00BREAK00

1) COUNTY: Manatee

2) STUDY NAME: Manatee

3) WATERCOURSE: Manatee River

4) DOCUMENT TYPE: 10, 50, 100, 500 Year floodway

00BREAK00

TOWNSHIP OF MANISTEE, FIS

MANISTEE RIVER (REVISED)

100-YR FLOOD - ENCROACHED RUN

INP = MNSTEN2

```
EEEEEE   EEEEEE          L        EEEEEE   EEEEEE
E        E                L        E        E
E        E                L        E        E
EEEE     EEEE             L        EEEE     EEEE
E        E                L        E        E
EEEEEE   EEEEEE           LLLLLL   EEEEEE   EEEEEE
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USACOE DETROIT H800 VOS 5 1 1  PRINTER: 6

EE LEE  1 APR 87  8 59:59

TERMINAL 105

THIS RUN EXECUTED 1 APR 87 8:52.24

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*****************************************************************
  HEC2 RELEASE DATED NOV 75 UPDATED MAY  1984
  ERROR CORR -  01 02, 03 04, 05, 06
  MODIFICATION -  50, 51, 52, 53, 54, 55, 56
*****************************************************************

C
T1     MANISTEE TOWNSHIP, FIS
T2     MANISTEE RIVER
T3     100 YEAR FLOOD

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0         2         0         0   0.000000     0.00      0.0       0.     579.800    0.000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

    1.000     0.000    -1.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

  110.000   150.000   200.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC      0.035     0.035     0.030     0.500     1.000     0.000     0.000     0.000     0.000     0.000
GT      2.000  4640.000  4640.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
ET      0.000     4.100     1.400  1348.000  2013.000     0.000     0.000     0.000     0.000     0.000
            CROSS SECTION AT MANISTEE LAKE
X1      0.000    13.000  1500.000  1860.000     0.000     0.000     0.000     0.000    -4.360     0.000
GR    587.300    50.000   584.300    50.000   583.500   945.000   583.400  1350.000   583.400  1500.000
GR    574.900  1520.000   575.620  1620.000   577.600  1790.000   577.600  1850.000   583.400  1860.000
GR    584.000  2000.000   585.600  2300.000   590.500  2340.000     0.000     0.000     0.000     0.000

ET      0.000     4.100     0.000  1550.000  1360.000     0.000     0.000     0.000     0.000     0.000
            CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
            RAILROAD BRIDGE
X1    900.000     8.000  1550.000  1780.000   800.000  1029.000   900.000     0.500     0.000     0.000
GR    587.300  1200.000   582.500  1200.000   582.000  1550.000   571.570  1580.000   571.570  1760.000
GR    582.000  1780.000   585.600  1830.000   590.500  1880.000     0.000     0.000     0.000     0.000

X1   1010.000     6.000   620.000   800.000   110.000   110.000   110.000     0.000     0.000     0.000
GR    582.000   200.000   582.000   620.000   571.680   630.000   571.680   770.000   582.000   800.000
GR    582.000  1200.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

X1   1040.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

X1   1070.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000
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X1    1100.000      0.000      0.000      0.000     30.000     30.000     30.000      0.950      0.030      0.000

NC       0.000      0.000      0.000      0.500      1.000      0.000      0.000      0.000      0.000      0.000
ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION JUST BELOW RAILROAD BRIDGE
X1    1120.000      8.000   1042.100   1151.900     20.000     20.000     20.000      0.000      0.000      0.000
GR     587.300      0.000    582.300     10.000    582.300   1042.100    571.790   1060.000    572.290   1130.000
GR     582.300   1151.900    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000

ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
X1    1121.000     50.000   1042.100   1151.900      1.000      1.000      1.000      0.000      0.000      0.000
BT     -50.000      0.000    592.000    587.300     10.000    592.000    582.300   1013.000    592.000    582.300
BT       0.000   1013.100    592.000    590.000   1014.000    592.000    590.000   1014.100    592.000    582.300
BT       0.000   1015.000    592.000    582.300   1015.100    592.000    590.000   1026.000    592.000    590.000
BT       0.000   1026.100    592.000    583.200   1027.000    592.000    583.200   1027.100    592.000    590.000
BT       0.000   1037.000    592.000    590.000   1037.100    592.000    582.300   1038.000    592.000    582.300
BT       0.000   1038.100    592.000    589.100   1039.000    592.000    589.100   1039.100    592.000    582.300
BT       0.000   1040.000    592.000    582.300   1040.100    592.000    589.100   1041.000    592.000    589.100
BT       0.000   1041.100    592.000    582.300   1042.000    592.000    582.300   1042.100    592.000    589.100
BT       0.000   1060.000    592.000    589.100   1130.000    592.000    589.100   1151.900    592.000    589.100
BT       0.000   1152.000    592.000    582.300   1153.000    592.000    582.300   1153.100    592.000    589.100
BT       0.000   1154.000    592.000    589.100   1154.100    592.000    582.300   1155.000    592.000    582.300
BT       0.000   1155.100    592.000    589.100   1156.000    592.000    589.100   1156.100    592.000    582.300
BT       0.000   1157.000    592.000    582.300   1157.100    592.000    590.000   1166.000    592.000    590.000
BT       0.000   1166.100    592.000    582.500   1167.000    592.000    582.500   1167.100    592.000    590.000
BT       0.000   1179.000    592.000    590.000   1179.100    592.000    582.700   1180.000    592.000    582.700
BT       0.000   1180.100    592.000    590.000   1192.000    592.000    590.000   1192.100    592.000    582.900
BT       0.000   1292.000    592.000    585.600   2292.000    592.000    590.500      0.000      0.000      0.000
GR     587.300      0.000    582.300     10.000    582.300   1013.000    582.300   1013.100    582.300   1014.000
GR     582.300   1014.100    582.300   1015.000    582.300   1015.100    582.300   1026.000    582.300   1026.100
GR     582.300   1027.000    582.300   1027.100    582.300   1037.000    582.300   1037.100    582.300   1038.000
GR     582.300   1038.100    582.300   1039.000    582.300   1039.100    582.300   1040.000    582.300   1040.100
GR     582.300   1041.000    582.300   1041.100    582.300   1042.000    582.300   1042.100    571.790   1060.000
GR     572.290   1130.000    582.300   1151.900    582.300   1152.000    582.300   1153.000    582.300   1153.100
GR     582.300   1154.000    582.300   1154.100    582.300   1155.000    582.300   1155.100    582.300   1156.000
GR     582.300   1156.100    582.300   1157.000    582.300   1157.100    582.500   1166.000    582.500   1166.100
GR     582.500   1167.000    582.500   1167.100    582.700   1179.000    582.700   1179.100    582.700   1180.000
GR     582.700   1180.100    582.900   1192.000    582.900   1192.100    585.600   1292.000    590.500   2292.000

ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
X1    1146.000      0.000      0.000      0.000     25.000     25.000     25.000      0.000      0.000      0.000
X2       0.000      0.000      0.000      0.000      0.000      0.000      1.000      0.000      0.000      0.000

ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
X1    1147.000      8.000   1042.100   1151.900      1.000      1.000      1.000      0.000      0.000      0.000
GR     587.300      0.000    582.300     10.000    582.300   1042.100    571.790   1060.000    572.290   1130.000
GR     582.300   1151.900    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000
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ET      0.000      4.100      0.000    990.000   1155.000      0.000      0.000      0.000      0.000      0.000
X1   1177.000      8.000   1035.000   1155.000     30.000     30.000     30.000      0.000      0.000      0.000
GR    587.300      0.000    581.300     10.000    581.300   1035.000    572.000   1060.000    572.740   1130.000
GR    581.300   1155.000    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      0.000    625.000   1175.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
X1   1364.000      8.000   1027.000   1150.000    137.000    187.000    187.000      0.000      0.000      0.000
GR    587.300      0.000    582.000     10.000    582.000   1027.000    572.300   1060.000    572.800   1130.000
GR    582.300   1150.000    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000

NC      0.000      0.000      0.000      0.100      0.300      0.000      0.000      0.000      0.000      0.000
ET      0.000      0.000      1.400   1375.000   1740.000      0.000      0.000      0.000      0.000      0.000
X1   1526.000      8.000   1620.000   1740.000    113.000    162.000    162.000      0.000      0.000      0.000
GR    587.300   1200.000    582.000   1200.000    582.000   1620.000    572.170   1640.000    572.770   1720.000
GR    582.000   1740.000    585.600   1830.000    590.500   1880.000      0.000      0.000      0.000      0.000

ET      0.000      0.000      1.400   1385.000   1750.000      0.000      0.000      0.000      0.000      0.000
X1   1851.000      8.000   1600.000   1750.000    225.000    325.000    325.000      0.000      0.000      0.000
GR    587.300   1200.000    582.000   1200.000    582.000   1600.000    572.500   1620.000    573.000   1730.000
GR    582.000   1750.000    585.600   1830.000    590.500   1880.000      0.000      0.000      0.000      0.000

OT      2.000   8520.000   8520.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
NC      0.080      0.080      0.030      0.100      0.300      0.000      0.000      0.000      0.000      0.000
ET      0.000      0.000      1.400   1410.000   1780.000      0.000      0.000      0.000      0.000      0.000
X1   2500.000      8.000   1550.000   1780.000    450.000    649.000    649.000      0.000      0.000      0.000
GR    587.300   1200.000    582.000   1200.000    582.000   1550.000    573.140   1580.000    574.140   1760.000
GR    582.000   1780.000    585.600   1830.000    590.500   1880.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      1.400   1365.000   1898.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          HIGHWAY 55 BRIDGE
