000       .000       .000   1283.000    615.800       .000       .000       .000
GR    620.200       .000    617.100     53.000    614.400    184.000    614.200    208.000    614.000    384.000
GR    612.200    519.000    611.700    537.000    612.000    679.000    611.400    709.000    610.800    719.000
GR    610.100    724.000    610.100    734.000    608.400    759.000    602.300    784.000    597.600    809.000
GR    598.900    834.000    603.500    859.000    608.000    884.000    610.000    888.000    610.500    893.000
GR    610.900    898.000    611.400    902.000    612.800    920.000    612.400   1111.000    612.100   1172.000
GR    615.800   1283.000    613.500   1525.000    615.400   1641.000    613.800   1772.000       .000       .000

NC        .070       .030       .000       .000       .000       .000       .000       .000       .000       .000
        SECTION THIRTEEN
X1   25875.000     31.000    590.000    820.000   2375.000   2375.000   2375.000       .000       .000       .000
X3        .000       .000       .000       .000       .000   1390.000    616.000       .000       .000       .000
GR    618.100       .000    616.500     40.000    615.300     90.000    615.000    125.000    615.000    125.000
GR    614.100    150.000    613.000    405.000    612.900    590.000    611.400    607.000    610.600    612.000
GR    610.100    617.000    609.200    622.000    608.600    632.000    598.700    657.000    595.300    682.000
GR    596.900    707.000    605.800    732.000    609.500    757.000    609.900    767.000    610.200    782.000
GR    607.900    798.000    609.200    803.000    611.400    813.000    612.900    820.000    615.200    940.000
GR    614.600   1020.000    614.100   1181.000    614.900   1309.000    615.700   1390.000    614.600   1664.000
GR    613.300   1782.000       .000       .000       .000       .000       .000       .000       .000       .000

NC        .000       .070       .000       .000       .000       .000       .000       .000       .000       .000
        SECTION FOURTEEN
X1   28080.000     28.000    850.000   1096.000   2205.000   2205.000   2205.000       .000       .000       .000
X3        .000       .000       .000    600.000       .000       .000       .000       .000       .000       .000
GR    620.100       .000    617.700     25.000    616.300     75.000    613.700    175.000    615.200    275.000
GR    612.500    375.000    612.400    850.000    611.400    861.000    610.900    866.000    610.400    871.000
GR    610.300    876.000    609.900    886.000    605.200    911.000    603.400    936.000    603.600    961.000
GR    606.400    986.000    608.200   1011.000    608.700   1036.000    609.300   1061.000    609.600   1071.000
GR    610.400   1076.000    610.900   1081.000    611.400   1086.000    612.300   1096.000    613.300   1452.000
GR    612.400   1627.000    612.800   1690.000    612.600   1850.000       .000       .000       .000       .000

        USGS GAGE LOCATION - REPEAT OF SECTION FOURTEEN
X1   28480.000       .000       .000       .000    400.000    400.000    400.000       .000       .000       .000
X3        .000       .000       .000    850.000       .000       .000       .000       .000       .000       .000

        SECTION FIFTEEN - MOUTH OF BLACK LAKE
X1   29870.000     24.000    460.000    717.000   1390.000   1390.000   1390.000       .000       .000       .000
GR    617.200       .000    616.100     80.000    615.200    180.000    612.100    460.000    611.400    478.000
GR    610.800    483.000    610.500    488.000    610.100    493.000    610.100    503.000    608.500    528.000
GR    604.700    553.000    600.500    578.000    598.900    603.000    600.500    628.000    602.900    653.000
GR    609.300    674.000    609.500    679.000    609.900    684.000    611.400    689.000    611.800    717.000
GR    611.600    888.000    611.700   1071.000    611.700   1146.000    611.800   1460.000       .000       .000
EJ        .000       .000       .000       .000       .000       .000       .000       .000       .000       .000
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   SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
   Q         OLOB      OCH       OROB      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

CCHV=    .100 CEHV=    .300
*SECNO 1.000
         JUST US ALVERNO DAM SYNTHETIC DATA
     1.00     10.50    610.50       .00    610.50    610.51       .01       .00       .00    617.00
    2350.        0.     2350.        0.        0.     2949.        0.        0.        0.    617.00
      .00       .00       .80       .00      .021      .026      .021      .000    600.00     19.12
  .000010        0.        0.        0.         0         0         0       .00    311.76    330.88

*SECNO 3700.000
        SECTION TWO
  3700.00     15.54    610.54       .00       .00    610.56       .02       .05       .00    615.50
    2350.        0.     2350.        0.        0.     2174.        0.      218.       23.    615.90
      .95       .00      1.08       .00      .021      .026      .021      .000    595.00     67.18
  .000018     3700.     3700.     3700.         0         0         0       .00    223.24    290.42

*SECNO 5760.000
        SECTION THREE
  5760.00     15.18    610.58       .00       .00    610.59       .01       .03       .00    614.50
    2350.        0.     2350.        0.        0.     2935.        0.      338.       38.    615.00
     1.67       .00       .80       .00      .030      .026      .021      .000    595.40     53.71
  .000015     2060.     2060.     2060.         1         0         0       .00    424.06    477.77

*SECNO 8400.000
        SECTION FOUR
  8400.00     10.03    610.63       .00       .00    610.70       .07       .09       .02    612.50
    2350.        0.     2350.        0.        0.     1105.        0.      461.       56.    613.70
     2.01       .00      2.13       .00      .021      .029      .030      .000    600.60    137.39
  .000147     2640.     2640.     2640.         0         0         0       .00    172.80    310.18

*SECNO 10540.000
        SECTION FIVE
 10540.00      7.22    611.02       .00       .00    611.11       .09       .40       .01    613.90
    2350.        0.     2350.        0.        0.      975.        0.      512.       65.    616.30
     2.26       .00      2.41       .00      .030      .029      .030      .000    603.80     87.79
  .000246     2140.     2140.     2140.         2         0         0       .00    186.92    274.72
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        QLOSS   BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       ARQB      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 12700.000
        CORPS A-A FROM 1965 REPORT
 12700.00     4.93   611.93      .00       .00   612.33      .40      1.13      .09   614.00
    2350.       0.    2350.       0.        0.     460.       0.      547.      73.    613.70
     2.37      .00     5.10      .00      .021     .029     .030      .000   607.00   103.55
  .001763    2160.    2160.    2160.         2        0        0       .00   124.87   228.42

*SECNO 12850.000
        CORPS B-B FROM 1965 REPORT
 12850.00     5.71   612.21      .00       .00   612.55      .34       .21      .01   614.00
    2350.       0.    2350.       0.        0.     502.       0.      549.      73.    613.70
     2.38      .00     4.68      .00      .021     .026     .030      .000   606.50   104.76
  .001184     150.     150.     150.         2        0        0       .00   135.34   240.10

*SECNO 13270.000
        CORPS C-C FROM 1965 REPORT
 13270.00     5.23   612.73      .00       .00   613.06      .33       .50      .00   613.00
    2350.       0.    2350.       0.        0.     513.       0.      554.      74.    614.20
     2.41      .00     4.58      .00      .021     .026     .046      .000   607.50   101.38
  .001204     420.     420.     420.         2        0        0       .00   145.27   246.65

*SECNO 13700.000
        CORPS C-C FROM 1965 REPORT REPEATED
 13700.00     5.74   613.24      .00       .00   613.48      .25       .42      .01   613.00
    2350.       0.    2350.       0.        0.     589.       0.      559.      76.    614.20
     2.44      .49     3.99      .00      .021     .026     .046      .000   607.50    97.55
  .000801     430.     430.     430.         0        0        0       .00   153.76   251.32

*SECNO 13870.000
        SECTION SIX
 13870.00    11.78   613.48      .00       .00   613.56      .08       .06      .02   617.70
    2350.       0.    2350.       0.        0.    1049.       0.      553.      77.    613.30
     2.46      .00     2.24      .09      .021     .033     .046      .000   601.70    13.27
  .000188     170.     170.     170.         2        0        0       .00   153.97   167.24

*SECNO 13920.000
        SECTION SIX MODIFIED FOR SILTATION ACROSS 1/2 OF CHANNEL
 13920.00     9.10   613.40      .00       .00   613.62      .22       .02      .04   617.70
    2350.       0.    2350.       0.        0.     620.       0.      564.      77.    613.30
     2.46      .00     3.79      .14      .021     .033     .046      .000   604.30    13.42
  .001078      50.      50.      50.         2        0        0       .00   151.41   164.82
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  O         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 13970.000
        SECTION SIX-A   ALSO USGS AUX GAGE
 13970.00    11.49   613.59      .00       .00   613.65      .06       .02       .02   615.30
    2350.       0.    2350.       0.        0.    1167.       1.      565.       77.   613.30
     2.47      .00     2.01      .11      .021     .033     .046      .000   602.10    13.07
  .000140      50.      50.      50.         2        0        0       .00   164.32   177.40

*SECNO 15080.000
        CORPS D-D FROM 1965 REPORT
 15080.00     8.90   613.80      .00       .00   613.89      .09       .23       .01   612.50
    2350.       3.    2347.       0.        6.     979.       0.      592.       81.   614.00
     2.60      .44     2.40      .00      .046     .035     .021      .000   604.90    90.12
  .000335    1110.    1110.    1110.         2        0        0       .00   189.18   279.30

*SECNO 15390.000
        SECTION SEVEN
 15390.00     6.61   613.91      .00       .00   614.00      .10       .11       .00   613.00
    2350.       3.    2347.       0.        8.     947.       0.      599.       83.   614.50
     2.63      .37     2.48      .00      .046     .035     .046      .000   607.30    57.79
  .000382     310.     310.     310.         2        0        0       .00   199.72   257.51

*SECNO 15900.000
        SECTION EIGHT WITH MATCHED ELMIN AT THIS STA W/COE REPORT
 15900.00    11.93   614.03      .00       .00   614.07      .05       .07       .00   612.20
    2350.      13.    2308.      29.       48.    1317.      39.      613.       86.   611.00
     2.72      .27     1.75      .76      .042     .026     .021      .000   602.10   147.94
  .000065     510.     510.     510.         2        0        0       .00   263.47   411.41

*SECNO 17270.000
        SECTION EIGHT
 17270.00    11.72   614.12      .00       .00   614.17      .05       .09       .00   612.50
    2350.      10.    2316.      25.       37.    1290.      33.      656.       94.   611.30
     2.93      .26     1.81      .75      .042     .026     .021      .000   602.40   153.90
  .000072    1370.    1370.    1370.         2        0        0       .00   245.41   399.31

CCHV=    .300 CEHV=    .500
*SECNO 17704.000
        REPEAT OF SECTION EIGHT 200 FEET DS BRIDGE
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS   BANK ELEV
  Q         OLOB      OCH       DROB      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

 17704.00    11.75    614.15      .00       .00    614.20      .05       .03       .00    612.50
    2350.      10.     2315.     25.       39.     1285.      34.      670.       96.     611.30
     3.00      .26      1.80      .75      .042      .026     .021      .000    602.40    153.04
  .000071     434.      434.     434.        0         0        0       .00    246.51    399.56

*SECNO 17904.000
        SECTION NINE JUST DS OF NORTH RIVER ROAD BRIDGE
 17904.00    13.57    614.17      .00       .00    614.21      .04       .01       .00    626.60
    2350.       0.     2350.       0.        0.     1396.       0.      676.       97.     622.93
     3.03      .00      1.68      .00      .042      .026     .021      .000    600.60     43.07
  .000044     200.      200.     200.        0         0        0       .00    144.01    187.08


SPECIAL BRIDGE

SB   XI        XIOR      COFO      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.05      1.56      2.60       .00     84.00      8.00   2961.00     2.90    601.50    601.50

*SECNO 17960.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=     614.17 BRIDGE VELOCITY=,      1.65      CALCULATED CHANNEL AREA=,     1428.

 EGPRS     EGLWC     H3        OWEIR     OLOW      BAREA     TRAPEZOID     ELLC      ELTRD
                                                                AREA
      .00    614.21      .00        0.     2350.     2961.     2975.     623.00    624.00


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      625.00 ELREA=      625.00

        SECTION NINE JUST US OF NORTH RIVER ROAD BRIDGE
 17960.00    13.57    614.17      .00       .00    614.21      .04       .00       .00    626.60
    2350.       0.     2350.       0.        0.     1397.       0.      679.       97.     622.93
     3.04      .00      1.68      .00      .000      .026     .000      .000    600.60     43.06
  .000044      56.       56.      56.        0         0        0       .00    144.04    187.10


*SECNO 18010.000
        REPEAT OF SECTION EIGHT 50 FEET US BRIDGE
 18010.00    11.77    614.17      .00       .00    614.22      .05       .00       .00    612.50
    2350.      10.     2314.     26.       40.     1290.      34.      679.       97.     611.30
     3.05      .26      1.79      .75      .042      .026     .021      .000    602.40    152.32
  .000070      50.       50.      50.        0         0        0       .00    247.45    399.77
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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
   Q         QLOB      OCH       OROB      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=    .100 CEHV=    .300
*SECNO 19840.000
        SECTION TEN
 19840.00    10.40   614.30      .00       .00   614.33      .03       .11       .00   613.20
    2350.       9.    2079.     261.       44.    1434.     628.      752.      116.    612.20
     3.43      .21     1.45      .42      .042     .026     .042      .000    603.90    85.19
  .000054    1830.    1830.    1830.         2        0        0       .00    620.90   706.09

*SECNO 21485.000

3265 DIVIDED FLOW

        SECTION ELEVEN
 21485.00    14.57   614.37      .00       .00   614.40      .02       .06       .00   614.80
    2350.       0.    2265.      85.        0.    1763.     466.      834.      144.    612.80
     3.79      .00     1.28      .18      .021     .026     .042      .000    599.80    86.26
  .000028    1645.    1645.    1645.         2        0        0       .00    869.42  1097.00

*SECNO 23500.000
3280 CROSS SECTION  23500.00 EXTENDED       .63 FEET

3470 ENCROACHMENT STATIONS=        .0    1283.0  TYPE=     1  TARGET=    1282.999
        SECTION TWELVE
 23500.00    16.83   614.43      .00       .00   614.45      .01       .05       .00   612.00
    2350.     163.    2052.     134.      652.    1966.     564.      959.      188.    612.80
     4.39      .25     1.04      .24      .042     .026     .042      .000    597.60   182.54
  .000021    2015.    2015.    2015.         2        0        0       .00   1059.36  1241.90

*SECNO 25875.000

3265 DIVIDED FLOW

3280 CROSS SECTION  25875.00 EXTENDED      1.18 FEET

3470 ENCROACHMENT STATIONS=        .0    1390.0  TYPE=     1  TARGET=    1389.999
        SECTION THIRTEEN
 25875.00    19.18   614.48      .00       .00   614.49      .02       .05       .00   612.90
    2350.      56.    2279.      15.      523.    2113.     100.     1121.      243.    612.90
     5.02      .11     1.08      .15      .070     .026     .030      .000    595.30   139.39
  .000019    2375.    2375.    2375.         1        0        0       .00    947.18  1242.09
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
  O         OLOB      OCH       OROB      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 28080.000
3280 CROSS SECTION  28080.00 EXTENDED      1.92 FEET

3470 ENCROACHMENT STATIONS=     600.0    1850.0  TYPE=     1  TARGET=    -600.000
        SECTION FOURTEEN
 28080.00    11.13   614.53      .00       .00   614.55      .02       .05       .00   612.40
    2350.      106.    2008.     237.      524.    1681.    1320.    1279.      299.   612.30
     5.60      .20     1.19      .18      .070     .026     .070     .000   603.40   600.00
  .000034    2205.    2205.    2205.         1        0        0      .00  1250.00  1850.00