X1   3515.000     12.000   1500.000   1860.000   1015.000   1015.000   1015.000      0.000      0.000      0.000
GR    587.300   1100.000    582.100   1100.000    582.000   1200.000    582.000   1350.000    582.000   1500.000
GR    574.350   1520.000    575.350   1620.000    577.050   1790.000    577.050   1850.000    582.100   1860.000
GR    585.600   1910.000    590.500   1960.000      0.000      0.000      0.000      0.000      0.000      0.000

NC      0.000      0.000      0.000      0.500      1.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
X1   3870.000     77.000   1500.000   1855.000    355.000    355.000    355.000      0.000      0.000      0.000
X3     10.000      0.000      0.000      0.000      0.000      0.000      0.000    595.500    595.900      0.000
GR    584.300     50.000    583.900    200.000    583.600    950.000    583.400   1350.000    583.400   1500.000
GR    579.600   1505.000    578.800   1510.000    576.900   1515.000    577.200   1520.000    577.000   1525.000
GR    576.300   1530.000    578.000   1535.000    576.600   1540.000    575.200   1545.000    576.200   1550.000
GR    574.500   1554.000    577.400   1560.000    575.500   1565.000    574.900   1570.000    578.700   1575.000
GR    578.900   1580.000    578.900   1583.000    578.800   1590.000    578.600   1595.000    577.900   1600.000
GR    577.600   1605.000    576.100   1610.000    576.300   1614.000    576.500   1620.000    577.200   1625.000
GR    579.100   1630.000    579.300   1635.000    579.300   1640.000    579.500   1645.000    579.100   1650.000
GR    579.300   1655.000    579.200   1660.000    579.400   1665.000    579.900   1670.000    578.100   1674.000
GR    578.700   1680.000    579.700   1685.000    579.800   1690.000    580.000   1695.000    580.000   1700.000
GR    579.900   1705.000    580.100   1710.000    579.600   1715.000    579.700   1720.000    579.900   1725.000
GR    579.900   1730.000    578.300   1734.000    579.200   1740.000    579.600   1745.000    579.900   1750.000
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GR    580.400   1755.000    580.400   1760.000    580.500   1765.000    580.400   1770.000    580.600   1775.000
GR    580.500   1780.000    580.400   1785.000    579.400   1790.000    578.700   1794.000    579.500   1800.000
GR    579.800   1805.000    580.200   1810.000    580.400   1815.000    580.500   1820.000    579.400   1825.000
GR    578.700   1830.000    577.900   1835.000    577.800   1840.000    579.300   1845.000    579.100   1850.000
GR    583.400   1855.000    584.700   2005.000      0.000      0.000      0.000      0.000      0.000      0.000

          DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE
X1   3871.000      0.000      0.000      0.000      1.000      1.000      1.000      0.000      0.000      0.000
X3     10.000      0.000      0.000      0.000      0.000      0.000      0.000    595.500    595.900      0.000
X4     12.000    583.400   1500.100    590.400   1555.000    590.400   1559.000    590.500   1615.000    590.500
X4   1619.000    590.600   1675.000    590.600   1679.000    590.700   1735.000    590.700   1739.000    590.800
X4   1795.000    590.800   1799.000    583.400   1854.900      0.000      0.000      0.000      0.000      0.000
BT    -19.000     50.000    588.100      0.000    200.000    588.000      0.000    950.000    590.000      0.000
BT      0.000   1550.000    593.200      0.000   1500.000    595.500    583.400   1500.100    595.500    590.400
BT      0.000   1555.000    595.900    590.400   1559.000    595.900    590.400   1615.000    595.900    590.500
BT      0.000   1619.000    595.900    590.500   1675.000    595.900    590.600   1679.000    595.900    590.600
BT      0.000   1735.000    595.900    590.700   1739.000    595.900    590.700   1795.000    595.900    590.800
BT      0.000   1799.000    595.900    590.800   1854.900    595.900    590.800   1855.000    595.900    583.400
BT      0.000   2005.000    595.300      0.000      0.000      0.000      0.000      0.000      0.000      0.000

          UPSTREAM FACE OF HIGHWAY 55 BRIDGE
X1   3900.000      0.000      0.000      0.000     29.000     29.000     29.000      0.000      0.000      0.000
X2      0.000      0.000      0.000      0.000      0.000      0.000      1.000      0.000      0.000      0.000
X3     10.000      0.000      0.000      0.000      0.000      0.000      0.000    595.500    595.900      0.000

          CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE
X1   3901.000     77.000   1500.000   1855.000      1.000      1.000      1.000      0.000      0.000      0.000
X3     10.000      0.000      0.000      0.000      0.000      0.000      0.000    595.500    595.900      0.000
GR    584.300     50.000    583.900    200.000    583.600    950.000    583.400   1350.000    583.400   1500.000
GR    579.600   1505.000    578.800   1510.000    576.900   1515.000    577.200   1520.000    577.000   1525.000
GR    576.300   1530.000    578.000   1535.000    576.600   1540.000    575.200   1545.000    576.200   1550.000
GR    574.500   1554.000    577.400   1560.000    575.300   1565.000    574.900   1570.000    578.700   1575.000
GR    578.900   1580.000    578.900   1585.000    578.800   1590.000    578.600   1595.000    577.900   1600.000
GR    577.600   1605.000    576.100   1610.000    576.300   1614.000    576.500   1620.000    577.200   1625.000
GR    579.100   1630.000    579.300   1635.000    579.300   1640.000    579.500   1645.000    579.100   1650.000
GR    579.200   1655.000    579.200   1660.000    579.400   1665.000    579.900   1670.000    578.100   1674.000
GR    578.700   1680.000    579.700   1685.000    579.000   1690.000    580.000   1695.000    580.000   1700.000
GR    579.900   1705.000    580.100   1710.000    579.600   1715.000    579.700   1720.000    579.900   1725.000
GR    579.900   1730.000    578.500   1734.000    579.200   1740.000    579.600   1745.000    579.900   1750.000
GR    580.400   1755.000    580.400   1760.000    580.500   1765.000    580.400   1770.000    580.600   1775.000
GR    580.500   1780.000    580.400   1785.000    579.400   1790.000    578.700   1794.000    579.500   1800.000
GR    579.800   1805.000    580.000   1810.000    580.400   1815.000    580.500   1820.000    579.400   1825.000
GR    578.700   1830.000    577.900   1835.000    577.800   1840.000    579.300   1845.000    579.100   1850.000
GR    583.400   1855.000    584.100   2005.000      0.000      0.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      1.400    946.000   2141.000   1200.000   1860.000      0.000      0.000      0.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF HIGHWAY 55 BRIDGE
X1   4321.000     13.000   1300.000   1860.000    420.000    420.000    420.000      0.000      0.000      0.000
GR    587.300     50.000    584.300     50.000    583.500    945.000    583.400   1350.000    583.400   1500.000
GR    574.900   1520.000    575.620   1620.000    577.600   1790.000    577.600   1850.000    583.400   1860.000
GR    584.000   2000.000    585.600   2300.000    590.500   2340.000      0.000      0.000      0.000      0.000
EJ      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
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   SECNO     DEPTH     CMSEL     CRTWS     WSELR     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

*PROF 1

CCHV=   0.500 CEHV=   1.000
*SECNO 0.000

3470 ENCROACHMENT STATIONS=     1348.0     2013.0  TYPE=      1  TARGET=      665.000
          CROSS SECTION AT MANISTEE LAKE
     0.00      9.26    579.80      0.00      0.00    579.84      0.04      0.00      0.00    579.04
    4640       37.      4589       15.       116     2704.       66.        0.        0.     579.04
     0.00      0.32      1.70      0.22     0.035     0.030     0.035     0.000    570.54   1348.00
 0.000081       0.        0         0         0         0         0      0.00    665.00   2013.00

*SECNO 900.000

3470 ENCROACHMENT STATIONS=     1550.0     1860.0  TYPE=      1  TARGET=      310.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
   900.00      8.34    579.91      0.00      0.00    580.03      0.12      0.11      0.08    582.00
    4640.        0      4640.       0.        0.     1568.        0        47.        9     582.00
     0.09      0.00      2.78      0.00     0.000     0.030     0.000     0.000    571.57   1556.01
 0.000216      800       900.      1029        2         0         0      0.00    219.99   1776.00

*SECNO 1010.000
  1010.00      8.26    579.94      0.00      0.00    580.14      0.20      0.03      0.08    582.00
    4640.        0.      4640       0.        0      1288.        0        51.       10.     582.00
     0.10      0.00      3.60      0.00     0.000     0.030     0.000     0.000    571.68    622.00
 0.000375      110.       110      110.        1         0         0      0.00    172.00    794.00

*SECNO 1040.000
  1040.00      8.25    579.96      0.00      0.00    580.24      0.23      0.01      0.08    582.03
    4640.        0      4640.       0.        0      1093.       0.        52.       10      582.03
     0.10      0.00      4.25      0.00     0.000     0.030     0.000     0.000    571.71    558.71
 0.000528       30.       30        30.        0         0         0      0.00    146.15    704.86

*SECNO 1070.000
  1070.00      8.23    579.97      0.00      0.00    580.36      0.39      0.02      0.11    582.06
    4640.        0.      4610       0.        0.      927.        0        52        10.     582.06
     0.10      0.00      5.00      0.00     0.000     0.030     0.000     0.000    571.74    504.91
 0.000746       30        30.       20.        0         0         0      0.00    124.20    629.11
```

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS   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 1100.000
 1100 00     8.20    580 00     0 00      0.00    560.54     0.54      0.03      0.15    582 09
   4640.       0      4640.      0.        0.      788.       0.        53        10      582.09
    0.10     0.00     5 89     0.00     0.000    0 030     0.000    0 000    571.77   459.18
 0 001055     30.      30.      30.         0        0         0      0.00    105.55   564 73


CCHV=   0.500 CEHV=   1.000
*SECNO 1120 000

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
          CROSS SECTION JUST BELOW RAILROAD BRIDGE
 1120.00     8.24    580 03     0.00      0.00    580 75     0.72      0 03      0 18    582.30
   4640        0.     4640        0.        0      682.       0        53.       10.     582.30
    0 10     0.00     6 81     0 00     0.000    0 030     0.000    0 000    571.79  1045.98
 0 001557     20.      20.      20          0        0         0      0.00    100.92  1146.91


*SECNO 1121.000

3370 NORMAL BRIDGE.NRD= 50 MIN ELTRD=  592 00 MAX ELLC=  590 50


3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
          CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
 1121.00     8.24    590 03     0.00      0 00    580.75     0.72      0.00      0 00    582.30
   4640        0     4640        0.        0      682.       0        53.       10.     582.30
    0.10     0.00     6 80     0.00     0 000    0.030     0.000    0.000    571.79  1045.97
 0.001551      1.       1        1.         0        0         0      0.00    100.96  1146.93


*SECNO 1146.000

3370 NORMAL BRIDGE.NRD= 50 MIN ELTRD=  592 00 MAX ELLC=  590 50


3470 ENCROACHMENT STATIONS=    1013 0    1192.1  TYPE=     1  TARGET=     179.100
          CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
 1146.00     8.29    580 02     0.00      0.00    580 79     0 71      0.04      0.01    582.30
   4640        0.     4640        0.        0.      687        0.       54.       10      582.30
    0.11     0.00     6 75     0.00     0.000    0.030     0.000    0 000    571.79  1045.89
 0.001519     25.      25.      25.         1        0         0      0.00    101.15  1147.03
```

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

*SECNO 1147 000

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179 100
          CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
  1147 00     8.30    580 09     0 00      0 00    580.79     0 71      0.00      0 00    582.30
    4640        0      4640       0.         0      688.       0        54.       10.     582.30
     0 11     0.00     6 74      0.00     0.000    0 030    0.000     0.000    571.79   1045.87
 0 001512      1.        1        1.         0        0        0      0.00     101.18   1147.06

*SECNO 1177.000

2470 ENCROACHMENT STATIONS=     990.0    1155.0  TYPE=     1  TARGET=     165.000
  1177 00     8 23    580 23     0 00      0 00    580 87     0 64      0.04      0 03    581.30
    4640        0.      4640       0         0       724       0        54.       10.  100000.00
     0 11     0.00     6 41      0 00     0 000    0 030    0 000     0 000    572 00   1037.86
 0 001471      30.       30       30.         2        0        0      0.00     114 03   1151.89

*SECNO 1364.000

3470 ENCROACHMENT STATIONS=     625.0    1175 0  TYPE=     1  TARGET=     550.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
  1364 00     8.24    580 54     0.00      0.00    581.15     0.61      0.27      0.01    582.00
    4640        0.      4640       0.         0      738.       0        57.       11      582.30
     0 11     0.00     6 29      0 00     0 000    0.030    0.000     0.000    572 30   1031.97
 0.001389      137       187     187.         2        0        0      0.00     114.32   1146.29

CCHV=   0.100 CEHV=   0.300
*SECNO 1526.000
  1526 00     8.68    580 85     0.00      0 00    581.35     0.50      0 19      0.01    582.00
    4640.       0      4640       0.         0      818.       0        60.       11.     582 00
     0 12     0.00     5 67      0.00     0.000    0 030    0.000     0.000    572 17   1622 33
 0 001002      113.     162.     162         2        0        0      0.00     115.19   1737.52

*SECNO 1851 000
  1851 00     8.33    581 33     0 00      0.00    581.60     0 28      0 23      0.02    582.00
    4640.       0.      4640.      0.         0.     1102.       0.       67.       12.     582 00
     0 14     0.00     4.21      0 00     0.000    0.030    0.000     0.000    572.50   1601.42
 0.000309     225.      325     325.         2        0        0      0 00     147.09   1748.50
```

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

CCHV=   0.100 CEHV=   0.300
*SECNO 2500.000
 2500.00     8.52    581 66      0.00      0 00    582 08      0.42      0.44      0.04    582 00
   8520.       0.     8520         0.        0.     1639.        0        88.        15     582.00
    0 18     0.00      5.20      0.00     0.000     0.030     0.000     0.000    573.14   1551.14
 0.000805    450.      649.      649.         2         0         0      0.00    228.01   1779.15

*SECNO 3515 000

3470 ENCROACHMENT STATIONS=    1365 0    1898.0  TYPE=     1  TARGET=     533.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          HIGHWAY 55 BRIDGE
 3515 00     8.16    582 51      0.00      0.00    582.73      0.21      0.62      0 02    582.00
   8520.      18.     8502         0        69.     2284.        1.       134.       23.    582.10
    0 25     0.26      3.72      0 14     0.080     0.030     0.080     0.000    574 35   1365.00
 0.000486   1015.     1015.     1015.         2         0         0      0.00    500.92   1865.92

CCHV=   0.500 CEHV=   1 000
*SECNO 3870 000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
 3870 00     8.34    582 84      0 00      0.00    583.38      0.54      0 32      0.33    583.40
   8520.       0.     8520         0         0     1439.        0.       150.       27.    583.40
    0.27     0.00      5 92      0.00     0.000     0.030     0.000     0.000    574.50   1500.74
 0 002271    355.      355       355         2         0         0      0.00    353.60   1854.35

*SECNO 3871 000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  538.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE
 3871 00     8.34    582.84      0.00      0.00    583.51      0 67      0.00      0.13    583.40
   8520        0.     8520         0.        0.     1297.        0       150        27.    583 40
    0 27     0.00      6 57      0 00     0.000     0 030     0.000     0 000    574.50   1500.82
 0 003455      ..         1         1.         0         0         0      0.00    327 33   1854.26
```

```
 SECNO    DEPTH    CWSEL    CRIWS    WRE_W    ED       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 3900.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= .9 MIN ELTRD=  588.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE ELLEA=      595.50 ELREA=      595.90

          UPSTREAM FACE OF HIGHWAY 55 BRIDGE
  3900.00     8.52   583.02     0.00     0.00   583.63     0.61     0.09     0.03   583.40
   8520.        0.     8520       0.        0.     1356.       0.      151.      27.   583.40
    0.27      0.00     6.28     0.00    0.000    0.030    0.000    0.000   574.50  1500.59
 0.002999       29       29      29.        2        0        0     0.00   327.91  1854.47

*SECNO 3901.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE
  3901.00     8.78   583.28     0.00     0.00   583.72     0.44     0.00     0.09   583.40
   8520        0.     8520        0.        0     1597.       0      151.      27    583.40
    0.27      0.00     5.31     0.00    0.000    0.030    0.000    0.000   574.50  1500.15
 0.001614        1        1        1        2        0        0     0.00   354.71  1854.86