*SECNO 28480.000
3280 CROSS SECTION  28480.00 EXTENDED      1.94 FEET

3470 ENCROACHMENT STATIONS=     850.0    1850.0  TYPE=     1  TARGET=    -850.000
        USGS GAGE LOCATION - REPEAT OF SECTION FOURTEEN
 28480.00    11.14   614.54      .00       .00   614.56      .02       .01       .00   612.40
    2350.        0.    2098.     252.        0.    1685.    1332.    1309.      309.   612.30
     5.70      .00     1.25      .19      .070     .026     .070     .000   603.40   850.00
  .000037     400.     400.     400.         0        0        0      .00  1000.00  1850.00

*SECNO 29870.000
3280 CROSS SECTION  29870.00 EXTENDED      2.79 FEET

        SECTION FIFTEEN - MOUTH OF BLACK LAKE
 29870.00    15.68   614.58      .00       .00   614.59      .01       .03       .00   612.10
    2350.       26.    1973.     350.      280.    2185.    2141.    1431.      344.   611.80
     6.19      .09      .90      .16      .070     .026     .070     .000   598.90   235.01
  .000015    1390.    1390.    1390.         0        0        0      .00  1224.99  1460.00
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THIS RUN EXECUTED 03/12/86 12:07:36

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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 APRIL 1985
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T1 JOB 12202-02  GRANT TWP. PIS
T2 50 YEAR FLOOD WITH FLOW THROUGH THE POWERHOUSE AT ALVERNO DAM
T3      BLACK R. ABOVE ALVERNO

J1  ICHECK    IND       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FD

      0.        0.        0.        0.   .000000      .00        .0     3000.   610.500     .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

    2.000      .000    -5.000     5.000   200.000     .000      .000      .000      .000      .000
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   SECNO     DEPTH     CWSEL     CRIWS     WSELV     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

CCHV=    .100 CEHV=    .300
*SECNO 1.000
         JUST US ALVERNO DAM SYNTHETIC DATA
     1.00     10.50    610.50      .00    610.50    610.52       .02       .00       .00    617.00
    3000.        0.     3000.       0.        0.     2949.        0.        0.        0.    617.00
      .00       .00      1.02      .00      .021      .026      .021      .000    600.00     19.12
  .000016        0.        0.       0.         0         0         0       .00    311.76    330.88

*SECNO 3700.000
        SECTION TWO
  3700.00     15.57    610.57      .00       .00    610.60       .03       .08       .00    615.50
    3000.        0.     3000.       0.        0.     2179.        0.      218.       23.    615.90
      .75       .00      1.38      .00      .021      .026      .021      .000    595.00     67.09
  .000028     3700.     3700.    3700.         0         0         0       .00    223.47    290.56

*SECNO 5760.000
        SECTION THREE
  5760.00     15.24    610.64      .00       .00    610.65       .02       .05       .00    614.50
    3000.        0.     3000.       0.        0.     2960.        0.      339.       38.    615.00
     1.31       .00      1.01      .00      .030      .026      .021      .000    595.40     52.72
  .000024     2060.     2060.    2060.         2         0         0       .00    425.64    478.37

*SECNO 8400.000
        SECTION FOUR
  8400.00     10.11    610.71      .00       .00    610.83       .11       .14       .03    612.50
    3000.        0.     3000.       0.        0.     1118.        0.      463.       56.    613.70
     1.58       .00      2.68      .00      .021      .029      .030      .000    600.60    137.06
  .000232     2640.     2640.    2640.         0         0         0       .00    173.64    310.70

*SECNO 10540.000
        SECTION FIVE
 10540.00      7.50    611.30      .00       .00    611.43       .13       .60       .01    613.90
    3000.        0.     3000.       0.        0.     1028.        0.      516.       65.    616.30
     1.79       .00      2.92      .00      .030      .029      .030      .000    603.80     86.15
  .000343     2140.     2140.    2140.         2         0         0       .00    189.27    275.42
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS   BANK ELEV
  Q         OLOB      OCH       OROB      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 12700.000
        CORPS A-A FROM 1965 REPORT
 12700.00     5.49   612.49      .00       .00   612.98       .50      1.44       .11   614.00
    3000.       0.     3000.       0.        0.     531.        0.     554.       73.    613.70
     1.89      .00     5.65      .00      .021     .029      .030     .000    607.00   102.26
  .001829    2160.    2160.    2160.         2        0         0      .00    126.86   229.12

*SECNO 12850.000
        CORPS B-B FROM 1965 REPORT
 12850.00     6.30   612.80      .00       .00   613.21       .41      .22       .01   614.00
    3000.       0.     3000.       0.        0.     584.        0.     556.       73.    613.70
     1.90      .00     5.14      .00      .021     .026      .030     .000    606.50   103.19
  .001234     150.     150.     150.         2        0         0      .00    140.85   244.04

*SECNO 13270.000
        CORPS C-C FROM 1965 REPORT
 13270.00     5.85   613.35      .00       .00   613.73       .38      .51       .00   613.00
    3000.       0.     3000.       0.        1.     605.        0.     562.       75.    614.20
     1.93      .76     4.96      .00      .021     .026      .046     .000    607.50    96.52
  .001206     420.     420.     420.         2        0         0      .00    155.74   252.26

*SECNO 13700.000
        CORPS C-C FROM 1965 REPORT REPEATED
 13700.00     6.37   613.87      .00       .00   614.16       .30      .42       .01   613.00
    3000.       4.     2996.       0.        4.     686.        0.     568.       76.    614.20
     1.95     1.16     4.37      .00      .021     .026      .046     .000    607.50    91.28
  .000824     430.     430.     430.         0        0         0      .00    165.75   257.02

*SECNO 13870.000
        SECTION SIX
 13870.00    12.44   614.14      .00       .00   614.25       .11      .07       .02   617.70
    3000.       0.     2997.       3.        0.    1148.       10.     572.       77.    613.30
     1.97      .00     2.61      .27      .021     .033      .046     .000    601.70    12.08
  .000229     170.     170.     170.         2        0         0      .00    174.45   186.52

*SECNO 13920.000
        SECTION SIX MODIFIED FOR SILTATION ACROSS 1/2 OF CHANNEL
 13920.00     9.75   614.05      .00       .00   614.32       .27      .02       .05   617.70
    3000.       0.     2995.       5.        0.     717.        8.     573.       77.    613.30
     1.97      .00     4.18      .55      .021     .033      .046     .000    604.30    12.25
  .001090      50.      50.      50.         2        0         0      .00    171.55   183.79
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      OCH       OROB      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 13970.000
        SECTION SIX-A   ALSO USGS AUX GAGE
 13970.00     12.17    614.27      .00       .00    614.36      .09       .02       .02    615.30
    3000.        0.     2996.       4.        0.     1274.      14.      574.       78.     613.30
     1.98       .00      2.35      .26      .021      .033     .046      .000    602.10     11.85
  .000172       50.       50.      50.         2         0        0       .00    185.37    197.22

*SECNO 15080.000
        CORPS D-D FROM 1965 REPORT
 15080.00      9.62    614.52      .00       .00    614.63      .11       .27       .01    612.50
    3000.       10.     2990.       1.       15.     1108.       1.      605.       82.     614.00
     2.10       .61      2.70      .54      .046      .035     .021      .000    604.90     84.66
  .000361     1110.     1110.    1110.         2         0        0       .00    198.97    283.63

*SECNO 15390.000

3265 DIVIDED FLOW

        SECTION SEVEN
 15390.00      7.33    614.63      .00       .00    614.75      .12       .12       .00    613.00
    3000.       14.     2980.       5.       25.     1081.      25.      613.       84.     614.50
     2.13       .57      2.76      .22      .046      .035     .046      .000    607.30     43.96
  .000403      310.      310.     310.         2         0        0       .00    348.14    628.68

*SECNO 15900.000
        SECTION EIGHT WITH MATCHED ELMIN AT THIS STA W/COE REPORT
 15900.00     12.67    614.77      .00       .00    614.83      .06       .07       .01    612.20
    3000.       34.     2895.      71.       94.     1448.      90.      629.       88.     611.00
     2.20       .36      2.00      .79      .042      .026     .021      .000    602.10    126.68
  .000074      510.      510.     510.         2         0        0       .00    352.49    479.18

*SECNO 17270.000
        SECTION EIGHT
 17270.00     13.47    614.87      .00       .00    614.94      .06       .11       .00    612.50
    3000.       29.     2911.      60.       80.     1413.      72.      679.       99.     611.30
     2.39       .36      2.06      .84      .042      .026     .021      .000    602.40    132.28
  .000082     1370.     1370.    1370.         2         0        0       .00    329.04    461.33
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        QLOSS    BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WIN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

CCHV=    .300 CEHV=    .500
*SECNO 17704.000
        REPEAT OF SECTION EIGHT 200 FEET DS BRIDGE
 17704.00    12.51   614.91      .00       .00   614.97      .06       .04       .00   612.50
    3000.      30.    2908.      62.       83.    1419.      75.      695.      102.   611.30
     2.45      .36     2.05      .83      .042     .026     .021      .000   602.40   131.31
  .000080     434.     434.     434.        0        0        0       .00   333.13   464.43

*SECNO 17904.000
        SECTION NINE JUST DS OF NORTH RIVER ROAD BRIDGE
 17904.00    14.33   614.93      .00       .00   614.99      .06       .01       .00   626.60
    3000.       0.    3000.       0.        0.    1507.       0.      702.      104.   622.93
     2.48      .00     1.99      .00      .042     .026     .021      .000   600.60    41.63
  .000058     200.     200.     200.        0        0        0       .00   147.15   188.78


SPECIAL BRIDGE

SB   XI        XIOR      CDFO      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.05      1.56      2.60       .00     84.00      8.00   2961.00     2.90    601.50    601.50

*SECNO 17960.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=    614.92 BRIDGE VELOCITY=,      1.94      CALCULATED CHANNEL AREA=,     1543.

 EGPRS     EGLWC      HS        QWEIR     QLOW      BAREA   TRAPEZOID      ELLC      ELTRD
                                                             AREA
       .00    614.99      .00        0.     3000.     2961.     2975.     623.00    624.00


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      625.00 ELREA=      625.00

        SECTION NINE JUST US OF NORTH RIVER ROAD BRIDGE
 17960.00    14.33   614.93      .00       .00   614.99      .06       .00       .00   626.60
    3000.       0.    3000.       0.        0.    1508.       0.      704.      104.   622.93
     2.48      .00     1.99      .00      .000     .026     .000      .000   600.60    41.63
  .000058      56.      56.      56.        0        0        0       .00   147.16   188.79


*SECNO 18010.000
        REPEAT OF SECTION EIGHT 50 FEET US BRIDGE
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   SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS   BANK ELEV
   Q         OLOB      OCH       OROB      ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN      SSTA
   SLOPE     XLOBL     XLCH      YLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID     ENDST

 18010.00    12.53    614.93      .00       .00    615.00      .06       .00       .00    612.50
    3000.      30.     2906.      63.       84.     1424.      77.      706.      104.    611.30
     2.49      .36      2.04      .82      .042      .026     .021      .000    602.40    130.59
  .000079      50.       50.      50.         0         0        0       .00    336.14    466.73

CCHV=    .100 CEHV=    .300
*SECNO 19840.000
        SECTION TEN
 19840.00    11.19    615.09      .00       .00    615.12      .03       .12       .00    613.20
    3000.      33.     2513.     455.      104.     1606.     899.      794.      125.    612.20
     2.86      .31      1.56      .51      .042      .026     .042      .000    603.90     62.19
  .000054    1830.     1830.    1830.         2         0        0       .00    664.76    726.95

*SECNO 21485.000
        SECTION ELEVEN
 21485.00    15.36    615.16      .00       .00    615.18      .03       .07       .00    614.80
    3000.       0.     2723.     277.        1.     1921.    1073.      900.      157.    612.80
     3.20      .12      1.42      .26      .021      .026     .042      .000    599.80     80.43
  .000031    1645.     1645.    1645.         2         0        0       .00   1041.97   1122.39

*SECNO 23500.000
3280 CROSS SECTION  23500.00 EXTENDED      1.42 FEET

3470 ENCROACHMENT STATIONS=        .0    1283.0  TYPE=     1  TARGET=    1282.999
        SECTION TWELVE
 23500.00    17.62    615.22      .00       .00    615.24      .02       .05       .00    612.00
    3000.     314.     2437.     249.     1059.     2157.     828.     1063.      207.    612.80
     3.78      .30      1.13      .30      .042      .026     .042      .000    597.60    144.20
  .000021    2015.     2015.    2015.         2         0        0       .00   1122.42   1265.61

*SECNO 25875.000
3280 CROSS SECTION  25875.00 EXTENDED      1.98 FEET

3470 ENCROACHMENT STATIONS=        .0    1390.0  TYPE=     1  TARGET=    1389.999
        SECTION THIRTEEN
 25875.00    19.97    615.27      .00       .00    615.29      .02       .05       .00    612.90
    3000.     138.     2768.      94.      893.     2296.     432.     1272.      272.    612.90
     4.37      .15      1.21      .22      .070      .026     .030      .000    595.30     92.87
  .000021    2375.     2375.    2375.         1         0        0       .00   1254.14   1347.01
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      OCH       OROB      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 28080.000
3280 CROSS SECTION  28080.00 EXTENDED      2.72 FEET

3470 ENCROACHMENT STATIONS=     600.0    1850.0  TYPE=     1  TARGET=    -600.000
        SECTION FOURTEEN
 28080.00    11.93   615.33      .00       .00   615.35      .02       .06       .00   612.40
    3000.      178.    2385.     437.      724.    1877.    1921.    1478.      335.   612.30
     4.94      .25     1.27      .23      .070     .026     .070     .000   603.40   600.00
  .000033    2205.    2205.    2205.         1        0        0      .00  1250.00  1850.00

*SECNO 28480.000
3280 CROSS SECTION  28480.00 EXTENDED      2.74 FEET

3470 ENCROACHMENT STATIONS=     850.0    1850.0  TYPE=     1  TARGET=    -850.000
        USGS GAGE LOCATION - REPEAT OF SECTION FOURTEEN
 28480.00    11.94   615.34      .00       .00   615.36      .02       .01       .00   612.40
    3000.        0.    2530.     470.        0.    1881.    1933.    1516.      346.   612.30
     5.04      .00     1.35      .24      .070     .026     .070     .000   603.40   850.00
  .000038     400.     400.     400.         0        0        0      .00  1000.00  1850.00

*SECNO 29870.000
3280 CROSS SECTION  29870.00 EXTENDED      3.59 FEET

        SECTION FIFTEEN - MOUTH OF BLACK LAKE
 29870.00    16.48   615.38      .00       .00   615.40      .01       .03       .00   612.10
    3000.       59.    2392.     549.      488.    2390.    2733.    1666.      383.   611.80
     5.50      .12     1.00      .20      .070     .026     .070     .000   598.90   159.19
  .000016    1390.    1390.    1390.         0        0        0      .00  1300.81  1460.00
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THIS RUN EXECUTED 03/12/86 12:08:50

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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 APRIL 1985
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T1 JOB 12202-02 GRANT TWP. FIS
T2 100 YEAR FLOOD WITH FLOW THROUGH THE POWERHOUSE AT ALVERNO DAM
T3 BLACK R. ABOVE ALVERNO DAM