*SECNO 4321.000

3470 ENCROACHMENT STATIONS=      946.0     2141.0  TYPE=      1  TARGET=     1195.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF HIGHWAY 55 BRIDGE
  4321.00     9.05   583.95     0.00     0.00   584.11     0.16     0.25     0.14   583.40
   8520.       59.     8457       5.      283.    2629.       35      173.      34.   583.40
    0.31      0.21     3.22     0.14    0.080    0.030    0.080    0.000   574.90   946.00
 0.000302     420.     420.     420.        2        0        0     0.00  1041.86  1987.86
```

THIS RUN EXECUTED 1 APR 87 8:52:29

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER
T3 100 YEAR FLOOD ENCROACHED RUN

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0 | 3. | 0 | 0 | 0.000000 | 0.00 | 0.0 | 0. | 579.900 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 15.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
   SECNO     DEPTH     CHSEL     CRTWS     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

#PRO= 2

CCHV=   0.500 CEHV=   1.000
#SECNO 0.000
 2800 NAT Q1=   5163.00  WSEL=    579.30  ENC Q1=   5219.59  WSEL=    579.90  RATIO= -0.0110
 NAT Q1=   5485.  RATIOS LOB,CH,ROB=  0.0442  0.9515  0.0042  WSEL=    579.90

3470 ENCROACHMENT STATIONS=    1500.0    1860.0  TYPE=     4  TARGET=       0.048
          CROSS SECTION AT MANISTEE LAKE
     0.00      9.36    579.90      0.00    579.80    579.94      0.04      0.00      0.00    579.04
    4640.        0.     4640.        0.        0.     2740.        0.        0.        0.    579.04
     0.00      0.00      1.69      0.00     0.000     0.030     0.000     0.000    570.54   1500.00
 0.000080        0.        0.        0.         0         0         0      0.00    360.00   1860.00


#SECNO 900.000
 2800 NAT Q1=   3157.13  WSEL=    579.91  ENC Q1=   3221.89  WSEL=    580.01  RATIO= -0.0205
 NAT Q1=   3222   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.01

3470 ENCROACHMENT STATIONS=    1550.0    1780.0  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
   900.00      8.44    580.01      0.00    579.91    580.13      0.12      0.11      0.07    582.00
    4640        0.     4640        0.        0.     1690.        0        46.         6     582.00
     0.09      0.00      2.75      0.00     0.000     0.030     0.000     0.000    571.57   1555.73
 0.000209      800.      900      1029.         2         0         0      0.00    220.46   1776.18


#SECNO 1010.000
 2800 NAT Q1=   2396.57  WSEL=    579.94  ENC Q1=   2449.67  WSEL=    580.04  RATIO= -0.0222
 NAT Q1=   2450.  RATIOS LOB CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.04

3470 ENCROACHMENT STATIONS=     620.0     800.0  TYPE=     4  TARGET=       0.000
  1010.00      8.36    580.04      0.00    579.94    580.23      0.20      0.03      0.08    582.00
    4640.        0.     4640.        0         0     1306        0.        50.         6     582.00
     0.10      0.00      3.55      0.00     0.000     0.030     0.000     0.000    571.68    621.90
 0.000359      110.      110.      110.         0         0         0      0.00    172.40    794.30


#SECNO 1040.000
 2800 NAT Q1=   2019.11  WSEL=    579.96  ENC Q1=   2062.63  WSEL=    580.06  RATIO= -0.0216
 NAT Q1=   2063.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.06
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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     TRIAL     IDC       ICONT     CORAR     TOPWID      ENDST


3470 ENCROACHMENT STATIONS=      357.0      710.0  TYPE=      4  TARGET=        0.000
  1040.00     3.34    580.05     0.00    579.96    580.32     0.27      0.01      0.08    582.03
    4640        0      4640       0.         0      1107       0.        50.        7.     582.03
     0.10     0.00      4.17     0.00     0.000     0.030    0.000     0.000    571.71    558.63
 0.000507     30.        30       30.         0         0        0      0.00    146.48    705.11


*SECNO 1070.000
 2900 NAT Q1=    1699.00  WSEL=     579.97  ENC Q1=    1735.80  WSEL=     580.07  RATIO= -0.0217
 NAT Q1=    1736   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.07

3470 ENCROACHMENT STATIONS=      503.4      633.5  TYPE=      4  TARGET=        0.000
  1070.00     8.32    580.07     0.00    579.97    580.45     0.38      0.02      0.11    582.06
    4640.       0.     4640.       0.         0.      940.       0.        51         7     582.06
     0.10     0.00      4.94     0.00     0.000     0.030    0.000     0.000    571.74    504.84
 0.000716     30.        30.       30.         0         0        0      0.00    124.48    629.32


*SECNO 1100.000
 2800 NAT Q1=    1428.69  WSEL=     580.00  ENC Q1=    1460.16  WSEL=     580.10  RATIO= -0.0220
 NAT Q1=    1460.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.10

3470 ENCROACHMENT STATIONS=      457.9      568.5  TYPE=      4  TARGET=        0.000
  1100.00     8.32    580.09     0.00    580.00    580.62     0.52      0.03      0.15    582.09
    4640        0.     4640       0.         0.      798.       0        52.        7.     582.09
     0.10     0.00      5.81     0.00     0.000     0.030    0.000     0.000    571.77    459.12
 0.001012     30.        30       30.         0         0        0      0.00    105.79    564.91


CCHV=    0.500 CEHV=    1.000
*SECNO 1120.000
 2800 NAT Q1=    1175.92  WSEL=     580.03  ENC Q1=    1203.72  WSEL=     580.13  RATIO= -0.0236
 NAT Q1=    1204.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.13

3470 ENCROACHMENT STATIONS=     1042.1     1151.9  TYPE=      4  TARGET=        0.000
           CROSS SECTION JUST BELOW RAILROAD BRIDGE
  1120.00     8.33    580.12     0.00    580.03    580.82     0.70      0.02      0.17    582.30
    4640.       0      4640       0.         0      692.       0        52         7     582.30
     0.11     0.00      6.71     0.00     0.000     0.030    0.000     0.000    571.79   1045.81
 0.001490     20         20.      20.         0         0        0      0.00    101.32   1147.13
```

```
 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
 Q         QLOB      QCH       QROB      QLOB      QCH       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 1121.000
 2300 NAT Q1=   1178.16  WSEL=    580 03  ENC Q1=   1204.84  WSEL=    580.13  RATIO= -0.0227
 NAT Q1=   1205.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.13

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592 00 MAX ELLC=  590 50


3470 ENCROACHMENT STATIONS=    1042 1    1151.9  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
  1121.00     8 33   530 12     0 00   580.03   580 82     0.70     0.00     0 00   582.30
   4640.        0.    4640.        0        0     692.        0       52        7.    582.30
    0 11      0 00     6 71     0.00    0 000    0.030    0 000    0.000   571.79  1045.81
 0 001490        1       1.        1.        0        0        0     0.00   101.32  1147.13


*SECNO 1146.000
 2800 NAT Q1=   1190.63  WSEL=    580.08  ENC Q1=   1218.84  WSEL=    580.18  RATIO= -0 0237
 NAT Q1=   1219   RATIOS LOB,CH,ROB=  0 0000  1.0000  0 0000  WSEL=    580 18

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50


3470 ENCROACHMENT STATIONS=    1042.1    1151.9  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
  1146 00     8.38   580 17     0.00   580.08   580.86     0 69     0.04     0 00   582.30
   4640        0.    4640        0        0.     696        0.       52.       7     582 30
    0 11      0.00     6.67     0 00    0.000    0.030    0.000    0.000   571.79  1045 74
 0.001462       25       25       25        1        0        0     0.00   101.49  1147.23


*SECNO 1147 000
 2300 NAT Q1=   1193 19  WSEL=    580.09  ENC Q1=   1220 04  WSEL=    580.19  RATIO= -0.0225
 NAT Q1=   1220.   RATIOS LOB,CH,ROB=  0 0000  1.0000  0.0000  WSEL=    580.19

3470 ENCROACHMENT STATIONS=    1042.1    1151.9  TYPE=     4  TARGET=       0.000
          CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
  1147 00     8.38   580 17     0 00   580.09   580.86     0 69     0.00     0.00   582.30
   4640        0.    4640        0        0     697.        0       52        7.    582.30
    0.11      0.00     6.66     0.00    0.000    0.030    0.000    0 000   571.79  1045.72
 0 001457        1.       1        1.        0        0        0     0.00   101.52  1147 24
```

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS   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 1177.000
 2800 NAT Q1=   1209 80  WSEL=    580.33  ENC Q1=   1237 49  WSEL=    580.33  RATIO= -0.0229
 NAT Q1=   1237   RATIOS LOB,CH,ROB=  0.0000  1.0000  0 0000  WSEL=    580.33

3470 ENCROACHMENT STATIONS=    1035 0    1155.0  TYPE=     4  TARGET=       0.000
  1177.00     8 32   590.32     0.00   580.23   580.94     0 62     0.04     0.03   581.30
    4640.        0     4640       0.        0     733.       0.       53.       7.   581 30
     0.11     0.00     6.33     0.00    0.000    0.030    0.000    0 000   572.00  1037.64
 0 001417      30.       30       30.        2        0        0     0.00   114.49  1152.13


*SECNO 1364.000
 2800 NAT Q1=   1245 14  WSEL=    580.54  ENC Q1=   1273 28  WSEL=    580.64  RATIO= -0 0226
 NAT Q1=   1273.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.64

3470 ENCROACHMENT STATIONS=    1027.0    1150.0  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
  1364 00     8 31   580 61     0.00   580.54   581.21     0 60     0.26     0.01   582.00
    4640.        0.    4640.       0.        0.     745.       0       56        7.   582.30
     0 12     0.00     6 22     0.00    0 000    0 030    0.000    0.000   572.30  1031.74
 0.001347      137.      187      187        2        0        0     0.00   114.69  1146.43


CCHV=   0.100 CEHV=   0 300
*SECNO 1525.000
 2800 NAT Q1=   1465 90  WSEL=    580.95  ENC Q1=   1496.56  WSEL=    580.95  RATIO= -0 0209
 NAT Q1=   1497.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.95

3470 ENCROACHMENT STATIONS=    1620.0    1740 0  TYPE=     4  TARGET=       0.000
  1526.00     8.74   520 91     0.00   580 85   581 40     0.49     0.18     0.01   582.00
    4640        0     4640.       0.        0.     825.       0.       59        8    582.00
     0.12     0.00     5 62     0.00    0 000    0 030    0.000    0.000   572.17  1622 21
 0 000978      113      162      162.        2        0        0     0.00   115 43  1737.64


*SECNO 1851.000
 2900 NAT Q1=   2056 53  WSEL=    581.33  ENC Q1=   2098 09  WSEL=    581.43  RATIO= -0.0202
 NAT Q1=   2098.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    581 43