J1	ICHECK	IND	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FD
	0.	0.	0.	0.	.000000	.00	.0	3250.	611.300	.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	3.000	1.000	5.000	5.000	200.000	.000	.000	.000	.000	.000

```
   SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS   BANK ELEV
   Q         OLOB      OCH       OROB      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 3

CCHV=    .100 CEHV=    .300
*SECNO 1.000
         JUST US ALVERNO DAM SYNTHETIC DATA
     1.00     11.30   611.30       .00   611.30   611.32       .02       .00       .00   617.00
    3250.        0.    3250.        0.       0.    3201.       0.        0.        0.    617.00
      .00       .00     1.02       .00      .021     .026      .021      .000   600.00    16.76
  .000015        0.       0.        0.        0        0         0       .00   316.47   333.24

*SECNO 3700.000
        SECTION TWO
  3700.00     16.36   611.36       .00       .00   611.39       .03       .07       .00   615.50
    3250.        0.    3250.        0.       0.    2360.       0.      236.       23.    615.90
      .75       .00     1.38       .00      .021     .026      .021      .000   595.00    63.87
  .000027     3700.    3700.     3700.        0        0         0       .00   231.28   295.15

*SECNO 5760.000
        SECTION THREE
  5760.00     16.03   611.43       .00       .00   611.44       .02       .05       .00   614.50
    3250.        0.    3250.        0.       0.    3304.       0.      370.       39.    615.00
     1.33       .00      .98       .00      .030     .026      .021      .000   595.40    44.21
  .000020     2060.    2060.     2060.        2        0         0       .00   441.03   485.24

*SECNO 8400.000
        SECTION FOUR
  8400.00     10.89   611.49       .00       .00   611.59       .10       .12       .03   612.50
    3250.        0:    3250.        0.       0.    1257.       0.      508.       58.    613.70
     1.61       .00     2.58       .00      .021     .029      .030      .000   600.60   132.78
  .000197     2640.    2640.     2640.        0        0         0       .00   182.49   315.27

*SECNO 10540.000
        SECTION FIVE
 10540.00      8.17   611.97       .00       .00   612.10       .12       .50       .01   613.90
    3250.        0.    3250.        0.       0.    1157.       0.      568.       67.    616.30
     1.82       .00     2.81       .00      .030     .029      .030      .000   603.80    83.26
  .000280     2140.    2140.     2140.        2        0         0       .00   193.59   276.85
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      OCH       OROB      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 12700.000
       CORPS A-A FROM 1965 REPORT
 12700.00      5.92    612.92       .00       .00    613.40       .48      1.20       .11    614.00
    3250.        0.      3250.       0.        0.      586.       0.      611.       75.     613.70
     1.93       .00      5.55       .00      .021      .029      .030      .000    607.00    101.61
  .001573     2160.     2160.     2160.         2         0         0       .00    128.04    229.66

*SECNO 12850.000
       CORPS B-B FROM 1965 REPORT
 12850.00      6.70    613.20       .00       .00    613.60       .40       .20       .01    614.00
    3250.        0.      3250.       0.        0.      641.       0.      613.       76.     613.70
     1.94       .00      5.07       .00      .021      .026      .030      .000    606.50    102.12
  .001100      150.      150.      150.         2         0         0       .00    144.57    246.69

*SECNO 13270.000
       CORPS C-C FROM 1965 REPORT
 13270.00      6.19    613.69       .00       .00    614.07       .38       .46       .00    613.00
    3250.        3.      3247.       0.        2.      657.       0.      619.       77.     614.20
     1.96      1.15      4.94       .00      .021      .026      .046      .000    607.50     93.11
  .001101      420.      420.      420.         2         0         0       .00    162.24    255.35

*SECNO 13700.000
       CORPS D-D FROM 1965 REPORT REPEATED
 13700.00      6.67    614.17       .00       .00    614.47       .30       .40       .01    613.00
    3250.        9.      3241.       0.        7.      732.       0.      626.       79.     614.20
     1.99      1.38      4.43       .00      .021      .026      .046      .000    607.50     88.38
  .000795      430.      430.      430.         0         0         0       .00    171.27    259.65

*SECNO 13870.000
       SECTION SIX
 13870.00     12.75    614.45       .00       .00    614.56       .11       .07       .02    617.70
    3250.        0.      3243.       7.        0.     1193.      19.      630.       80.     613.30
     2.01       .00      2.72       .35      .021      .033      .046      .030    601.70     11.53
  .000237      170.      170.      170.         2         0         0       .00    183.46    195.00

*SECNO 13920.000
       SECTION SIX MODIFIED FOR SILTATION ACROSS 1/2 OF CHANNEL
 13920.00     10.05    614.35       .00       .00    614.63       .28       .02       .05    617.70
    3250.        0.      3239.      11.        0.      762.      16.      631.       80.     613.30
     2.01       .00      4.25       .68      .021      .033      .046      .000    604.30     11.70
  .001044       50.       50.       50.         2         0         0       .00    180.92    192.62
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  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      OCH       OROB      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 13970.000
        SECTION SIX-A   ALSO USGS AUX GAGE
 13970.00    12.48   614.58      .00       .00   614.67      .09       .02       .02   615.30
    3250.       0.    3242.       8.        0.   1322.      24.     632.       80.    613.30
     2.02      .00     2.45      .34      .021     .033     .046     .000   602.10    11.30
  .000179     50.      50.      50.         2        0        0      .00   193.49   204.79

*SECNO 15080.000
        CORPS D-D FROM 1965 REPORT
 15080.00     9.93   614.83      .00       .00   614.95      .12       .27       .01   612.50
    3250.      14.    3234.       2.       21.   1164.       2.     665.       85.    614.00
     2.13      .67     2.78      .74      .046     .035     .021     .000   604.90    82.29
  .000359    1110.    1110.    1110.         2        0        0      .00   203.51   285.81

*SECNO 15390.000

3265 DIVIDED FLOW

        SECTION SEVEN
 15390.00     7.64   614.94      .00       .00   615.07      .12       .12       .00   613.00
    3250.      23.    3200.      27.       36.   1139.      73.     673.       87.    614.50
     2.16      .63     2.81      .37      .046     .035     .046     .000   607.30    38.05
  .000391     310.     310.     310.         2        0        0      .00   399.94   634.90

*SECNO 15900.000

3265 DIVIDED FLOW

        SECTION EIGHT WITH MATCHED ELMIN AT THIS STA W/COE REPORT
 15900.00    12.98   615.08      .00       .00   615.15      .06       .07       .01   612.20
    3250.      48.    3099.     102.      119.   1503.     127.     691.       92.    611.00
     2.23      .41     2.06      .81      .042     .026     .021     .000   602.10   116.01
  .000075     510.     510.     510.         2        0        0      .00   400.20   705.15

*SECNO 17270.000
        SECTION EIGHT
 17270.00    12.79   615.19      .00       .00   615.26      .07       .11       .00   612.50
    3250.      40.    3124.      86.      103.   1468.     103.     745.      104.    611.30
     2.41      .39     2.13      .83      .042     .026     .021     .000   602.40   123.37
  .000083    1370.    1370.    1370.         2        0        0      .00   366.37   489.74
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      QCH       OROB      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 17704.000
        REPEAT OF SECTION EIGHT 200 FEET DS BRIDGE
 17704.00    12.82   615.22      .00       .00   615.29      .07       .04       .00   612.50
    3250.      42.    3120.      88.      106.    1474.     107.      761.      108.   611.30
     2.47      .39     2.12      .83      .042     .026     .021      .000    602.40   122.17
  .000081     434.     434.     434.        0        0        0       .00    370.71   492.88

*SECNO 17904.000
        SECTION NINE JUST DS OF NORTH RIVER ROAD BRIDGE
 17904.00    14.64   615.24      .00       .00   615.31      .07       .01       .00   626.60
    3250.       0.    3250.       0.        0.    1554.       0.      769.      109.   622.93
     2.50      .00     2.09      .00      .042     .026     .021      .000    600.60    41.04
  .000062     200.     200.     200.        0        0        0       .00    148.43   189.48


SPECIAL BRIDGE

SB   XR        XROR      COFO      RDLEN     BWC       BWR       BAREA     SS        ELCHU     ELCHD
     1.05      1.56      2.60       .00     84.00      8.00   2961.00      2.90    601.50    601.50

*SECNO 17960.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=    615.24 BRIDGE VELOCITY=,      2.04      CALCULATED CHANNEL AREA=,     1591.

 EGPRS      EGLWC      H3        OWEIR     OLOW      BAREA   TRAPEZOID      ELLC      ELTRD
                                                              AREA
       .00   615.31      .00        0.     3250.     2961.    2975.      623.00    624.00


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      625.00 ELREA=      625.00

        SECTION NINE JUST US OF NORTH RIVER ROAD BRIDGE
 17960.00    14.64   615.24      .00       .00   615.31      .07       .00       .00   626.60
    3250.       0.    3250.       0.        0.    1554.       0.      771.      109.   622.93
     2.51      .00     2.09      .00      .000     .026     .000      .000    600.60    41.04
  .000062      56.      56.      56.        0        0        0       .00    148.44   189.48


*SECNO 16010.000
        REPEAT OF SECTION EIGHT 50 FEET US BRIDGE
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   SECNO     DEPTH     CWSEL     CRIWS     WSELV     EG        HV        HL        OLOSS    BANK ELEV
   Q         OLOB      OCH       OROB      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

 18010.00    12.85    615.25      .00       .00    615.31      .07       .00       .00    612.50
    3250.      43.     3117.     90.      107.     1479.     110.      773.      109.    611.30
     2.51      .40      2.11      .82      .042      .026     .021      .000    602.40    121.25
  .000081     50.       50.      50.        0         0        0       .00     373.80    495.05

CCHV=    .100 CEHV=    .300
*SECNO 19840.000
        SECTION TEN
 19840.00    11.50    615.40      .00       .00    615.43      .03       .12       .00    613.20
    3250.      46.     2664.     540.      133.     1675.    1013.      867.      131.    612.20
     2.88      .34      1.59      .53      .042      .026     .042      .000    603.90     52.88
  .000052    1830.     1830.    1830.        2         0        0       .00     682.51    735.39

*SECNO 21485.000
        SECTION ELEVEN
 21485.00    15.67    615.47      .00       .00    615.50      .03       .06       .00    614.80
    3250.       1.     2865.     394.        3.     1985.    1339.      984.      164.    612.80
     3.23      .19      1.44      .29      .021      .026     .042      .000    599.80     76.36
  .000031    1645.     1645.    1645.        2         0        0       .00    1056.25   1132.61

*SECNO 23500.000
3280 CROSS SECTION  23500.00 EXTENDED      1.75 FEET

3470 ENCROACHMENT STATIONS=        .0    1283.0  TYPE=     1  TARGET=    1282.999
        SECTION TWELVE
 23500.00    17.94    615.54      .00       .00    615.55      .02       .05       .00    612.00
    3250.     387.     2562.     301.     1236.     2235.     942.     1163.      215.    612.80
     3.80      .31      1.15      .32      .042      .026     .042      .000    597.60    128.41
  .000021    2015.     2015.    2015.        1         0        0       .00    1146.95   1275.37

*SECNO 25875.000
3280 CROSS SECTION  25875.00 EXTENDED      2.29 FEET

3470 ENCROACHMENT STATIONS=        .0    1390.0  TYPE=     1  TARGET=    1389.999
        SECTION THIRTEEN
 25875.00    20.28    615.58      .00       .00    615.60      .02       .05       .00    612.90
    3250.     177.     2917.     156.     1052.     2368.     603.     1393.      282.    612.90
     4.39      .17      1.23      .26      .070      .026     .030      .000    595.30     77.91
  .000021    2375.     2375.    2375.        1         0        0       .00    1300.96   1378.87
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   SECNO     DEPTH     CWSEL     CRIWS     WSELR     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 28080.000
3280 CROSS SECTION  28080.00 EXTENDED      3.04 FEET

3470 ENCROACHMENT STATIONS=     600.0    1850.0  TYPE=     1  TARGET=    -600.000
        SECTION FOURTEEN
 28080.00    12.24   615.64      .00       .00   615.66      .02       .06       .00   612.40
    3250.     209.    2518.     523.      802.    1954.    2158.    1619.      347.   612.30
     4.97      .26     1.29      .24      .070     .026     .070     .000    603.40   600.00
  .000032    2205.    2205.    2205.         1        0        0      .00   1250.00  1850.00

*SECNO 28480.000
3280 CROSS SECTION  28480.00 EXTENDED      3.05 FEET

3470 ENCROACHMENT STATIONS=     850.0    1850.0  TYPE=     1  TARGET=    -850.000
        USGS GAGE LOCATION - REPEAT OF SECTION FOURTEEN
 28480.00    12.25   615.65      .00       .00   615.68      .02       .01       .00   612.40
    3250.       0.    2684.     566.        0.    1958.    2170.    1660.      357.   612.30
     5.06      .00     1.37      .26      .070     .026     .070     .000    603.40   850.00
  .000037     400.     400.     400.         0        0        0      .00   1000.00  1850.00

*SECNO 29870.000
3280 CROSS SECTION  29870.00 EXTENDED      3.90 FEET

        SECTION FIFTEEN - MOUTH OF BLACK LAKE
 29870.00    16.80   615.70      .00       .00   615.71      .01       .03       .00   612.10
    3250.      79.    2539.     632.      588.    2471.    2966.    1822.      394.   611.80
     5.52      .13     1.03      .21      .070     .026     .070     .000    598.90   124.42
  .000016    1390.    1390.    1390.         0        0        0      .00   1335.59  1460.00
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THIS RUN EXECUTED 03/12/86 12:12:51

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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 APRIL 1985
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T1 JOB 12202-02 GRANT TWP. PIS
T2 500 YEAR FLOOD WITH FLOW THROUGH POWERHOUSE AT ALVERNO DAM
T3 BLACK R. ABOVE ALVERNO

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0.	0.	0.	0.	.000000	.00	.0	3850.	613.650	.000
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15.000	.000	-5.000	5.000	200.000	.000	.000	.000	.000	.000

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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
   O         OLOB      OCH       OROB      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 4

CCHV=    .100 CEHV=    .300
*SECNO 1.000
        JUST US ALVERNO DAM SYNTHETIC DATA
     1.00     13.65    613.65      .00    613.65    613.66      .01       .00       .00    617.00
    3850.        0.     3850.       0.        0.     3961.       0.        0.        0.    617.00
      .00       .00       .97      .00      .021      .026     .021      .000    600.00      9.85
  .000011        0.        0.       0.         0         0        0       .00    330.29    340.15

*SECNO 3700.000
        SECTION TWO
  3700.00     18.69    613.69      .00       .00    613.72      .03       .05       .00    615.50
    3850.        0.     3850.       0.        0.     2914.       0.      292.       24.    615.90
      .78       .00      1.32      .00      .021      .026     .021      .000    595.00     58.31
  .000020     3700.     3700.    3700.         0         0        0       .00    243.44    301.75

*SECNO 5760.000
        SECTION THREE
  5760.00     18.34    613.74      .00       .00    613.75      .01       .03       .00    614.50
    3850.        0.     3850.       0.        0.     4344.       0.      464.       41.    615.00
     1.42       .00       .89      .00      .030      .026     .021      .000    595.40     29.79
  .000012     2060.     2060.    2060.         1         0        0       .00    459.82    489.61

*SECNO 8400.000
        SECTION FOUR
  8400.00     13.17    613.77      .00       .00    613.85      .08       .07       .02    612.50
    3850.        5.     3845.       0.       10.     1700.       0.      647.       61.    613.70
     1.75       .56      2.26      .01      .021      .029     .030      .000    600.60    109.59
  .000114     2640.     2640.    2640.         1         0        0       .00    216.23    325.82

*SECNO 10540.000
        SECTION FIVE
 10540.00     10.24    614.04      .00       .00    614.13      .09       .28       .00    613.90
    3850.        0.     3850.       0.        0.     1571.       0.      728.       72.    616.30
     1.99       .11      2.45      .00      .030      .029     .030      .000    603.80     72.18
  .000155     2140.     2140.    2140.         2         0        0       .00    209.05    281.22
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  D         OLOB      OCH       OROB      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 12700.000
       CORPS A-A FROM 1965 REPORT
 12700.00     7.52   614.52      .00       .00   614.88       .36       .66       .08   614.00
    3850.       1.    3848.       1.        1.     803.        2.     787.       81.    613.70
     2.12      .85     4.79      .79      .021     .029      .030      .000   607.00    95.67
  .000870    2160.    2160.    2160.         2        0         0       .00   148.23   243.90

*SECNO 12850.000
       CORPS B-B FROM 1965 REPORT
 12850.00     8.18   614.68      .00       .00   614.99       .31       .11       .00   614.00
    3850.       1.    3848.       1.        1.     860.        1.     789.       81.    613.70
     2.13      .84     4.47      .72      .021     .026      .030      .000   606.50    96.61
  .000608     150.     150.     150.         2        0         0       .00   155.72   252.33

*SECNO 13270.000
       CORPS C-C FROM 1965 REPORT
 13270.00     7.45   614.95      .00       .00   615.25       .31       .26       .00   613.00
    3850.      34.    3816.       0.       19.     858.        0.     798.       83.    614.20
     2.15     1.77     4.45      .39      .021     .026      .046      .000   607.50    80.52
  .000652     420.     420.     420.         2        0         0       .00   180.77   261.29

*SECNO 13700.000
       CORPS C-C FROM 1965 REPORT REPEATED
 13700.00     7.74   615.24      .00       .00   615.51       .27       .26       .00   613.00
    3850.      44.    3805.       0.       25.     904.        1.     807.       85.    614.20
     2.18     1.77     4.21      .44      .021     .026      .046      .000   607.50    77.61
  .000543     430.     430.     430.         2        0         0       .00   184.18   261.79

*SECNO 13870.000
       SECTION SIX
 13870.00    13.76   615.46      .00       .00   615.58       .12       .06       .01   617.70
    3850.       0.    3811.      39.        0.    1347.       64.     811.       86.    613.30
     2.20      .00     2.63      .60      .021     .033      .046      .000   601.70     9.34
  .000223     170.     170.     170.         2        0         0       .00   211.10   220.43

*SECNO 13920.000
       SECTION SIX MODIFIED FOR SILTATION ACROSS 1/2 OF CHANNEL
 13920.00    11.08   615.38      .00       .00   615.64       .26       .02       .04   617.70
    3850.       0.    3784.      66.        0.     918.       60.     813.       86.    613.30
     2.20      .00     4.12     1.09      .021     .033      .046      .000   604.30     9.65
  .000782      50.      50.      50.         2        0         0       .00   208.54   218.19
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   SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS   BANK ELEV
   Q         OLOB      OCH       OROB      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 13970.000
        SECTION SIX-A   ALSO USGS AUX GAGE
 13970.00    13.47   615.57      .00       .00   615.67      .10       .02       .02   615.30
    3850.       0.    3811.      39.        0.    1480.      71.      814.      86.    613.30
     2.21      .24     2.57      .54      .021     .033     .046      .000   602.10     8.87
  .000172     50.      50.      50.         2        0        0       .00   221.86   230.73

*SECNO 15080.000
3280 CROSS SECTION  15080.00 EXTENDED       .81 FEET

        CORPS D-D FROM 1965 REPORT
 15080.00    10.91   615.81      .00       .00   615.93      .12       .25       .01   612.50
    3850.      35.    3803.      13.       39.    1340.       9.      852.      91.    614.00
     2.32      .89     2.84     1.38      .046     .035     .021      .000   604.90    81.00
  .000310    1110.    1110.    1110.         2        0        0       .00   206.00   287.00

*SECNO 15390.000
        SECTION SEVEN
 15390.00     8.62   615.92      .00       .00   616.03      .10       .09       .00   613.00
    3850.      63.    3534.     253.       75.    1320.     422.      863.      94.    614.50
     2.35      .84     2.68      .60      .046     .035     .046      .000   607.30    32.56
  .000292     310.     310.     310.         2        0        0       .00   621.92   654.48

*SECNO 15900.000

3265 DIVIDED FLOW

        SECTION EIGHT WITH MATCHED ELMIN AT THIS STA W/COE REPORT
 15900.00    13.93   616.03      .00       .00   616.09      .06       .06       .00   612.20
    3850.     106.    3464.     280.      214.    1670.     350.      887.     102.    611.00
     2.42      .50     2.07      .80      .042     .026     .021      .000   602.10    85.22
  .000066     510.     510.     510.         2        0        0       .00   635.03   764.50

*SECNO 17270.000

3265 DIVIDED FLOW

        SECTION EIGHT
 17270.00    13.72   616.12      .00       .00   616.19      .07       .10       .00   612.50
    3850.      95.    3519.     236.      191.    1633.     285.      955.     121.    611.30
     2.61      .50     2.15      .83      .042     .026     .021      .000   602.40    91.01
  .000074    1370.    1370.    1370.         2        0        0       .00   571.20   751.48
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  SECNO     DEPTH     CWSEL     CRIWS     WSELH     EG        HV        HL        OLOSS   BANK ELEV
  Q         OLOB      OCH       OROB      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 17704.000

3265 DIVIDED FLOW

        REPEAT OF SECTION EIGHT 200 FEET DS BRIDGE
 17704.00    13.76   616.16      .00       .00   616.22      .07      .03      .00   612.50
    3850.      97.    3512.     242.      194.    1678.     294.     976.     126.   611.30
     2.67      .50     2.14      .82      .042     .026     .021     .000   602.40    90.16
  .000073     434.     434.     434.         0        0        0      .00   578.03   753.38

*SECNO 17904.000
        SECTION NINE JUST DS OF NORTH RIVER ROAD BRIDGE
 17904.00    15.56   616.16      .00       .00   616.24      .08      .01      .01   626.60
    3850.       0.    3850.       0.        0.    1693.       0.     985.     129.   622.93
     2.69      .00     2.27      .00      .042     .026     .021     .000   600.60    39.17
  .000067     200.     200.     200.         0        0        0      .00   152.03   191.19


SPECIAL BRIDGE

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.05      1.56      2.60       .00    84.00      8.00   2961.00      2.90    601.50    601.50

*SECNO 17960.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=    616.15 BRIDGE VELOCITY=,      2.22      CALCULATED CHANNEL AREA=,      1736.

 EGPRS      EGLWC       H3        OWEIR      OLOW      BAREA   TRAPEZOID      ELLC      ELTRD
                                                                  AREA
       .00    616.25      .01         0.     3850.     2961.     2975.      623.00    624.00


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      625.00 ELREA=      625.00

        SECTION NINE JUST US OF NORTH RIVER ROAD BRIDGE
 17960.00    15.57   616.17      .00       .00   616.25      .08      .01      .00   626.60
    3850.       0.    3850.       0.        0.    1693.       0.     987.     128.   622.93
     2.70      .00     2.27      .00      .000     .026     .000     .000   600.60    39.17
  .000068      56.      56.      56.         0        0        0      .00   152.02   191.19
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   SECNO     DEPTH     CWSEL     CRIWS     WSELI     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 18010.000

3265 DIVIDED FLOW

        REPEAT OF SECTION EIGHT 50 FEET US BRIDGE
 18010.00     13.79    616.19       .00       .00    616.26       .06       .00       .00    612.50
    3850.       99.     3502.      249.      198.     1645.      305.      989.      129.    611.30
     2.71       .50      2.13       .82      .042      .026      .021      .000    602.40     89.10
  .000071       50.       50.       50.         2         0         0       .00    586.62    755.77

CCHV=    .100 CEHV=    .300
*SECNO 19840.000
        SECTION TEN
 19840.00     12.43    616.33       .00       .00    616.36       .03       .10       .00    613.20
    3850.       95.     2969.      786.      228.     1879.     1370.     1107.      157.    612.20
     3.09       .41      1.58       .57      .042      .026      .042      .000    603.90     41.75
  .000044     1830.     1830.     1830.         1         0         0       .00    754.62    796.37

*SECNO 21485.000
        SECTION ELEVEN
 21485.00     16.59    616.39       .00       .00    616.42       .03       .06       .00    614.80
    3850.        6.     3103.      740.       18.     2171.     2154.     1255.      193.    612.80
     3.46       .35      1.43       .34      .021      .026      .042      .000    599.80     61.72
  .000027     1645.     1645.     1645.         2         0         0       .00   1181.75   1243.47

*SECNO 23500.000
3280 CROSS SECTION  23500.00 EXTENDED      2.66 FEET

3470 ENCROACHMENT STATIONS=       .0    1283.0  TYPE=     1  TARGET=    1282.999
        SECTION TWELVE
 23500.00     18.85    616.45       .00       .00    616.46       .01       .04       .00    612.00
    3850.      595.     2770.      485.     1757.     2455.     1592.     1490.      260.    612.80
     4.08       .34      1.13       .30      .042      .026      .042      .000    597.60     84.24
  .000018     2015.     2015.     2015.         1         0         0       .00   1687.76   1772.00

*SECNO 25875.000
3280 CROSS SECTION  25875.00 EXTENDED      3.20 FEET
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  SECNO     DEPTH     CWSEL     CRIWS     WSELR     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      OCH       OROB      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


3470 ENCROACHMENT STATIONS=        .0    1390.0  TYPE=     1  TARGET=    1389.999
        SECTION THIRTEEN
 25875.00    21.19   616.49      .00       .00   616.51      .02       .04       .00   612.90
    3850.     296.    3144.     411.     1532.    2576.    1313.     1796.      353.    612.90
     4.71      .19     1.22      .31      .070     .026     .030      .000   595.30    40.20
  .000019    2375.    2375.    2375.        1        0        0       .00  1741.80  1782.00

*SECNO 28080.000
3280 CROSS SECTION  28080.00 EXTENDED      3.93 FEET

3470 ENCROACHMENT STATIONS=     600.0    1850.0  TYPE=     1  TARGET=    -600.000
        SECTION FOURTEEN
 28080.00    13.14   616.54      .00       .00   616.56      .02       .05       .00   612.40
    3850.     291.    2795.     764.     1026.    2174.    2832.     2086.      429.    612.30
     5.32      .28     1.29      .27      .070     .026     .070      .000   603.40   600.00
  .000028    2205.    2205.    2205.        0        0        0       .00  1250.00  1850.00

*SECNO 28480.000
3280 CROSS SECTION  28480.00 EXTENDED      3.95 FEET

3470 ENCROACHMENT STATIONS=     850.0    1850.0  TYPE=     1  TARGET=    -850.000
        USGS GAGE LOCATION - REPEAT OF SECTION FOURTEEN
 28480.00    13.15   616.55      .00       .00   616.57      .02       .01       .00   612.40
    3850.       0.    3013.     837.        0.    2179.    2846.     2136.      439.    612.30
     5.42      .00     1.38      .29      .070     .026     .070      .000   603.40   850.00
  .000033     400.     400.     400.        0        0        0       .00  1000.00  1850.00

*SECNO 29870.000
3280 CROSS SECTION  29870.00 EXTENDED      4.79 FEET

        SECTION FIFTEEN - MOUTH OF BLACK LAKE
 29870.00    17.69   616.59      .00       .00   616.60      .01       .03       .00   612.10
    3850.     147.    2849.     854.      926.    2699.    3627.     2332.      478.    611.80
     5.88      .16     1.06      .24      .070     .026     .070      .000   598.90    44.38
  .000015    1390.    1390.    1390.        0        0        0       .00  1415.62  1460.00
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THIS RUN EXECUTED 03/12/86 12:14:10

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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 APRIL 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

BLACK R. ABOVE ALVERNO

SUMMARY PRINTOUT

SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	OLOSS	QCH	DEPTH	TOPWID
1.000	.00	600.00	2350.00	610.50	.01	.00	.00	2350.00	10.50	311.76
1.000	.00	600.00	3000.00	610.50	.02	.00	.00	3000.00	10.50	311.76
1.000	.00	600.00	3250.00	611.30	.02	.00	.00	3250.00	11.30	316.47
1.000	.00	600.00	3850.00	613.65	.01	.00	.00	3850.00	13.65	330.29
3700.000	3700.00	595.00	2350.00	610.54	.02	.05	.00	2350.00	15.54	223.24
3700.000	3700.00	595.00	3000.00	610.57	.03	.08	.00	3000.00	15.57	223.47
3700.000	3700.00	595.00	3250.00	611.36	.03	.07	.00	3250.00	16.36	231.28
3700.000	3700.00	595.00	3850.00	613.69	.03	.05	.00	3850.00	18.69	243.44
5760.000	2060.00	595.40	2350.00	610.58	.01	.03	.00	2350.00	15.18	424.06
5760.000	2060.00	595.40	3000.00	610.64	.02	.05	.00	3000.00	15.24	425.64
5760.000	2060.00	595.40	3250.00	611.43	.02	.05	.00	3250.00	16.03	441.03
5760.000	2060.00	595.40	3850.00	613.74	.01	.03	.00	3850.00	18.34	459.82
8400.000	2640.00	600.60	2350.00	610.63	.07	.09	.02	2350.00	10.03	172.80
8400.000	2640.00	600.60	3000.00	610.71	.11	.14	.03	3000.00	10.11	173.64
8400.000	2640.00	600.60	3250.00	611.49	.10	.12	.03	3250.00	10.89	182.49
8400.000	2640.00	600.60	3850.00	613.77	.08	.07	.02	3844.51	13.17	216.23
10540.000	2140.00	603.80	2350.00	611.02	.09	.40	.01	2350.00	7.22	186.92
10540.000	2140.00	603.80	3000.00	611.30	.13	.60	.01	3000.00	7.50	189.27
10540.000	2140.00	603.80	3250.00	611.97	.12	.50	.01	3250.00	8.17	193.59
10540.000	2140.00	603.80	3850.00	614.04	.09	.28	.00	3849.98	10.24	209.05
12700.000	2160.00	607.00	2350.00	611.93	.40	1.13	.09	2350.00	4.93	124.87
12700.000	2160.00	607.00	3000.00	612.49	.50	1.44	.11	3000.00	5.49	126.86
12700.000	2160.00	607.00	3250.00	612.92	.48	1.20	.11	3250.00	5.92	128.04
12700.000	2160.00	607.00	3850.00	614.52	.36	.66	.08	3847.78	7.52	148.23
12850.000	150.00	606.50	2350.00	612.21	.34	.21	.01	2350.00	5.71	135.34
12850.000	150.00	606.50	3000.00	612.80	.41	.22	.01	3000.00	6.30	140.85
12850.000	150.00	606.50	3250.00	613.20	.40	.20	.01	3250.00	6.70	144.57
12850.000	150.00	606.50	3850.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	OLOSS	OCH	DEPTH	TOPWID
13270.000	420.00	607.50	2350.00	612.73	.33	.50	.00	2350.00	5.23	145.27
13270.000	420.00	607.50	3000.00	613.35	.38	.51	.00	2999.54	5.85	155.74
13270.000	420.00	607.50	3250.00	613.69	.38	.46	.00	3247.27	6.19	162.24
13270.000	420.00	607.50	3850.00	614.95	.31	.26	.00	3816.26	7.45	180.77
13700.000	430.00	607.50	2350.00	613.24	.25	.42	.01	2349.85	5.74	153.76
13700.000	430.00	607.50	3000.00	613.87	.30	.42	.01	2995.57	6.37	165.75
13700.000	430.00	607.50	3250.00	614.17	.30	.40	.01	3240.66	6.67	171.27
13700.000	430.00	607.50	3850.00	615.24	.27	.26	.00	3805.17	7.74	184.18
13870.000	170.00	601.70	2350.00	613.48	.08	.06	.02	2349.96	11.78	153.97
13870.000	170.00	601.70	3000.00	614.14	.11	.07	.02	2997.16	12.44	174.45
13870.000	170.00	601.70	3250.00	614.45	.11	.07	.02	3243.28	12.75	183.46
13870.000	170.00	601.70	3850.00	615.46	.12	.06	.01	3811.34	13.76	211.10
13920.000	50.00	604.30	2350.00	613.40	.22	.02	.04	2349.98	9.10	151.41
13920.000	50.00	604.30	3000.00	614.05	.27	.02	.05	2995.48	9.75	171.55
13920.000	50.00	604.30	3250.00	614.35	.28	.02	.05	3239.04	10.05	180.92
13920.000	50.00	604.30	3850.00	615.38	.26	.02	.04	3784.25	11.08	208.54
13970.000	50.00	602.10	2350.00	613.59	.06	.02	.02	2349.87	11.49	164.32
13970.000	50.00	602.10	3000.00	614.27	.09	.02	.02	2996.42	12.17	185.37
13970.000	50.00	602.10	3250.00	614.58	.09	.02	.02	3241.89	12.48	193.49
13970.000	50.00	602.10	3850.00	615.57	.10	.02	.02	3811.19	13.47	221.86
15080.000	1110.00	604.90	2350.00	613.80	.09	.23	.01	2347.17	8.90	189.18
15080.000	1110.00	604.90	3000.00	614.52	.11	.27	.01	2989.97	9.62	198.97
15080.000	1110.00	604.90	3250.00	614.83	.12	.27	.01	3234.33	9.93	203.51
15080.000	1110.00	604.90	3850.00	615.81	.12	.25	.01	3802.58	10.91	206.00
15390.000	310.00	607.30	2350.00	613.91	.10	.11	.00	2347.10	6.61	199.72
15390.000	310.00	607.30	3000.00	614.63	.12	.12	.00	2980.21	7.33	348.14
15390.000	310.00	607.30	3250.00	614.94	.12	.12	.00	3200.38	7.64	399.94
15390.000	310.00	607.30	3850.00	615.92	.10	.09	.00	3533.85	8.62	621.92
15900.000	510.00	602.10	2350.00	614.03	.05	.07	.00	2308.13	11.93	263.47
15900.000	510.00	602.10	3000.00	614.77	.06	.07	.01	2894.57	12.67	352.49
15900.000	510.00	602.10	3250.00	615.08	.06	.07	.01	3099.46	12.98	400.20
15900.000	510.00	602.10	3850.00	616.03	.06	.06	.00	3464.14	13.93	635.03
17270.000	1370.00	602.40	2350.00	614.12	.05	.09	.00	2315.68	11.72	245.41
17270.000	1370.00	602.40	3000.00	614.87	.06	.11	.00	2911.17	12.47	329.04
17270.000	1370.00	602.40	3250.00	615.19	.07	.11	.00	3123.99	12.79	366.37
17270.000	1370.00	602.40	3850.00	616.12	.07	.10	.00	3519.17	13.72	571.20
17704.000	434.00	602.40	2350.00	614.15	.05	.03	.00	2314.75	11.75	246.51
17704.000	434.00	602.40	3000.00	614.91	.06	.04	.00	2908.44	12.51	333.13
17704.000	434.00	602.40	3250.00	615.22	.07	.04	.00	3120.12	12.82	370.71
17704.000	434.00	602.40	3850.00	616.16	.07	.03	.00	3511.63	13.76	578.03

SECNO	XLCH	ELMIN	Q	CWSEL	HV	HL	OLOSS	QCH	DEPTH	TOPWID
17904.000	200.00	600.60	2350.00	614.17	.04	.01	.00	2350.00	13.57	144.01
17904.000	200.00	600.60	3000.00	614.93	.06	.01	.00	3000.00	14.33	147.15
17904.000	200.00	600.60	3250.00	615.24	.07	.01	.00	3250.00	14.64	148.43
17904.000	200.00	600.60	3850.00	616.16	.08	.01	.01	3850.00	15.56	152.03
17960.000	56.00	600.60	2350.00	614.17	.04	.00	.00	2350.00	13.57	144.04
17960.000	56.00	600.60	3000.00	614.93	.06	.00	.00	3000.00	14.33	147.16
17960.000	56.00	600.60	3250.00	615.24	.07	.00	.00	3250.00	14.64	148.44
17960.000	56.00	600.60	3850.00	616.17	.08	.01	.00	3850.00	15.57	152.02
18010.000	50.00	602.40	2350.00	614.17	.05	.00	.00	2313.94	11.77	247.45
18010.000	50.00	602.40	3000.00	614.93	.06	.00	.00	2906.38	12.53	336.14
18010.000	50.00	602.40	3250.00	615.25	.07	.00	.00	3117.31	12.85	373.80
18010.000	50.00	602.40	3850.00	616.19	.06	.00	.00	3502.01	13.79	586.62
19840.000	1830.00	603.90	2350.00	614.30	.03	.11	.00	2079.36	10.40	620.90
19840.000	1830.00	603.90	3000.00	615.09	.03	.12	.00	2512.83	11.19	664.76
19840.000	1830.00	603.90	3250.00	615.40	.03	.12	.00	2664.48	11.50	682.51
19840.000	1830.00	603.90	3850.00	616.33	.03	.10	.00	2969.09	12.43	754.62
21485.000	1645.00	599.80	2350.00	614.37	.02	.06	.00	2264.71	14.57	869.42
21485.000	1645.00	599.80	3000.00	615.16	.03	.07	.00	2722.90	15.36	1041.97
21485.000	1645.00	599.80	3250.00	615.47	.03	.06	.00	2865.50	15.67	1056.25
21485.000	1645.00	599.80	3850.00	616.39	.03	.06	.00	3103.45	16.59	1181.75
23500.000	2015.00	597.60	2350.00	614.43	.01	.05	.00	2052.33	16.83	1059.36
23500.000	2015.00	597.60	3000.00	615.22	.02	.05	.00	2437.15	17.62	1121.42
23500.000	2015.00	597.60	3250.00	615.54	.02	.05	.00	2562.49	17.94	1146.95
23500.000	2015.00	597.60	3850.00	616.45	.01	.04	.00	2770.28	18.85	1687.76
25875.000	2375.00	595.30	2350.00	614.48	.02	.05	.00	2279.47	19.18	947.18
25875.000	2375.00	595.30	3000.00	615.27	.02	.05	.00	2768.31	19.97	1254.14
25875.000	2375.00	595.30	3250.00	615.58	.02	.05	.00	2917.38	20.28	1300.96
25875.000	2375.00	595.30	3850.00	616.49	.02	.04	.00	3143.59	21.19	1741.80
28080.000	2205.00	603.40	2350.00	614.53	.02	.05	.00	2007.74	11.13	1250.00
28080.000	2205.00	603.40	3000.00	615.33	.02	.06	.00	2385.24	11.93	1250.00
28080.000	2205.00	603.40	3250.00	615.64	.02	.06	.00	2518.31	12.24	1250.00
28080.000	2205.00	603.40	3850.00	616.54	.02	.05	.00	2794.93	13.14	1250.00
28480.000	400.00	603.40	2350.00	614.54	.02	.01	.00	2098.48	11.14	1000.00
28480.000	400.00	603.40	3000.00	615.34	.02	.01	.00	2529.88	11.94	1000.00
28480.000	400.00	603.40	3250.00	615.65	.02	.01	.00	2684.17	12.25	1000.00
28480.000	400.00	603.40	3850.00	616.55	.02	.01	.00	3013.33	13.15	1000.00
29870.000	1390.00	598.90	2350.00	614.58	.01	.03	.00	1973.46	15.68	1224.99
29870.000	1390.00	598.90	3000.00	615.38	.01	.03	.00	2391.80	16.48	1300.81
29870.000	1390.00	598.90	3250.00	615.70	.01	.03	.00	2539.33	16.80	1335.59
29870.000	1390.00	598.90	3850.00	616.59	.01	.03	.00	2849.13	17.69	1415.62

THIS RUN EXECUTED 03/12/86 12:14:36

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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 APRIL 1985
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00BREAK00

1) COUNTY: Cheboygan

2) STUDY NAME: Grant Twp

3) WATERCOURSE: Black River

4) DOCUMENT TYPE: 100 yr. Encroached

00BREAK00

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*****************************************************
*  WATER SURFACE PROFILES                           *
*  VERSION OF NOVEMBER 1976                         *
*  UPDATED MAY 1984                                 *
*  IBM-PC-XT VERSION                                *
*  RUN DATE  03/12/86  TIME  11:30:40               *
*****************************************************
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Johnson & Anderson, Inc.
Consulting Engineers
Drayton Plains, Michigan

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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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GRANT TWP FIS
BLACK RIVER
ENCROACHED FLOODWAY
100 YEAR