3470 ENCROACHMENT STATIONS=    1600.0    1750.0  TYPE=     4  TARGET=       0.000
  1851 00     8.87   581 37     0 00   581 33   581.65     0.27     0.22     0 02   582 00
    4640        0.    4640       0.        0.    1110.       0       66.       9.   582 00
     0 15     0.00     4 16     0 00    0 000    0.030    0.000    0.000   572.50  1601.32
 0.000499      225      325      325.        2        0        0     0 00   147.29  1748.61
```

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

CCHV=   0.100 CEHV=   0.300
*SECNO 2500.000
 2800 NAT Q1=   3002.24  WSEL=    581.66  ENC Q1=   3066.69  WSEL=    581.76  RATIO= -0.0215
 NAT Q1=   3067.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    581.76

3470 ENCROACHMENT STATIONS=    1550.0    1780.0  TYPE=     4  TARGET=       0.000
  2500.00     8.57   581.71     0.00   581.66   582.12     0.41     0.43     0.04   582.00
    8520        0.     8520       0.       0.    1649.       0.      87.      12.   582.00
     0.18     0.00     5.17     0.00    0.000    0.030    0.000    0.000   573.14  1551.00
 0.000791     450.      649      649.        2        0        0     0.00   228.25  1779.25


*SECNO 3515.000
 2800 NAT Q1=   3866.61  WSEL=    582.61  ENC Q1=   3960.37  WSEL=    582.61  RATIO= -0.0242
 NAT Q1=   3992.   RATIOS LOB,CH,ROB=  0.0080  0.9920  0.0000  WSEL=    582.61

3470 ENCROACHMENT STATIONS=    1500.0    1860.0  TYPE=     4  TARGET=       0.008
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          HIGHWAY 55 BRIDGE
  3515.00     8.19   582.54     0.00   582.51   582.76     0.21     0.62     0.02   582.00
    8520        0.     8520.      0.       0.    2294.       0      133       19   582.10
     0.26     0.00     3.71     0.00    0.000    0.030    0.000    0.000   574.35  1500.00
 0.000482    1015.    1015.    1015.        2        0        0     0.00   360.00  1860.00


CCHV=   0.500 CEHV=   1.000
*SECNO 3870.000
 2800 NAT Q1=   1787.67  WSEL=    582.84  ENC Q1=   1860.45  WSEL=    582.94  RATIO= -0.0407
 NAT Q1=   1860.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    582.94

3470 ENCROACHMENT STATIONS=    1500.0    1855.0  TYPE=     4  TARGET=       0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
  3870.00     8.36   582.86     0.00   582.84   583.40     0.54     0.32     0.32   583.40
    9520        0.     8520       0.       0.    1448.       0      148.      21    583.40
     0.27     0.00     5.88     0.00    0.000    0.030    0.000    0.000   574.50  1500.71
 0.002225     355.      355      355.        2        0        0     0.00   353.67  1854.37


*SECNO 3871.000
```

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

2800 NAT Q1=   1449.42  WSEL=    582.84  ENC Q1=   1508.30  WSEL=    582.94  RATIO= -0.0406
NAT Q1=   1508.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    582.94

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3470 ENCROACHMENT STATIONS=    1500.0    1855.0  TYPE=     4  TARGET=       0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE.ELLEA=      595.50 ELREA=      595.90

          DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE
  3871.00     8.36    582.86      0.00    582.84    583.53      0.66      0.00      0.12    583.40
    8520.       0.     8520.        0.        0.     1305.        0.      148.       21.    583.40
     0.27     0.00      6.53      0.00     0.000     0.030     0.000     0.000    574.50   1500.79
 0.003383       1.        1.        1.        0.        0.        0.      0.00    327.41   1854.29

*SECND 3900.000
2800 NAT Q1=   1555.90  WSEL=    583.02  ENC Q1=   1614.78  WSEL=    583.12  RATIO= -0.0378
NAT Q1=   1615.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    583.12

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3470 ENCROACHMENT STATIONS=    1500.0    1855.0  TYPE=     4  TARGET=       0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE.ELLEA=      595.50 ELREA=      595.90

          UPSTREAM FACE OF HIGHWAY 55 BRIDGE
  3900.00     8.54    583.04      0.00    583.02    583.64      0.61      0.09      0.03    583.40
    8520.       0.     8520.        0.        0.     1362.        0.      149.       22.    583.40
     0.27     0.00      6.25      0.00     0.000     0.030     0.000     0.000    574.50   1500.57
 0.002958      29.       29.       29.        2.        0.        0.      0.00    327.97   1854.49

*SECND 3901.000
```

```
 SECND     DEPTH     CWSEL     CRWS      WSELK     EG        HV        HL        OLOSS    BANK ELEV
 Q         QLOB      QCH       QROB      AROB      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

2900 NAT Q1=   2120 73  WSEL=    583.28  ENC Q1=   2194 66  WSEL=    583.38  RATIO= -0.0349
NAT Q1=   2195   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    583 38

3470 ENCROACHMENT STATIONS=    1500 0    1855.0  TYPE=     4  TARGET=       0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

         CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE
 3901.00     8.79   582 29     0.00   583.28   583.73     0.44     0.00     0.08   583 40
   8520        0.     8520        0        0    1602.        0      149      22.   583.40
   0 27     0 00     5 32     0.00    0 000    0 030    0.000    0.000   574 50  1500.14
0.001597       1        1       1.        2        0        0     0.00   354 74  1854.88


*SECND 4321 000
2800 NAT Q1=   4904.24  WSEL=    583.95  ENC Q1=   4979 61  WSEL=    584 05  RATIO= -0.0154
NAT Q1=   5043.  RATIOS LOB,CH,ROB=  0.0116  0.9875  0.0009  WSEL=    584.05

3470 ENCROACHMENT STATIONS=    1500 0    1860.0  TYPE=     4  TARGET=       0.013
         CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
         UPSTREAM OF HIGHWAY 55 BRIDGE
 4321.00     9.06   583 95     0.00   583 95   584.12     0.16     0.25     0.14   583.40
   8520        0.     8520       0.        0    2630.        0.      169       25   583.40
   0 31     0 00     3 24     0 00    0 000    0 030    0.000    0 000   574 90  1500 00
0 000307    420.     420      420.        2        0        5     0.00   360.00  1860.00
```

THIS RUN EXECUTED 1 APR 87 8.52: 33

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

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 110

| SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENCR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 579.30 | 0.00 | 579.84 | 665.50 | 36.61 | 4583.59 | 14.80 | 665.00 | 1348 00 | 1500.00 | 1860.00 | 2013 00 |
| 0 000 | 579.90 | 0.10 | 579 94 | 360 00 | 0.00 | 4640 00 | 0 00 | 0.05 | 1500 00 | 1500.00 | 1860.00 | 1860 00 |
| 900 000 | 579 91 | 0 00 | 580.03 | 219.99 | 0.00 | 4640.00 | 0.00 | 310.00 | 1550.00 | 1550.00 | 1780.00 | 1860 00 |
| 900 000 | 580 01 | 0.10 | 580 13 | 220.46 | 0.00 | 4640.00 | 0 00 | 0.00 | 1550.00 | 1550.00 | 1780.00 | 1780 00 |
| 1010 000 | 579.94 | 0.00 | 580.14 | 172.00 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 620.00 | 800.00 | 0 00 |
| 1010.000 | 580.04 | 0 10 | 580 23 | 172.40 | 0.00 | 4640.00 | 0 00 | 0 00 | 620.00 | 620.00 | 800.00 | 800 00 |
| 1040 000 | 579.96 | 0.00 | 580.24 | 146.15 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 557.00 | 710.00 | 0 00 |
| 1040.000 | 580.05 | 0.10 | 580 32 | 146.48 | 0.00 | 4640.00 | 0.00 | 0.00 | 557 00 | 557.00 | 710.00 | 710 00 |
| 1070.000 | 579.97 | 0.00 | 580.36 | 124 20 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 503 45 | 633 50 | 0 00 |
| 1070.000 | 580 07 | 0.09 | 580 45 | 124.48 | 0.00 | 4640.00 | 0.00 | 0.00 | 503.45 | 503 45 | 633.50 | 633.50 |
| 1100.000 | 580 00 | 0 00 | 580.54 | 105 55 | 0 00 | 4640.00 | 0.00 | 0.00 | 0.00 | 457.93 | 568.47 | 0 00 |
| 1100 000 | 580 09 | 0.09 | 580.62 | 105.79 | 0.00 | 4640.00 | 0.00 | 0 00 | 457.93 | 457.93 | 568.47 | 568 48 |
| 1120 000 | 580 03 | 0.00 | 580.75 | 100 92 | 0.00 | 4640.00 | 0.00 | 179.10 | 1013 00 | 1042.10 | 1151 90 | 1192 10 |
| 1120.000 | 580.12 | 0.09 | 580 82 | 101.32 | 0.00 | 4640 00 | 0.00 | 0.00 | 1042.10 | 1042 10 | 1151.90 | 1151 90 |
| 1121.000 | 580.03 | 0.00 | 580.75 | 100.96 | 0.00 | 4640.00 | 0 00 | 179.10 | 1013.00 | 1042 10 | 1151.90 | 1192 10 |
| 1121 000 | 580 12 | 0.09 | 580.82 | 101.32 | 0 00 | 4640 00 | 0.00 | 0.00 | 1042.10 | 1042.10 | 1151.90 | 1151 90 |
| 1146.000 | 580.08 | 0.00 | 580 79 | 101.15 | 0.00 | 4640 00 | 0.00 | 179.10 | 1013.00 | 1042.10 | 1151.90 | 1192 10 |
| 1146 000 | 580 17 | 0 09 | 580 86 | 101.49 | 0.00 | 4640.00 | 0.00 | 0.00 | 1042.10 | 1042.10 | 1151.90 | 1151 90 |
| 1147.000 | 580.09 | 0.00 | 580 79 | 101.18 | 0.00 | 4640.00 | 0.00 | 179.10 | 1013.00 | 1042 10 | 1151.90 | 1192 10 |
| 1147.000 | 580 17 | 0.09 | 580 86 | 101.52 | 0.00 | 4640.00 | 0.00 | 0.00 | 1042.10 | 1042.10 | 1151 90 | 1151 90 |
| 1177.000 | 580.23 | 0.00 | 580.87 | 114.03 | 0.00 | 4640.00 | 0.00 | 165.00 | 990.00 | 1035.00 | 1155.00 | 1155 00 |
| 1177.000 | 580 32 | 0.08 | 580.94 | 114.49 | 0.00 | 4640 00 | 0 00 | 0.00 | 1035.00 | 1035.00 | 1155.00 | 1155 00 |

| SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENCR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1364.000 | 580 54 | 0.00 | 581.15 | 114.32 | 0 00 | 4640.00 | 0.00 | 550.00 | 625.00 | 1027.00 | 1150.00 | 1175 00 |
| 1364.000 | 580 61 | 0 07 | 581.21 | 114.69 | 0.00 | 4640.00 | 0.00 | 0.00 | 1027 00 | 1027 00 | 1150.00 | 1150 00 |
| 1526 000 | 580 85 | 0.00 | 581.25 | 113 19 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 1620.00 | 1740.00 | 0 00 |
| 1526.000 | 580.91 | 0.06 | 581.40 | 115.43 | 0 00 | 4640.00 | 0.00 | 0.00 | 1620.00 | 1620.00 | 1740.00 | 1740 00 |
| 1851 000 | 581 33 | 0.00 | 581.60 | 147 09 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 1600.00 | 1750.00 | 0 00 |
| 1851 000 | 581 37 | 0.05 | 581.65 | 147 29 | 0.00 | 4640.00 | 0 00 | 0.00 | 1600.00 | 1600.00 | 1750 00 | 1750 00 |
| 2500.000 | 581 66 | 0.00 | 582.08 | 228.01 | 0.00 | 8520.00 | 0 00 | 0.00 | 0.00 | 1550.00 | 1780.00 | 0 00 |
| 2500 000 | 581 71 | 0.04 | 582.12 | 228.25 | 0 00 | 8520.00 | 0.00 | 0.00 | 1550.00 | 1550 00 | 1780.00 | 1780 00 |
| 3515.000 | 582 51 | 0 00 | 582.73 | 500.92 | 18.19 | 8501.64 | 0.18 | 533.00 | 1365.00 | 1500.00 | 1860.00 | 1898 00 |
| 3515.000 | 582.54 | 0.03 | 582 76 | 360.00 | 0.00 | 8520.00 | 0 00 | 0.01 | 1500.00 | 1500.00 | 1860.00 | 1860 00 |
| 3870.000 | 582.84 | 0.00 | 583.38 | 353.60 | 0.00 | 8520.00 | 0.00 | 0.00 | 0.00 | 1500.00 | 1855.00 | 0 00 |
| 3870.000 | 582 86 | 0.03 | 583.40 | 353.67 | 0.00 | 8520.00 | 0 00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855 00 |
| 3871.000 | 582.84 | 0 00 | 583 51 | 327.33 | 0.00 | 8520.00 | 0.00 | 0.00 | 0.00 | 1500.00 | 1855.00 | 0 00 |
| 3871.000 | 582 86 | 0.03 | 583.53 | 327.41 | 0 00 | 8520.00 | 0.00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855 00 |
| 3900 000 | 583.02 | 0.00 | 583.63 | 327.91 | 0 00 | 8520.00 | 0.00 | 0 00 | 0.00 | 1500.00 | 1855.00 | 0 00 |
| 3900 000 | 583.04 | 0.02 | 583.64 | 327.97 | 0.00 | 8520.00 | 0 00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855 00 |
| 3901.000 | 583.28 | 0.00 | 583.72 | 354.71 | 0.00 | 8520 00 | 0.00 | 0.00 | 0.00 | 1500.00 | 1855.00 | 0 00 |
| 3901.000 | 583.29 | 0 01 | 583 73 | 354.74 | 0.00 | 8520.00 | 0 00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855 00 |
| 4321 000 | 583.95 | 0.00 | 584.11 | 1041 86 | 58.53 | 8456.70 | 4.77 | 1195.00 | 946.00 | 1500.00 | 1860.00 | 2141 00 |
| 4321.000 | 583.96 | 0.01 | 584 12 | 360.00 | 0.00 | 8520.00 | 0.00 | 0.01 | 1500.00 | 1500.00 | 1860.00 | 1860 00 |

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 150

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10W*S | VCH | AREA | QIK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.00 | 570.54 | 4640.00 | 579.80 | 0.00 | 579.84 | 0.81 | 1.70 | 2885.45 | 5163.00 |
| 0.000 | 0.00 | 0.00 | 0.00 | 570.54 | 4640.00 | 579.90 | 0.00 | 579.94 | 0.80 | 1.69 | 2739.90 | 5203.17 |
| 900.000 | 900.00 | 0.00 | 0.00 | 571.57 | 4640.00 | 579.91 | 0.00 | 580.03 | 2.16 | 2.78 | 1668.35 | 3157.13 |
| 900.000 | 900.00 | 0.00 | 0.00 | 571.57 | 4640.00 | 580.01 | 0.00 | 580.13 | 2.08 | 2.75 | 1689.77 | 3220.13 |
| 1010.000 | 110.00 | 0.00 | 0.00 | 571.68 | 4640.00 | 579.94 | 0.00 | 580.14 | 3.75 | 3.60 | 1287.85 | 2396.57 |
| 1010.000 | 110.00 | 0.00 | 0.00 | 571.68 | 4640.00 | 580.04 | 0.00 | 580.23 | 3.59 | 3.55 | 1305.91 | 2448.54 |
| 1040.000 | 30.00 | 0.00 | 0.00 | 571.71 | 4640.00 | 579.96 | 0.00 | 580.24 | 5.28 | 4.25 | 1092.63 | 2019.11 |
| 1040.000 | 30.00 | 0.00 | 0.00 | 571.71 | 4640.00 | 580.05 | 0.00 | 580.32 | 5.07 | 4.19 | 1107.29 | 2060.85 |
| 1070.000 | 30.00 | 0.00 | 0.00 | 571.74 | 4640.00 | 579.97 | 0.00 | 580.36 | 7.46 | 5.00 | 927.23 | 1679.00 |
| 1070.000 | 30.00 | 0.00 | 0.00 | 571.74 | 4640.00 | 580.07 | 0.00 | 580.45 | 7.16 | 4.94 | 939.71 | 1734.10 |
| 1100.000 | 30.00 | 0.00 | 0.00 | 571.77 | 4640.00 | 580.00 | 0.00 | 580.54 | 10.55 | 5.89 | 787.54 | 1428.69 |
| 1100.000 | 30.00 | 0.00 | 0.00 | 571.77 | 4640.00 | 580.09 | 0.00 | 580.62 | 10.12 | 5.81 | 798.27 | 1458.46 |
| 1120.000 | 20.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.57 | 6.81 | 681.54 | 1179.92 |
| 1120.000 | 20.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.12 | 0.00 | 580.82 | 14.90 | 6.71 | 691.72 | 1201.97 |
| 1121.000 | 1.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.51 | 6.80 | 682.42 | 1178.16 |
| 1121.000 | 1.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.12 | 0.00 | 580.82 | 14.90 | 6.71 | 691.81 | 1202.19 |
| 1146.000 | 25.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.08 | 0.00 | 580.79 | 15.19 | 6.75 | 687.30 | 1190.63 |