```
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
```

THIS RUN EXECUTED 03/12/86 11:30:42

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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 APRIL 1985
*************************************************

FR FREE FORMAT
C
T1 JOB 12202-02   GRANT TWP. FIS
T2 100 YEAR FLOOD      ENCROACHED FLOODWAY
T3      BLACK R. ABOVE ALVERNO

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     O         WSEL      FQ

      0.        0.        0.        0.   .000000      .00        .0      3250.   611.300      .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

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

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    110.000   200.000      .000      .000      .000      .000      .000      .000      .000      .000

NC       .021      .021      .026      .100      .300      .000      .000      .000      .000      .000
         JUST US ALVERNO DAM SYNTHETIC DATA
X1      1.000     4.000      .000   350.000      .000      .000      .000      .000      .000      .000
X3     10.000      .000      .000      .000      .000      .000      .000   620.000   620.000      .000
GR    617.000      .000   600.000    50.000   600.000   300.000   617.000   350.000      .000      .000

         SECTION TWO
X1   3700.000    22.000    54.000   308.000  3700.000  3700.000  3700.000      .000      .000      .000
X3     10.000      .000      .000      .000      .000      .000      .000   620.000   620.000      .000
GR    636.600      .000   632.700    10.000   618.800    40.000   615.900    50.000   615.500    54.000
GR    611.300    64.000   610.100    69.000   608.400    74.000   606.900    79.000   603.400    89.000
GR    595.300   114.000   595.000   139.000   596.300   164.000   598.200   189.000   601.400   214.000
GR    602.300   239.000   605.000   264.000   610.300   289.000   611.300   295.000   615.900   308.000
GR    617.400   325.000   628.300   450.000      .000      .000      .000      .000      .000      .000

NC       .030      .000      .000      .000      .000      .000      .000      .000      .000      .000
         SECTION THREE
X1   5760.000    30.000    25.000   492.000  2060.000  2060.000  2060.000      .000      .000      .000
X3     10.000      .000      .000      .000      .000      .000      .000   620.000   620.000      .000
GR    618.000      .000   616.600    10.000   614.500    25.000   611.300    45.000   610.800    45.000
GR    610.800    50.000   610.500    55.000   610.300    60.000   609.800    70.000   609.200    95.000
GR    606.800   120.000   608.600   145.000   608.600   170.000   608.400   195.000   608.300   220.000
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GR	601.300	245.000	596.000	270.000	595.400	295.000	596.300	320.000	596.500	345.000
GR	599.100	370.000	599.400	395.000	600.200	420.000	606.300	445.000	609.800	470.000
GR	611.300	485.000	615.000	492.000	618.400	510.000	623.100	535.000	624.800	545.000
NC	.021	.030	.029	.000	.000	.000	.000	.000	.000	.000
	SECTION FOUR									
X1	8400.000	23.000	125.000	325.000	2640.000	2640.000	2640.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	619.900	.000	615.900	25.000	615.700	75.000	615.400	90.000	612.500	125.000
GR	611.200	135.000	610.000	140.000	608.000	145.000	606.200	150.000	603.900	170.000
GR	601.200	185.000	600.700	210.000	600.600	235.000	605.100	270.000	608.700	285.000
GR	609.700	299.000	610.000	304.000	610.600	310.000	611.200	314.000	613.700	325.000
GR	615.000	339.000	619.100	364.000	625.400	389.000	.000	.000	.000	.000
NC	.030	.000	.000	.000	.000	.000	.000	.000	.000	.000
	SECTION FIVE									
X1	10540.000	23.000	75.000	286.000	2140.000	2140.000	2140.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	621.500	.000	619.100	10.000	616.200	25.000	615.000	53.000	613.900	75.000
GR	611.100	87.000	610.600	92.000	610.100	97.000	609.600	102.000	608.100	112.000
GR	606.000	137.000	604.400	162.000	604.100	187.000	603.800	212.000	603.800	237.000
GR	606.300	260.000	607.700	265.000	609.700	270.000	611.100	275.000	616.700	286.000
GR	618.600	300.000	620.100	315.000	621.600	430.000	.000	.000	.000	.000
NC	.021	.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	12700.000	14.000	100.000	240.000	2160.000	2160.000	2160.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	625.000	.000	620.000	50.000	614.000	100.000	612.000	103.000	610.000	120.000
GR	607.500	140.000	607.000	160.000	607.000	180.000	607.300	200.000	609.000	220.000
GR	610.000	226.000	613.200	230.000	613.700	240.000	620.000	270.000	.000	.000
NC	.000	.000	.026	.000	.000	.000	.000	.000	.000	.000
X1	12850.000	12.000	100.000	250.000	150.000	150.000	150.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	620.000	70.000	614.000	100.000	606.500	120.000	606.800	140.000	608.900	160.000
GR	607.000	173.000	608.200	185.000	607.500	194.000	610.100	220.000	612.200	240.000
GR	613.700	250.000	620.000	265.000	.000	.000	.000	.000	.000	.000
NC	.000	.046	.000	.000	.000	.000	.000	.000	.000	.000
X1	13270.000	11.000	100.000	260.000	420.000	420.000	420.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	620.000	30.000	613.000	100.000	609.100	120.000	609.000	140.000	609.000	160.000
GR	608.500	180.000	608.000	200.000	607.500	220.000	612.000	240.000	614.200	260.000
GR	620.000	270.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	13700.000	.000	.000	.000	430.000	430.000	430.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
NC	.000	.000	.033	.000	.000	.000	.000	.000	.000	.000
X1	13870.000	20.000	.000	162.000	170.000	170.000	170.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	617.700	.000	615.300	10.000	611.400	17.000	609.100	22.000	608.000	27.000
GR	606.400	32.000	604.300	57.000	603.400	82.000	601.700	107.000	608.900	130.000
GR	610.000	135.000	611.400	145.000	613.300	162.000	614.400	194.000	615.000	207.000

GR	616.300	245.000	616.300	260.000	616.100	295.000	616.500	345.000	617.100	380.000
X1	13920.000	17.000	.000	162.000	50.000	50.000	50.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	617.700	.000	615.300	10.000	611.400	17.000	609.100	22.000	608.000	27.000
GR	606.400	32.000	604.300	57.000	610.000	82.000	611.400	145.000	613.300	162.000
GR	614.400	194.000	615.000	207.000	616.300	245.000	616.300	260.000	616.100	295.000
GR	616.500	345.000	617.100	380.000	.000	.000	.000	.000	.000	.000
X1	13970.000	23.000	10.000	169.000	50.000	50.000	50.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	617.700	.000	615.300	10.000	611.400	17.000	610.400	22.000	608.900	27.000
GR	608.100	32.000	605.400	42.000	603.000	67.000	602.300	92.000	602.100	117.000
GR	605.200	127.000	607.600	137.000	610.200	142.000	610.900	147.000	611.400	152.000
GR	613.300	169.000	614.400	201.000	615.000	214.000	616.300	252.000	616.300	267.000
GR	616.100	302.000	616.500	352.000	617.100	387.000	.000	.000	.000	.000
NC	.046	.021	.035	.000	.000	.000	.000	.000	.000	.000
X1	15090.000	12.000	100.000	280.000	1110.000	1110.000	1110.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	615.000	81.000	612.500	100.000	611.700	120.000	610.800	140.000	607.700	160.000
GR	607.500	180.000	605.100	200.000	604.900	220.000	606.000	240.000	608.300	260.000
GR	614.000	280.000	615.000	287.000	.000	.000	.000	.000	.000	.000
NC	.000	.046	.000	.000	.000	.000	.000	.000	.000	.000
X1	15390.000	27.000	75.000	260.000	310.000	310.000	310.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	621.600	.000	617.500	25.000	615.000	37.000	613.000	75.000	611.400	83.000
GR	610.300	88.000	609.800	93.000	608.700	98.000	608.300	108.000	607.300	133.000
GR	607.500	158.000	607.900	183.000	608.000	208.000	609.200	232.000	609.400	237.000
GR	609.600	242.000	611.400	247.000	614.500	260.000	615.200	291.000	615.200	322.000
GR	615.000	422.000	615.000	472.000	614.400	522.000	614.500	572.000	614.300	622.000
GR	616.800	672.000	619.700	697.000	.000	.000	.000	.000	.000	.000
NC	.042	.021	.026	.000	.000	.000	.000	.000	.000	.000
X1	15900.000	25.000	200.000	400.000	510.000	510.000	510.000	.000	-.300	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	621.900	.000	617.600	50.000	615.800	100.000	615.200	123.000	612.500	200.000
GR	611.300	224.000	610.600	229.000	610.000	234.000	608.700	239.000	606.300	249.000
GR	602.400	274.000	603.500	299.000	604.900	324.000	607.100	349.000	609.500	361.000
GR	609.800	366.000	610.600	371.000	611.300	376.000	614.200	400.000	615.300	500.000
GR	616.200	600.000	616.500	672.000	615.300	700.000	616.900	800.000	617.900	825.000
X1	17270.000	.000	.000	.000	1370.000	1370.000	1370.000	.000	.300	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
NC	.000	.000	.000	.300	.500	.000	.000	.000	.000	.000
X1	17704.000	.000	.000	.000	434.000	434.000	434.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000

X1	17904.000	20.000	20.000	261.000	200.000	200.000	200.000	.766	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	626.600	20.000	624.300	21.000	615.840	46.000	611.360	57.000	609.550	62.000
GR	610.000	67.000	609.000	72.000	605.400	82.000	601.100	107.000	600.600	132.000
GR	601.100	157.000	601.500	179.000	606.500	204.000	604.500	215.000	606.200	220.000
GR	608.900	225.000	611.360	230.000	615.500	242.000	621.360	255.000	622.930	261.000
SB	1.050	1.560	2.600	.000	84.000	8.000	2961.000	2.900	601.500	601.500
X1	17960.000	.000	.000	.000	56.000	56.000	56.000	.000	.000	.000
X2	.000	.000	1.000	623.000	624.000	.000	.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	625.000	625.000	.000
X1	18010.000	25.000	200.000	400.000	50.000	50.000	50.000	.000	.000	.000
X3	10.000	.000	.000	.000	.000	.000	.000	620.000	620.000	.000
GR	621.900	.000	617.600	50.000	615.800	100.000	615.200	123.000	612.500	200.000
GR	611.300	224.000	610.600	229.000	610.000	234.000	608.700	239.000	606.300	249.000
GR	602.400	274.000	603.500	299.000	604.900	324.000	607.100	349.000	609.500	361.000
GR	609.800	366.000	610.600	371.000	611.300	376.000	614.200	400.000	615.300	500.000
GR	616.200	600.000	616.500	672.000	615.300	700.000	616.900	800.000	617.900	825.000
NC	.000	.042	.000	.100	.300	.000	.000	.000	.000	.000
X1	19840.000	26.000	150.000	370.000	1830.000	1830.000	1830.000	.000	.000	.000
X3	.000	.000	.000	150.000	.000	550.000	.000	.000	.000	.000
GR	620.700	.000	616.500	40.000	615.500	50.000	613.800	100.000	613.200	150.000
GR	611.300	185.000	610.700	190.000	610.100	195.000	609.800	200.000	608.800	210.000
GR	605.300	235.000	605.200	260.000	604.000	285.000	603.900	310.000	609.100	335.000
GR	609.800	350.000	610.300	360.000	610.900	365.000	611.300	370.000	612.200	370.000
GR	611.800	550.000	612.900	613.000	613.400	682.000	615.500	738.000	615.900	750.000
GR	617.000	870.000	.000	.000	.000	.000	.000	.000	.000	.000
NC	.021	.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	21485.000	33.000	85.000	287.000	1645.000	1645.000	1645.000	.000	.000	.000
X3	.000	.000	.000	85.000	.000	763.000	.000	.000	.000	.000
GR	619.300	.000	618.800	10.000	617.800	35.000	616.500	60.000	615.500	76.000
GR	614.800	85.000	611.400	95.000	610.600	100.000	610.000	105.000	609.400	110.000
GR	608.700	120.000	602.600	145.000	601.300	170.000	599.800	195.000	601.000	220.000
GR	607.800	245.000	610.100	260.000	610.500	265.000	611.000	270.000	611.300	275.000
GR	612.800	287.000	613.100	449.000	613.900	566.000	614.000	612.000	614.400	635.000
GR	614.900	763.000	613.900	785.000	614.300	885.000	613.800	985.000	614.000	1085.000
GR	615.700	1140.000	616.100	1185.000	616.600	1285.000	.000	.000	.000	.000
NC	.042	.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	23500.000	29.000	679.000	920.000	2015.000	2015.000	2015.000	.000	.000	.000
X3	.000	.000	.000	384.000	.000	1283.000	615.800	.000	.000	.000
GR	620.200	.000	617.100	53.000	614.400	184.000	614.200	208.000	614.000	384.000
GR	612.200	519.000	611.700	537.000	612.000	679.000	611.400	709.000	610.800	719.000
GR	610.100	724.000	610.100	734.000	608.400	759.000	602.300	784.000	597.600	809.000
GR	598.900	834.000	603.500	859.000	608.000	884.000	610.000	888.000	610.500	893.000
GR	610.900	898.000	611.400	903.000	612.800	920.000	612.400	1111.000	612.100	1172.000
GR	615.800	1283.000	613.500	1525.000	615.400	1641.000	613.800	1772.000	.000	.000

NC	.000	.021	.000	.000	.000	.000	.000	.000	.000	.000
X1	25875.000	31.000	590.000	820.000	2375.000	2375.000	2375.000	.000	.000	.000
X3	.000	.000	.000	250.000	.000	940.000	.000	.000	.000	.000
GR	618.100	.000	616.500	40.000	615.300	90.000	615.000	125.000	615.000	125.000
GR	614.100	150.000	613.000	405.000	612.900	590.000	611.400	607.000	610.600	612.000
GR	610.100	617.000	609.200	622.000	608.600	632.000	598.700	657.000	595.300	682.000
GR	596.900	707.000	605.800	732.000	609.500	757.000	609.900	767.000	610.200	782.000
GR	607.900	798.000	609.200	803.000	611.400	813.000	612.900	820.000	615.200	940.000
GR	614.600	1020.000	614.100	1181.000	614.900	1309.000	615.700	1390.000	614.600	1664.000
GR	613.300	1782.000	.000	.000	.000	.000	.000	.000	.000	.000
NC	.000	.042	.000	.000	.000	.000	.000	.000	.000	.000
X1	28080.000	28.000	850.000	1096.000	2205.000	2205.000	2205.000	.000	.000	.000
X3	.000	.000	.000	600.000	.000	.000	.000	.000	.000	.000
GR	620.100	.000	617.700	25.000	616.300	75.000	613.700	175.000	615.200	275.000
GR	612.500	375.000	612.400	850.000	611.400	861.000	610.900	866.000	610.400	871.000
GR	610.300	876.000	609.900	886.000	605.200	911.000	603.400	936.000	603.600	961.000
GR	606.400	986.000	608.200	1011.000	608.700	1036.000	609.300	1061.000	609.600	1071.000
GR	610.400	1076.000	610.900	1081.000	611.400	1086.000	612.300	1096.000	613.300	1452.000
GR	612.400	1627.000	612.800	1690.000	612.600	1850.000	.000	.000	.000	.000
X1	28480.000	.000	.000	.000	400.000	400.000	400.000	.000	.000	.000
X3	.000	.000	.000	850.000	.000	.000	.000	.000	.000	.000
X1	29870.000	24.000	460.000	717.000	1390.000	1390.000	1390.000	.000	.000	.000
GR	617.200	.000	616.100	80.000	615.200	180.000	612.100	460.000	611.400	479.000
GR	610.800	483.000	610.500	488.000	610.100	493.000	610.100	503.000	608.500	528.000
GR	604.700	553.000	600.500	578.000	598.900	603.000	600.500	628.000	602.900	653.000
GR	609.300	674.000	609.500	679.000	609.900	684.000	611.400	689.000	611.800	717.000
GR	611.600	888.000	611.700	1071.000	611.700	1146.000	611.800	1460.000	.000	.000
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELI     EG        HV        HL        OLOSS   BANK ELEV
  O         OLOB      OCH       OROB      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

CCHV=    .100 CEHV=    .300
*SECNO 1.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE.ELLEA=      620.00 ELREA=      620.00

         JUST US ALVERNO DAM SYNTHETIC DATA
    1.00     11.30   611.30      .00   611.30   611.32      .02      .00      .00   617.00
   3250.       0.    3250.       0.       0.    3201.       0.       0.       0.    617.00
     .00      .00     1.02      .00     .021     .026     .021     .000   600.00    16.76
 .000015       0.       0.       0.        0        0        0      .00   316.47   333.24

*SECNO 3700.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE.ELLEA=      620.00 ELREA=      620.00

        SECTION TWO
  3700.00     16.36   611.36      .00      .00   611.39      .03      .07      .00   615.50
   3250.       0.    3250.       0.       0.    2360.       0.     236.      23.    615.90
     .75      .00     1.38      .00     .021     .026     .021     .000   595.00    63.87
 .000027    3700.    3700.    3700.        0        0        0      .00   231.28   295.15

*SECNO 5760.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE.ELLEA=      620.00 ELREA=      620.00

        SECTION THREE
  5760.00     16.03   611.43      .00      .00   611.44      .02      .05      .00   614.50
   3250.       0.    3250.       0.       0.    3304.       0.     370.      39.    615.00
    1.33      .00      .98      .00     .030     .026     .021     .000   595.40    44.21
 .000020    2060.    2060.    2060.        2        0        0      .00   441.03   485.24

*SECNO 8400.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE.ELLEA=      620.00 ELREA=      620.00

        SECTION FOUR
  8400.00     10.89   611.49      .00      .00   611.59      .10      .12      .03   612.50
   3250.       0.    3250.       0.       0.    1257.       0.     508.      58.    613.70
    1.61      .00     2.58      .00     .021     .029     .030     .000   600.60   132.78
 .000197    2640.    2640.    2640.        0        0        0      .00   182.49   315.27
```

```
   SECNO     DEPTH     CWSEL     CRIWS     WSELI     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 10540.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

        SECTION FIVE
 10540.00      8.17    611.97       .00       .00    612.10       .12       .50       .01    613.90
    3250.        0.     3250.        0.        0.     1157.        0.      568.       67.    616.30
     1.82       .00      2.81       .00      .030      .029      .030      .000    603.80     83.26
  .000280     2140.     2140.     2140.         2         0         0       .00    193.59    276.85

*SECNO 12700.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 12700.00      5.92    612.92       .00       .00    613.40       .48      1.20       .11    614.00
    3250.        0.     3250.        0.        0.      586.        0.      611.       75.    613.70
     1.93       .00      5.55       .00      .021      .029      .030      .000    607.00    101.61
  .001573     2160.     2160.     2160.         2         0         0       .00    128.04    229.66

*SECNO 12850.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 12850.00      6.70    613.20       .00       .00    613.60       .40       .20       .01    614.00
    3250.        0.     3250.        0.        0.      641.        0.      613.       76.    613.70
     1.94       .00      5.07       .00      .021      .026      .030      .000    606.50    102.12
  .001100      150.      150.      150.         2         0         0       .00    144.57    246.69

*SECNO 13270.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 13270.00      6.19    613.69       .00       .00    614.07       .38       .46       .00    613.00
    3250.        0.     3250.        0.        0.      657.        0.      619.       77.    614.20
     1.96       .00      4.94       .00      .021      .026      .046      .000    607.50    100.00
  .001103      420.      420.      420.         2         0         0       .00    155.35    255.35

*SECNO 13700.000
```