| 1146.000 | 25.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.17 | 0.00 | 580.86 | 14.62 | 6.67 | 696.14 | 1213.33 |
| 1147.000 | 1.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.09 | 0.00 | 580.79 | 15.12 | 6.74 | 688.30 | 1193.19 |
| 1147.000 | 1.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.17 | 0.00 | 580.86 | 14.57 | 6.66 | 697.04 | 1215.65 |
| 1177.000 | 30.00 | 0.00 | 0.00 | 572.00 | 4640.00 | 580.23 | 0.00 | 580.87 | 14.71 | 6.41 | 723.76 | 1209.80 |
| 1177.000 | 30.00 | 0.00 | 0.00 | 572.00 | 4640.00 | 580.32 | 0.00 | 580.94 | 14.17 | 6.33 | 733.16 | 1232.65 |
| 1364.000 | 187.00 | 0.00 | 0.00 | 572.30 | 4640.00 | 580.54 | 0.00 | 581.15 | 13.89 | 6.29 | 737.59 | 1245.14 |
| 1364.000 | 187.00 | 0.00 | 0.00 | 572.30 | 4640.00 | 580.61 | 0.00 | 581.21 | 13.47 | 6.22 | 745.40 | 1264.31 |
| 1526.000 | 162.00 | 0.00 | 0.00 | 572.17 | 4640.00 | 580.85 | 0.00 | 581.35 | 10.02 | 5.67 | 818.28 | 1465.90 |
| 1526.000 | 162.00 | 0.00 | 0.00 | 572.17 | 4640.00 | 580.91 | 0.00 | 581.40 | 9.78 | 5.62 | 824.96 | 1483.67 |
| 1851.000 | 325.00 | 0.00 | 0.00 | 572.50 | 4640.00 | 581.33 | 0.00 | 581.60 | 5.09 | 4.21 | 1102.45 | 2056.53 |
| 1851.000 | 325.00 | 0.00 | 0.00 | 572.50 | 4640.00 | 581.37 | 0.00 | 581.65 | 4.99 | 4.18 | 1109.56 | 2076.58 |
| 2500.000 | 649.00 | 0.00 | 0.00 | 573.14 | 8520.00 | 581.66 | 0.00 | 582.08 | 8.05 | 5.20 | 1639.49 | 3002.24 |
| 2500.000 | 649.00 | 0.00 | 0.00 | 573.14 | 8520.00 | 581.71 | 0.00 | 582.12 | 7.91 | 5.17 | 1649.85 | 3028.61 |
| 3515.000 | 1015.00 | 0.00 | 0.00 | 574.35 | 8520.00 | 582.51 | 0.00 | 582.73 | 4.86 | 3.72 | 2354.48 | 3866.61 |
| 3515.000 | 1015.00 | 0.00 | 0.00 | 574.35 | 8520.00 | 582.54 | 0.00 | 582.76 | 4.82 | 3.71 | 2294.32 | 3880.77 |

| SECND | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | TOK*S | VCH | AREA | OIK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3870.000 | 353.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.38 | 22.71 | 5.92 | 1439.03 | 1787.67 |
| 3870.000 | 353.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 582.86 | 0.00 | 583.40 | 22.25 | 5.88 | 1448.02 | 1806.05 |
| 3871.000 | 1.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.51 | 34.55 | 6.57 | 1296.72 | 1449.42 |
| 3871.000 | 1.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 582.86 | 0.00 | 583.53 | 33.83 | 6.53 | 1305.48 | 1464.89 |
| 3900.000 | 29.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 583.02 | 0.00 | 583.63 | 29.99 | 6.28 | 1356.45 | 1555.90 |
| 3900.000 | 29.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 583.04 | 0.00 | 583.64 | 29.58 | 6.25 | 1362.34 | 1566.02 |
| 3901.000 | 1.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 583.28 | 0.00 | 583.72 | 16.14 | 5.34 | 1596.86 | 2120.73 |
| 3901.000 | 1.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 583.29 | 0.00 | 583.73 | 15.97 | 5.32 | 1601.94 | 2131.80 |
| 4321.000 | 420.00 | 0.00 | 0.00 | 574.90 | 8520.00 | 583.95 | 0.00 | 584.11 | 3.02 | 3.22 | 2946.01 | 4904.24 |
| 4321.000 | 420.00 | 0.00 | 0.00 | 574.90 | 8520.00 | 583.96 | 0.00 | 584.12 | 3.07 | 3.24 | 2630.23 | 4866.11 |

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 150

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 0.000 | 4640.00 | 579.80 | 0.00 | 0.00 | 0.00 | 665.00 | 0.00 |
| 0.000 | 4640.00 | 579.90 | 0.10 | 0.00 | 0.10 | 360.00 | 0.00 |
| 900.000 | 4640.00 | 579.91 | 0.00 | 0.11 | 0.00 | 219.99 | 900.00 |
| 900.000 | 4640.00 | 580.01 | 0.10 | 0.11 | 0.10 | 220.46 | 900.00 |
| 1010.000 | 4640.00 | 579.94 | 0.00 | 0.03 | 0.00 | 172.00 | 110.00 |
| 1010.000 | 4640.00 | 580.04 | 0.10 | 0.03 | 0.10 | 172.40 | 110.00 |
| 1040.000 | 4640.00 | 579.96 | 0.00 | 0.01 | 0.00 | 146.15 | 30.00 |
| 1040.000 | 4640.00 | 580.05 | 0.10 | 0.01 | 0.10 | 146.48 | 30.00 |
| 1070.000 | 4640.00 | 579.97 | 0.00 | 0.02 | 0.00 | 124.20 | 30.00 |
| 1070.000 | 4640.00 | 580.07 | 0.09 | 0.02 | 0.09 | 124.48 | 30.00 |
| 1100.000 | 4640.00 | 580.00 | 0.00 | 0.03 | 0.00 | 105.55 | 30.00 |
| 1100.000 | 4640.00 | 580.09 | 0.09 | 0.03 | 0.09 | 105.79 | 30.00 |
| 1120.000 | 4640.00 | 580.03 | 0.00 | 0.03 | 0.00 | 100.92 | 20.00 |
| 1120.000 | 4640.00 | 580.12 | 0.09 | 0.02 | 0.09 | 101.32 | 20.00 |
| 1121.000 | 4640.00 | 580.03 | 0.00 | 0.00 | 0.00 | 100.96 | 1.00 |
| 1121.000 | 4640.00 | 580.12 | 0.09 | 0.00 | 0.09 | 101.32 | 1.00 |
| 1146.000 | 4640.00 | 580.08 | 0.00 | 0.05 | 0.00 | 101.15 | 25.00 |
| 1146.000 | 4640.00 | 580.17 | 0.09 | 0.05 | 0.09 | 101.49 | 25.00 |
| 1147.000 | 4640.00 | 580.09 | 0.00 | 0.00 | 0.00 | 101.18 | 1.00 |
| 1147.000 | 4640.00 | 580.17 | 0.09 | 0.00 | 0.09 | 101.52 | 1.00 |
| 1177.000 | 4640.00 | 580.23 | 0.00 | 0.15 | 0.00 | 114.03 | 30.00 |
| 1177.000 | 4640.00 | 580.32 | 0.08 | 0.14 | 0.08 | 114.49 | 30.00 |
| 1264.000 | 4640.00 | 580.54 | 0.00 | 0.30 | 0.00 | 114.32 | 187.00 |
| 1364.000 | 4640.00 | 580.61 | 0.07 | 0.29 | 0.07 | 114.69 | 187.00 |
| 1526.000 | 4640.00 | 580.85 | 0.00 | 0.32 | 0.00 | 115.19 | 162.00 |
| 1526.000 | 4640.00 | 580.91 | 0.06 | 0.31 | 0.06 | 115.43 | 162.00 |
| 1851.000 | 4640.00 | 581.33 | 0.00 | 0.47 | 0.00 | 147.09 | 325.00 |
| 1851.000 | 4640.00 | 581.37 | 0.05 | 0.46 | 0.05 | 147.29 | 325.00 |
| 2500.000 | 8520.00 | 581.66 | 0.00 | 0.34 | 0.00 | 228.01 | 649.00 |
| 2500.000 | 8520.00 | 581.71 | 0.04 | 0.33 | 0.04 | 228.25 | 649.00 |
| 3515.000 | 8520.00 | 582.51 | 0.00 | 0.85 | 0.00 | 500.92 | 1015.00 |
| 3515.000 | 8520.00 | 582.54 | 0.03 | 0.84 | 0.03 | 360.00 | 1015.00 |

| SECND | Q | DWSEL | DIFWSP | DIFWSX | DIFWWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 3870.000 | 8520.00 | 582.84 | 0.00 | 0.32 | 0.00 | 353.60 | 355.00 |
| 3870.000 | 8520.00 | 582.86 | 0.03 | 0.32 | 0.03 | 353.67 | 355.00 |
| 3871.000 | 8520.00 | 582.84 | 0.00 | 0.00 | 0.00 | 327.33 | 1.00 |
| 3871.000 | 8520.00 | 582.86 | 0.03 | 0.00 | 0.03 | 327.41 | 1.00 |
| 3900.000 | 8520.00 | 583.02 | 0.00 | 0.18 | 0.00 | 327.91 | 29.00 |
| 3900.000 | 8520.00 | 583.04 | 0.02 | 0.17 | 0.02 | 327.97 | 29.00 |
| 3901.000 | 8520.00 | 583.28 | 0.00 | 0.26 | 0.00 | 354.71 | 1.00 |
| 3901.000 | 8520.00 | 583.29 | 0.01 | 0.25 | 0.01 | 354.74 | 1.00 |
| 4321.000 | 8520.00 | 583.95 | 0.00 | 0.67 | 0.00 | 1041.86 | 420.00 |
| 4321.000 | 8520.00 | 583.96 | 0.01 | 0.66 | 0.01 | 360.00 | 420.00 |

SUMMARY OF ERRORS AND SPECIAL NOTES

FLOODWAY DATA. 0 YEAR FLOOD
PROFILE NO 2

| STATION | FLOODWAY WIDTH | FLOODWAY SECTION AREA | FLOODWAY MEAN VELOCITY | WATER SURFACE ELEVATION WITH FLOODWAY | WITHOUT FLOODWAY | DIFFERENCE |
|---|---|---|---|---|---|---|
| 0 000 | 360 | 2740. | 1.7 | 579 9 | 579 8 | 0. 1 |
| 900. 000 | 220 | 1690. | 2. 7 | 580. 0 | 579 9 | 0. 1 |
| 1010. 000 | 172 | 1306. | 3. 6 | 580. 0 | 579 9 | 0. 1 |
| 1040 000 | 146. | 1107 | 4. 2 | 580. 1 | 560 0 | 0 1 |
| 1070 000 | 124. | 940 | 4. 9 | 580 1 | 580 0 | 0. 1 |
| 1100 000 | 106. | 798 | 5 3 | 580. 1 | 580. 0 | 0. 1 |
| 1120. 000 | 101. | 692 | 6. 7 | 580. 1 | 580. 0 | 0. 1 |
| 1121 000 | 101. | 692 | 6. 7 | 580 1 | 580. 0 | 0. 1 |
| 1146 000 | 101 | 696 | 6. 7 | 580 2 | 580. 1 | 0. 1 |
| 1147 000 | 102 | 697. | 6. 7 | 580 2 | 580. 1 | 0. 1 |
| 1177 000 | 114. | 733 | 6. 3 | 580. 3 | 580. 2 | 0. 1 |
| 1364 000 | 115. | 745 | 6. 2 | 580. 6 | 580 5 | 0 1 |
| 1526. 000 | 115. | 825. | 5. 6 | 581 0 | 580. 9 | 0. 1 |
| 1851. 000 | 147. | 1110 | 4. 2 | 581. 3 | 581 3 | 0. 0 |
| 2500 000 | 228 | 1649 | 5 2 | 581 7 | 581 7 | 0 0 |
| 3515 000 | 360 | 2294 | 3 7 | 582 5 | 582. 5 | 0. 0 |
| 3870 000 | 354 | 1448. | 5. 9 | 582 8 | 582. 8 | 0. 0 |
| 3871. 000 | 354. | 1305 | 6. 5 | 582 8 | 582 8 | 0 0 |
| 3900 000 | 354 | 1362 | 6 3 | 583 0 | 583. 0 | 0. 0 |
| 3901. 000 | 355 | 1602 | 5. 3 | 583 3 | 583. 3 | 0. 0 |
| 4321 000 | 360. | 2630 | 3 2 | 583 9 | 583. 9 | 0 0 |

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp

3) WATERCOURSE: ~~[illegible]~~ Bar Lake Outlet
enclosure 2

4) DOCUMENT TYPE: ~~[illegible]~~ 100 year flood

00BREAK00