SECNO	DEPTH	CWSEL	CRIWS	WSELF	EG	HV	HL	OLOSS	BANK ELEV
D	DLOB	DCH	DROB	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

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 620.00 ELREA= 620.00

13700.00	6.67	614.17	.00	.00	614.48	.31	.40	.01	613.00
3250.	0.	3250.	0.	0.	732.	0.	626.	79.	614.20
1.99	.00	4.44	.00	.021	.026	.046	.000	607.50	100.00
.000799	430.	430.	430.	0	0	0	.00	159.65	259.65

*SECNO 13870.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 620.00 ELREA= 620.00

13870.00	12.75	614.45	.00	.00	614.56	.12	.07	.02	617.70
3250.	0.	3250.	0.	0.	1193.	0.	630.	79.	613.30
2.01	.00	2.72	.00	.021	.033	.046	.000	601.70	11.53
.000238	170.	170.	170.	2	0	0	.00	150.47	162.00

*SECNO 13920.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 620.00 ELREA= 620.00

13920.00	10.05	614.35	.00	.00	614.63	.28	.02	.05	617.70
3250.	0.	3250.	0.	0.	762.	0.	631.	80.	613.30
2.01	.00	4.26	.00	.021	.033	.046	.000	604.30	11.70
.001051	50.	50.	50.	2	0	0	.00	150.30	162.00

*SECNO 13970.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 620.00 ELREA= 620.00

13970.00	12.48	614.58	.00	.00	614.67	.09	.02	.02	615.30
3250.	0.	3250.	0.	0.	1322.	0.	632.	80.	613.30
2.02	.00	2.46	.00	.021	.033	.046	.000	602.10	11.30
.000180	50.	50.	50.	2	0	0	.00	157.70	169.00

*SECNO 15080.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA= 620.00 ELREA= 620.00

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  SECNO     DEPTH     CWSEL     CRIWS     WSELH     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      OCH       OROB      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

 15080.00     9.93    614.83       .00       .00    614.95       .12       .27       .01    612.50
    3250.       0.     3250.       0.        0.     1165.       0.       664.       84.     614.00
     2.13      .00      2.79      .00      .046      .035      .021      .000    604.90    100.00
  .000362    1110.     1110.    1110.         2         0         0       .00    180.00    280.00

*SECNO 15390.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 15390.00     7.65    614.95       .00       .00    615.07       .13       .12       .00    613.00
    3250.       0.     3250.       0.        0.     1139.       0.       672.       85.     614.50
     2.16      .00      2.85      .00      .046      .035      .046      .000    607.30     75.00
  .000403     310.      310.     310.         2         0         0       .00    185.00    260.00

*SECNO 15900.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 15900.00    12.99    615.10       .00       .00    615.16       .07       .08       .01    612.20
    3250.       0.     3250.       0.        0.     1568.       0.       688.       88.     613.90
     2.23      .00      2.07      .00      .042      .026      .021      .000    602.10    200.00
  .000085     510.      510.     510.         2         0         0       .00    200.00    400.00

*SECNO 17270.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 17270.00    12.81    615.21       .00       .00    615.28       .07       .12       .00    612.50
    3250.       0.     3250.       0.        0.     1532.       0.       737.       94.     614.20
     2.40      .00      2.12      .00      .042      .026      .021      .000    602.40    200.00
  .000092    1370.     1370.    1370.         2         0         0       .00    200.00    400.00

CCHV=     .300 CEHV=     .500
*SECNO 17704.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 17704.00    12.85    615.25       .00       .00    615.32       .07       .04       .00    612.50
    3250.       0.     3250.       0.        0.     1540.       0.       752.       96.     614.20
     2.46      .00      2.11      .00      .042      .026      .021      .000    602.40    200.00
  .000091     434.      434.     434.         0         0         0       .00    200.00    400.00
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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 17904.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 17904.00     14.67    615.27       .00       .00    615.34       .07       .01       .00    626.60
    3250.        0.     3250.        0.        0.     1558.        0.      759.       97.    622.93
     2.49       .00      2.09       .00      .042      .026      .021      .000    600.60     40.98
  .000061      200.      200.      200.         0         0         0       .00    148.57    189.55


SPECIAL BRIDGE

SB  XK        XI OR      COFO      RDLEN      BWC       BWP       BAREA      SS        ELCHU     ELCHD
     1.05      1.56      2.60        .00     84.00      8.00   2961.00      2.90    601.50    601.50

*SECNO 17960.000
CLASS A LOW FLOW

3420 BRIDGE W.S.=    615.27 BRIDGE VELOCITY=,      2.04      CALCULATED CHANNEL AREA=,      1596.

 EGPRS       EGLWC       HJ        OWEIR       QLOW       BAREA    TRAPEZOID       ELLC      ELTRD
                                                                      AREA
       .00    615.34       .00         0.      3250.      2961.      2975.      623.00    624.00


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      625.00 ELREA=      625.00

 17960.00     14.68    615.28       .00       .00    615.34       .07       .00       .00    626.60
    3250.        0.     3250.        0.        0.     1559.        0.      761.       97.    622.93
     2.50       .00      2.08       .00      .000      .026      .000      .000    600.60     40.98
  .000061       56.       56.       56.         0         0         0       .00    148.58    189.56


*SECNO 18010.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      620.00 ELREA=      620.00

 18010.00     12.88    615.28       .00       .00    615.35       .07       .00       .00    612.50
    3250.        0.     3250.        0.        0.     1545.        0.      763.       97.    614.20
     2.50       .00      2.10       .00      .042      .026      .021      .000    602.40    200.00
  .000090       50.       50.       50.         0         0         0       .00    200.00    400.00
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   SECNO     DEPTH     CWSEL     CRIWS     WSELH     EG        HV        HL        OLOSS    BANK ELEV
   Q         OLOB      OCH       OROB      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=    .100 CEHV=    .300
*SECNO 19840.000

3470 ENCROACHMENT STATIONS=     150.0     550.0  TYPE=     1  TARGET=     400.000
 19840.00    11.54   615.44      .00       .00   615.48      .04       .13       .00   613.20
    3250.       0.    2867.     383.        0.    1685.     620.      844.      110.   612.20
     2.83      .00     1.70      .62      .042     .026     .042      .000   603.90   150.00
  .000060    1830.    1830.    1830.         2        0        0       .00   400.00   550.00

*SECNO 21485.000

3470 ENCROACHMENT STATIONS=      85.0     763.0  TYPE=     1  TARGET=     678.000
 21485.00    15.72   615.52      .00       .00   615.56      .03       .07       .00   614.80
    3250.       0.    2967.     283.        0.    1996.     869.      941.      130.   612.80
     3.16      .00     1.49      .33      .021     .026     .042      .000   599.80    85.00
  .000033    1645.    1645.    1645.         2        0        0       .00   678.00   763.00

*SECNO 23500.000
3280 CROSS SECTION  23500.00 EXTENDED      1.79 FEET

3470 ENCROACHMENT STATIONS=     384.0    1283.0  TYPE=     1  TARGET=     899.000
 23500.00    17.99   615.59      .00       .00   615.61      .02       .05       .00   612.00
    3250.     335.    2604.     311.      934.    2247.     959.     1103.      166.   612.80
     3.72      .36     1.16      .32      .042     .026     .042      .000   597.60   384.00
  .000021    2015.    2015.    2015.         2        0        0       .00   892.79  1276.79

*SECNO 25875.000
3280 CROSS SECTION  25875.00 EXTENDED      2.35 FEET

3470 ENCROACHMENT STATIONS=     250.0     940.0  TYPE=     1  TARGET=     690.000
 25875.00    20.34   615.64      .00       .00   615.66      .02       .05       .00   612.90
    3250.     257.    2909.      84.      858.    2382.     192.     1310.      209.   612.90
     4.30      .30     1.22      .44      .042     .026     .021      .000   595.30   250.00
  .000021    2375.    2375.    2375.         1        0        0       .00   690.00   940.00

*SECNO 28060.000
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         OLOB      OCH       OROB      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

3280 CROSS SECTION  28080.00 EXTENDED      3.09 FEET

3470 ENCROACHMENT STATIONS=     600.0    1850.0  TYPE=     1  TARGET=    -600.000
 28080.00    12.30   615.70      .00       .00   615.71      .01       .05       .00   612.40
    3250.     306.    2175.     769.      816.    1968.    2200.     1523.      259.   612.30
     5.02      .37     1.11      .35      .042     .026     .042      .000    603.40   600.00
  .000024    2205.    2205.    2205.         1        0        0       .00   1250.00  1850.00

*SECNO 28480.000
3280 CROSS SECTION  28480.00 EXTENDED      3.11 FEET

3470 ENCROACHMENT STATIONS=     850.0    1850.0  TYPE=     1  TARGET=    -850.000
 28480.00    12.30   615.70      .00       .00   615.72      .02       .01       .00   612.40
    3250.       0.    2393.     857.        0.    1972.    2211.     1565.      269.   612.30
     5.13      .00     1.21      .39      .042     .026     .042      .000    603.40   850.00
  .000029     400.     400.     400.         0        0        0       .00   1000.00  1850.00

*SECNO 29870.000
3280 CROSS SECTION  29870.00 EXTENDED      3.94 FEET

 29870.00    16.84   615.74      .00       .00   615.75      .01       .02       .00   612.10
    3250.     118.    2208.     924.      602.    2481.    2996.     1728.      306.   611.80
     5.68      .20      .89      .31      .042     .026     .042      .000    598.90   119.86
  .000012    1390.    1390.    1390.         0        0        0       .00   1340.14  1460.00
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THIS RUN EXECUTED 03/12/86 11:34:11

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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 APRIL 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

BLACK R. ABOVE ALVERNO

SUMMARY PRINTOUT TABLE 110

SECNO	CWSEL	DIFLWS	EG	TOPWID	OLOB	OCH	OROB	PERENC	STENCL	STCHL	STCHR	STENCR
1.000	611.30	.00	611.32	316.47	.00	3250.00	.00	.00	.00	.00	350.00	.00
3700.000	611.36	.00	611.39	231.28	.00	3250.00	.00	.00	.00	54.00	308.00	.00
5760.000	611.43	.00	611.44	441.03	.00	3250.00	.00	.00	.00	25.00	492.00	.00
8400.000	611.49	.00	611.59	182.49	.00	3250.00	.00	.00	.00	125.00	325.00	.00
10540.000	611.97	.00	612.10	193.59	.00	3250.00	.00	.00	.00	75.00	286.00	.00
12700.000	612.92	.00	613.40	128.04	.00	3250.00	.00	.00	.00	100.00	240.00	.00
12850.000	613.20	.00	613.60	144.57	.00	3250.00	.00	.00	.00	100.00	250.00	.00
13270.000	613.69	.00	614.07	155.35	.00	3250.00	.00	.00	.00	100.00	260.00	.00
13700.000	614.17	.00	614.48	159.65	.00	3250.00	.00	.00	.00	100.00	260.00	.00
13870.000	614.45	.00	614.56	150.47	.00	3250.00	.00	.00	.00	.00	162.00	.00
13920.000	614.35	.00	614.63	150.30	.00	3250.00	.00	.00	.00	.00	162.00	.00
13970.000	614.58	.00	614.67	157.70	.00	3250.00	.00	.00	.00	10.00	169.00	.00
15080.000	614.83	.00	614.95	100.00	.00	3250.00	.00	.00	.00	100.00	280.00	.00
15390.000	614.95	.00	615.07	185.00	.00	3250.00	.00	.00	.00	75.00	260.00	.00
15900.000	615.10	.00	615.16	200.00	.00	3250.00	.00	.00	.00	200.00	400.00	.00
17270.000	615.21	.00	615.28	200.00	.00	3250.00	.00	.00	.00	200.00	400.00	.00
17704.000	615.25	.00	615.32	200.00	.00	3250.00	.00	.00	.00	200.00	400.00	.00

SECNO	CWSEL	DIFWS	EG	TOPWID	OLOB	OCH	OROB	PERENC	STENCL	STCHL	STCHR	STENCR
17904.000	615.27	.00	615.34	148.57	.00	3250.00	.00	.00	.00	20.00	204.61	.00
17960.000	615.28	.00	615.34	148.58	.00	3250.00	.00	.00	.00	20.00	204.61	.00
18010.000	615.28	.00	615.35	200.00	.00	3250.00	.00	.00	.00	200.00	400.00	.00
19840.000	615.44	.00	615.48	400.00	.00	2866.95	383.05	400.00	150.00	150.00	370.00	550.00
21485.000	615.52	.00	615.56	678.00	.00	2967.08	282.92	678.00	85.00	85.00	287.00	763.00
23500.000	615.59	.00	615.61	892.79	334.64	2603.89	311.47	899.00	384.00	679.00	920.00	1283.00
25875.000	615.64	.00	615.66	690.00	256.70	2908.84	84.46	690.00	250.00	590.00	820.00	940.00
28080.000	615.70	.00	615.71	1250.00	305.61	2175.50	768.89	-600.00	600.00	850.00	1096.00	1850.00
28480.000	615.70	.00	615.72	1000.00	.00	2392.51	857.49	-850.00	850.00	850.00	1096.00	1850.01
29870.000	615.74	.00	615.75	1340.14	117.82	2207.90	924.28	.00	.00	460.00	717.00	.00

THIS RUN EXECUTED 03/12/86 11:34:21

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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 APRIL 1985
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00BREAK00

1) COUNTY: Cheboygan

2) STUDY NAME: Grant Twp

3) WATERCOURSE: Black River

4) DOCUMENT TYPE: report

00BREAK00

Johnson & Anderson, Inc.

Consulting Engineers

4479 Dixie Highway
Drayton Plains, Michigan 48020
Telephone (313) 334-9901

March 14, 1986

Mr. Bruce E. Menerey, P.E.
Technical Programs
Engineering-Water Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Re: Grant Township, MI Flood Insurance Study, River Hydraulics

Dear Mr. Menerey:

Enclosed for your review is the hydraulic analysis of the Black River from Alverno Dam to Black Lake. This submittal consists of the following materials:

- -Write up and explanation of the procedures used
- -HEC-2 multiple profile run of the 10,50,100, and 500 year floods
- -HEC-2 floodway run for the 100 year flood
- -HEC-2 printer plotted X-Sections
- -1"= 800' scale photo base work map
- -Dam spillway and powerhouse rating curves

If you have any questions or comments, please do not hesitate to contact me.

Very truly yours,

JOHNSON & ANDERSON, INC.

Ole Anderson, P.E.
Project Engineer

OA:kb

Enclosure

cc: Norbert Schwartz, FEMA, Chicago

File #12202-02

RECEIVED
MAR 17 1986
ENGINEERING-WATER
MANAGEMENT

Study Engineer: JOHNSON & ANDERSON, INC.
Date: March 14, 1986

HYDRAULIC ANALYSIS

A. Introduction

This hydraulic analysis is for the Black River within Grant Township, Cheboygan County, Michigan. The study begins at Alverno Dam and terminates upstream at Black Lake. The total length of river studied is 29,870 feet.

This analysis was performed in conjunction with the Grant Township Flood Insurance Study. The modeling was performed by Ole Anderson, P.E. and Karen Ridgway, P.E.

B. AVAILABLE INFORMATION

A flood control report was prepared in 1965 by the U.S. Army Corps of Engineers which studied a section of Black River between Alverno Dam and Black Lake known as Smiths Rapids. The report contained a river profile, several cross-sections, boring logs, information on Alverno Dam, and a plan for improvement of the Black River channel in the area of Smiths Rapids. The report also contained information on flood flow frequencies but this information was not used since it has been updated more recently. Four (4) cross-sections from the Corps of Engineers report were used to supplement the field surveyed data.

Another source of information was the 1981 National Dam Safety Inspection Report for Alverno Dam. This report contained a plan of and cross-section through the dam embankment, and a cross-section through the dam powerhouse. Rating curves for the dam spillway and tailwater also were given in this report. The current Alverno Dam owner and operator, Mr. Rick Byer, (Black River Power Co.) was contacted in regard to the current operation of the powerhouse. He supplied rating curves for the powerhouse which were used to estimate flow through the powerhouse under various operating conditions.

Cross-sectional information was obtained for fifteen (15) river/valley sections and one bridge. The Alverno Dam spillway and powerhouse also were surveyed. The field survey was performed in October 1985 by Westshore Engineering and Surveying, Inc. of Muskegon, Michigan under subcontract to Johnson & Anderson, Inc.

C. Hydrology

Stream flows were determined by a streamgage analysis performed by Johnson & Anderson, reviewed and approved by the MDNR in a letter dated March 12,1985. Q_{10}=2350, Q_{50}=3000, Q_{100}=3250, Q_{500}=3850.

D. Starting Conditions

The starting conditions for the 10, 50, 100 and 500 year floods at Alverno Pond were determined from information on powerhouse operating policy and the spillway rating curve given on Figure 1 and both described in later paragraphs.

E. Method of Analysis

The standard HEC-2 program was run on our in house IBM-AT or IBM-XT. The North River Road Bridge was modeled using the special bridge routine i.e., there were piers and the channel could be easily approximated by a trapezoid. A normal bridge routine also was tried but the losses were slightly higher with the special bridge routine. The losses at the bridge are so small (about 0.02 feet) that use of either method would not effect the water surface measurably.

Roughness coefficients were calibrated for most of the river studied based on a flood in April of 1971. Water surface elevations were known at the two USGS gages (SECNO 13970 and SECNO 28480) along the Black River and flow in the river was measured simultaneously by the U.S. Geological Survey. Roughness coefficients were estimated for the remainder of the river studied by matching descriptions and roughness coefficients of the calibrated and uncalibrated sections of the river.

A rating curve for the Alverno Dam spillway was developed assuming the tainter gate opening was ten (10) feet (wide open). The spillway consists of a 20 foot wide concrete channel with a sill over which the tainter gate is located. When open channel flow conditions prevail through the spillway (the flow does not touch or isn't backed up by the tainter gate), flow will be critical on the sill and will jump up to subcritical upstream of the sill. Open channel flow conditions were modeled with HEC-2 and are shown on Figure 1.

Flow through the spillway under orifice conditions also is shown on Figure 1. The orifice conditions for the tainter gate fully open were taken from the 1965 Corps of Engineers report and give a coefficient of discharge of about 0.62 for the tainter gate. With the tainter gate full open, orifice conditions would prevail for flow rates greater than 3200 cfs. But, at flow rates through the spillway greater than 3260 cfs. flow would be over the top of the embankment.

The relationship on Figure 1 does not include any flow through the powerhouse. When there is flow through the powerhouse, the powerhouse flow would be subtracted from the total river flow to determine how much flow the spillway must pass.

F. Floodway

During flood stage, the Black River is generally contained within its banks down stream of the bridge (SECNO 17960). As a check, all sections up to 18010 were encroached at the bank stations, with a resulting maximum water surface increase of only 0.03 foot compared to the naturally encroached model. Above the bridge, the river does begin escaping the banks until at the river mouth into Black Lake the flood plain is over a half mile wide. Although the cross sections are not across the entire flood plain, at this point thick swamp will limit conveyence. Total losses in that 1.2 mile section of the river are on the order of 0.14 feet, indicating the modeled flood plain has adequate capacity to carry flows. Flood plain encroachments

were made upstream of the bridge using encroachment stations on the X3 card after running encroachment methods 1.4 and 1.5 for guidance. The maximum increase in water surface was 0.06 feet at SECNO 25875 and 28080. At the confluence with Black Lake, the increase was 0.04 feet. It was decided to not target a 0.1 foot increase because the increase would be reflected along the entire Black Lake shoreline.

G. Assumed Dam Operating Policy

All flows studied through the 500 year flood flow can be passed by the spillway and powerhouse at the Alverno Dam without overtopping the dam itself. As it is certainly in the interest of the Black River Power Company to preserve the integrity of the dam, the basic operating assumption is that during major periods of flooding the spillway tainter gate will be full open and full flow will be maintained through the powerhouse. This policy has been confirmed in telephone conversations with the dam operator. Although the dam is not manned at all times the slow time of rise in lake levels and subsequent river flows allow adequate response time to adjust the spillway gate for maximum flow prior to excessive flows. It was assumed that for the 10 year flood, the pond level would be kept at the legal winter level of 610.5, as a lower pond level at the dam would not effect the levels measurably above Smith's Rapids.

BLACK RIVER

OA
3/4/86

GRANT TWP FIS

Job 12356

STARTING ELEVATIONS AT ALVERNO DAM

Q_{10} = 2350 cfs TAILWATER = 596.9 (ROUGH HEC-2)

APPROX 800 CFS THRU TURBINE, 2350-800 = 1550 cfs over spillway

608.0 PER SPILLWAY CURVE, 608.0 - 596.9 = 11.1' = 695 cfs

2350 - 695 = 1655 spillway = 608.4 - 596.9 = 11.5' = 710 cfs

2350 - 710 = 1640 " = 608.3 - 596.9 = 11.4' = 705 cfs

Σ = 2345

use 608.35

Q_{50} = 3000 cfs TAILWATER = 597.7

APPROX 800 CFS THRU TURBINE

3000 - 800 = 2200 spillway = 610.3 - 597.7 = 12.6' = 735 cfs turbine

3000 - 735 = 2265 spillway = 610.5 - 597.7 = 12.8' = 740

3000 - 740 = 2260 " = 610.5

use 610.50

Q_{100} = 3250 cfs TAILWATER = 598.0

APPROX 780 CFS THRU TURBINE

3250 - 780 = 2470 spillway = 611.25 - 598.0 = 13.25' = 755 cfs turbine

3250 - 755 = 2495 " = 611.3

use 611.30

Q_{500} = 3850 cfs TAILWATER = 598.7

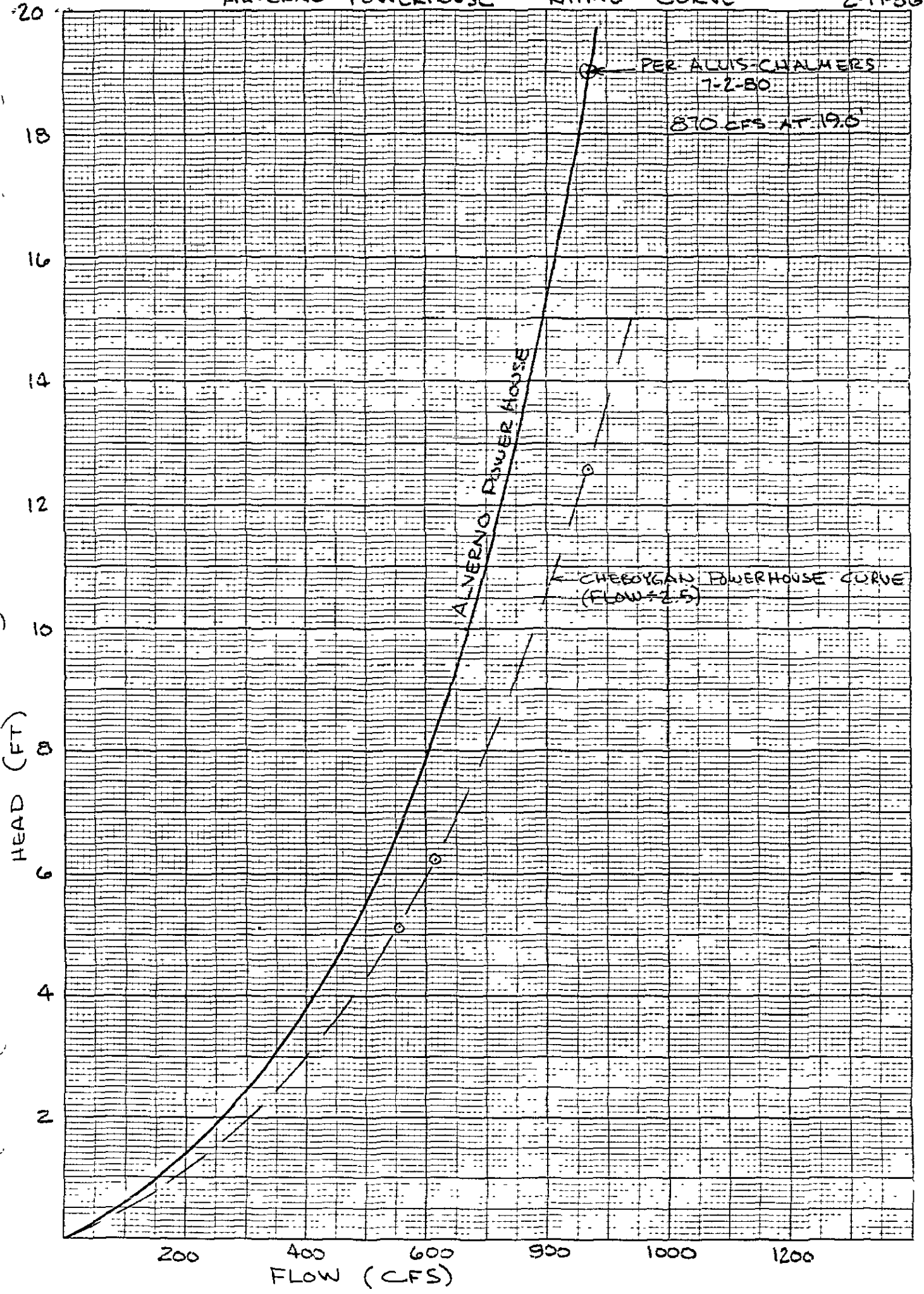
APPROX 780 CFS THRU TURBINE

3850 - 780 = 3070 spillway = 613.7 - 598.7 = 15.0' = 790 cfs turbine

3850 - 790 = 3060 spillway = 613.65

use 613.65

ALVERNO POWERHOUSE RATING CURVE 2-17-86



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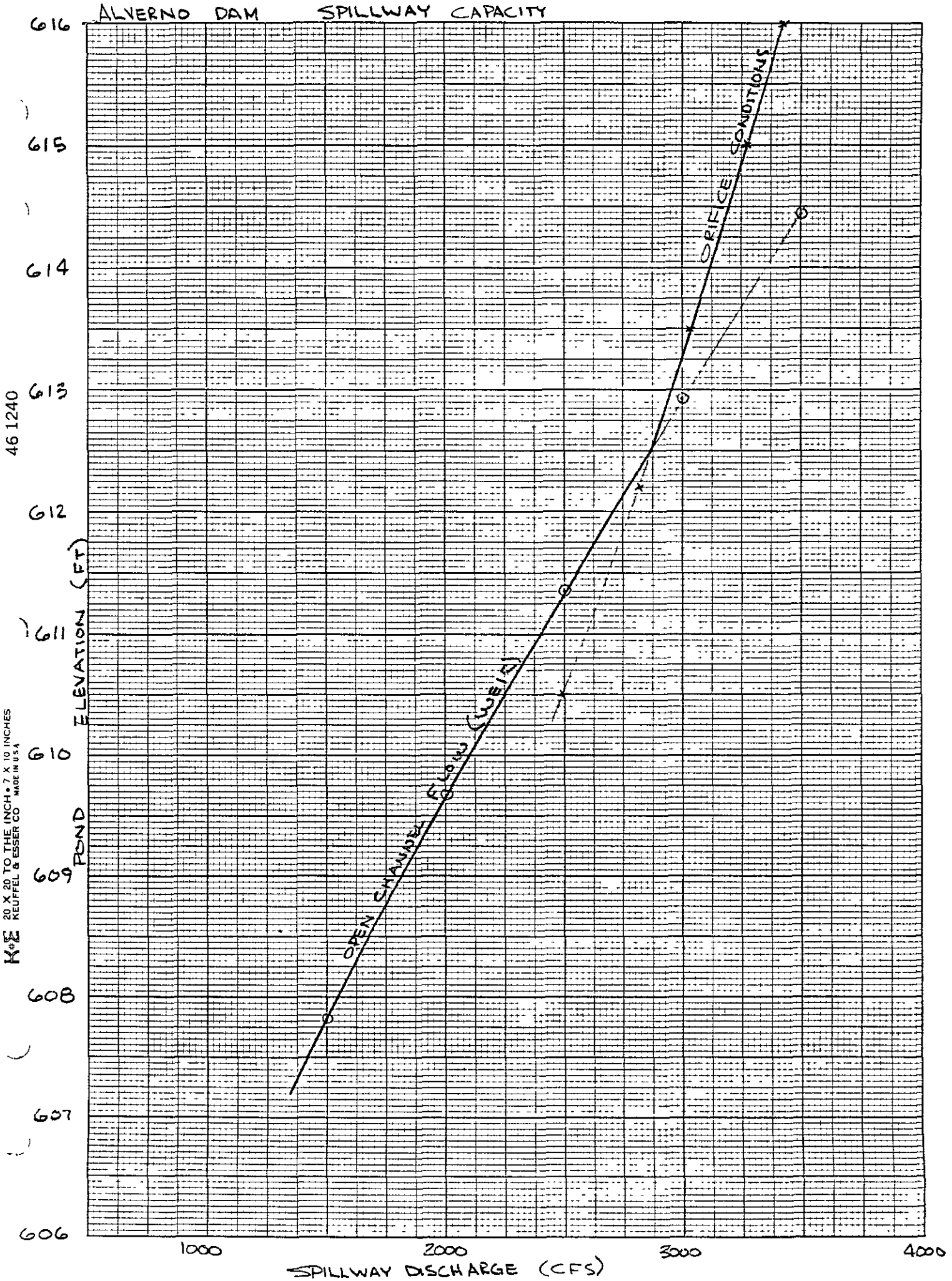
K+E 20 X 20 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

2-12-86


ALVERNO DAM SPILLWAY CAPACITY
616
615
614
613
612
611
610
609
608
607
606
POND ELEVATION (FT)
ORIFICE CONDITIONS
OPEN CHANNEL FLOW (WEIR)
1000
2000
3000
4000
SPILLWAY DISCHARGE (CFS)
46 1240
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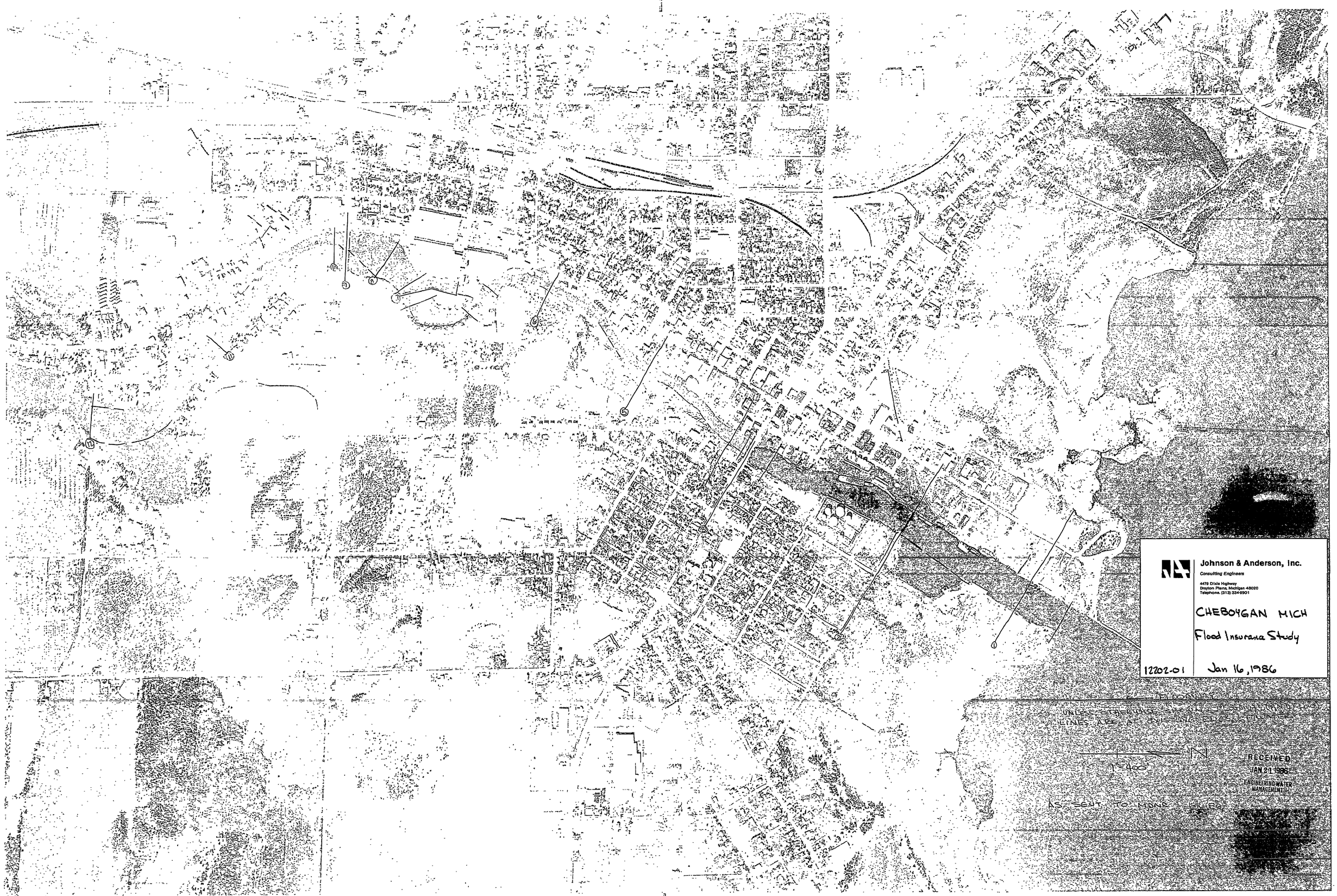
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Flood Insurance Study
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Black River

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