```
*********************************************************
*  WATER SURFACE PROFILES                               *
*  VERSION OF NOVEMBER 1976                             *
*  UPDATED MAY 1984                                     *
*                                                       *
*  RUN DATE  10 SEP 86 TIME    10:47:26                 *
*********************************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  THE HYDROLOGIC ENGINEERING CENTER *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616          *
*  (916) 440-2105 (FTS) 448-2105    *
*************************************
```

```
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
```

OK

MANISTEE TWNSHP
HEC-2
BAR LAKE OUTLET

ENCLOSURE 2

THIS RUN EXECUTED 10 SEP 86 10:47:26

```
*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
```

```
C
T1      MANISTEE TOWNSHIP - FIS
T2      BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3      BACKWATER PROFILES - 10 CFS

J1  ICHECK    ING       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0.        2.        0.        0.   0.000000     0.00      0.0       0.     580.140    0.000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

    1.000     0.000    -1.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC      0.070     0.070     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
QT      6.000    10.000    30.000    50.000    75.000   100.000     0.000     0.000     0.000     0.000
        CROSS SECTION AT MOUTH OF LAKE
X1      0.000    18.000   225.000   270.000     0.000     0.000     0.000     0.000     0.000     0.000
GR    586.400     0.000   586.300    50.000   586.200   100.000   586.400   150.000   586.600   200.000
GR    586.700   218.000   583.300   225.000   582.900   228.000   582.500   230.000   581.700   231.000
GR    581.700   235.000   582.500   236.000   586.900   270.000   587.500   300.000   588.100   350.000
GR    588.300   400.000   588.300   450.000   588.500   500.000     0.000     0.000     0.000     0.000

        CROSS SECTION DOWNSTREAM OF BRIDGE
X1     60.000    19.000   225.000   270.000    60.000    60.000    60.000     0.000    -0.150     0.000
GR    586.700     0.000   586.600    50.000   586.500   100.000   586.700   150.000   586.900   200.000
GR    587.000   218.000   584.100   225.000   583.200   228.000   582.800   230.000   582.000   231.000
GR    582.000   233.000   582.000   235.000   582.800   236.000   587.200   270.000   587.800   300.000
GR    588.400   350.000   588.600   400.000   588.600   450.000   588.800   500.000     0.000     0.000

X1    108.000     0.000     0.000     0.000    48.000    48.000    48.000     0.000     0.075     0.000
X3      0.000     0.000     0.000   227.000     0.000   239.000     0.000     0.000     0.000     0.000

NC      0.000     0.000     0.020     0.300     0.500     0.000     0.000     0.000     0.000     0.000
X1    114.000     0.000     0.000     0.000     6.000     6.000     6.000     0.000     0.032     0.000
X3      0.000     0.000     0.000   228.000     0.000   237.000     0.000     0.000     0.000     0.000

        CROSS SECTION DOWNSTREAM OF BRIDGE
X1    120.000     0.000     0.000     0.000     6.000     6.000     6.000     0.000     0.032     0.000
X3      0.000     0.000     0.000   230.000     0.000   236.000     0.000     0.000     0.000     0.000
```

DOWNSTREAM FACE OF HWY 110 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 121.000 | 19.000 | 225.000 | 270.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -17.000 | 0.000 | 586.700 | 0.000 | 50.000 | 586.600 | 0.000 | 100.000 | 586.500 | 0.000 |
| BT | 0.000 | 150.000 | 586.700 | 0.000 | 200.000 | 586.900 | 0.000 | 218.000 | 587.000 | 0.000 |
| BT | 0.000 | 230.000 | 586.900 | 582.800 | 231.000 | 587.000 | 584.500 | 233.000 | 587.000 | 586.300 |
| BT | 0.000 | 235.000 | 587.100 | 584.500 | 236.000 | 587.100 | 582.800 | 270.000 | 587.200 | 0.000 |
| BT | 0.000 | 300.000 | 587.800 | 0.000 | 350.000 | 588.400 | 0.000 | 400.000 | 588.600 | 0.000 |
| BT | 0.000 | 450.000 | 588.600 | 0.000 | 500.000 | 588.800 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 586.600 | 50.000 | 586.500 | 100.000 | 586.700 | 150.000 | 586.900 | 200.000 |
| GR | 587.000 | 218.000 | 584.100 | 225.000 | 583.200 | 228.000 | 582.800 | 230.000 | 582.000 | 231.000 |
| GR | 582.000 | 233.000 | 582.000 | 235.000 | 582.800 | 236.000 | 587.200 | 270.000 | 587.800 | 300.000 |
| GR | 588.400 | 350.000 | 588.600 | 400.000 | 588.600 | 450.000 | 588.800 | 500.000 | 0.000 | 0.000 |
| | | | | | | | | | | |
| X1 | 135.000 | 0.000 | 0.000 | 0.000 | 14.000 | 14.000 | 14.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | |
| X1 | 148.000 | 0.000 | 0.000 | 0.000 | 13.000 | 13.000 | 13.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |

UPSTREAM FACE OF HWY 110 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 175.000 | 22.000 | 225.000 | 270.000 | 27.000 | 27.000 | 27.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -16.000 | 0.000 | 586.700 | 0.000 | 50.000 | 586.600 | 0.000 | 100.000 | 586.500 | 0.000 |
| BT | 0.000 | 150.000 | 586.700 | 0.000 | 200.000 | 586.900 | 0.000 | 230.000 | 586.900 | 582.800 |
| BT | 0.000 | 231.000 | 587.000 | 584.500 | 233.000 | 587.000 | 586.300 | 235.000 | 587.100 | 584.500 |
| BT | 0.000 | 236.000 | 587.100 | 582.800 | 270.000 | 587.200 | 0.000 | 300.000 | 587.800 | 0.000 |
| BT | 0.000 | 350.000 | 588.400 | 0.000 | 400.000 | 588.600 | 0.000 | 450.000 | 588.600 | 0.000 |
| BT | 0.000 | 500.000 | 588.800 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 583.400 | 25.000 | 583.200 | 50.000 | 583.400 | 75.000 | 583.600 | 100.000 |
| GR | 583.700 | 125.000 | 583.400 | 150.000 | 583.400 | 175.000 | 583.500 | 200.000 | 584.100 | 225.000 |
| GR | 583.200 | 228.000 | 582.800 | 230.000 | 582.000 | 231.000 | 582.000 | 233.000 | 582.000 | 235.000 |
| GR | 582.800 | 236.000 | 587.200 | 270.000 | 587.800 | 300.000 | 588.400 | 350.000 | 588.600 | 400.000 |
| GR | 588.600 | 450.000 | 588.800 | 500.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION UPSTREAM OF BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 176.000 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | |
| NC | 0.000 | 0.000 | 0.035 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 179.000 | 0.000 | 0.000 | 0.000 | 3.000 | 3.000 | 3.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 227.000 | 0.000 | 239.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | |
| NC | 0.000 | 0.000 | 0.000 | 0.100 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 326.000 | 26.000 | 225.000 | 250.000 | 147.000 | 147.000 | 147.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 583.400 | 25.000 | 583.200 | 50.000 | 583.400 | 75.000 | 583.600 | 100.000 |
| GR | 583.700 | 125.000 | 583.400 | 150.000 | 583.400 | 175.000 | 583.500 | 200.000 | 584.100 | 225.000 |
| GR | 583.200 | 228.000 | 582.800 | 230.000 | 582.400 | 235.000 | 582.400 | 240.000 | 583.200 | 245.000 |
| GR | 584.600 | 250.000 | 587.700 | 275.000 | 590.200 | 300.000 | 591.900 | 325.000 | 589.800 | 350.000 |
| GR | 590.100 | 375.000 | 589.700 | 400.000 | 593.600 | 425.000 | 590.000 | 450.000 | 588.500 | 475.000 |
| GR | 588.400 | 500.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT BAR LAKE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 476.000 | 26.000 | 225.000 | 250.000 | 150.000 | 150.000 | 150.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 583.400 | 25.000 | 583.200 | 50.000 | 583.400 | 75.000 | 583.600 | 100.000 |
| GR | 583.700 | 125.000 | 583.400 | 150.000 | 583.400 | 175.000 | 583.500 | 200.000 | 584.100 | 225.000 |
| GR | 583.200 | 228.000 | 582.800 | 230.000 | 582.400 | 235.000 | 582.400 | 240.000 | 583.200 | 245.000 |
| GR | 584.600 | 250.000 | 587.700 | 275.000 | 590.200 | 300.000 | 591.900 | 325.000 | 589.800 | 350.000 |
| GR | 590.100 | 375.000 | 589.700 | 400.000 | 593.600 | 425.000 | 590.000 | 450.000 | 588.500 | 475.000 |
| GR | 588.400 | 500.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| EJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 1

CCHV=    0.100 CEHV=    0.300
*SECNO 0.000
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.00    582.70      0.00    580.14    582.75      0.05      0.00      0.00    583.30
      10.        0.       10.        0.        0.        5.        0.        0.        0.    586.90
     0.00      0.00      1.83      0.00     0.000     0.035     0.000     0.000    581.70    229.00
 0.003710        0.        0.        0.         0         0         0      0.00      8.55    237.55

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      1.06    582.91      0.00      0.00    582.95      0.04      0.20      0.00    583.95
      10.        0.       10.        0.        0.        6.        0.        0.        0.    587.05
     0.01      0.00      1.66      0.00     0.000     0.035     0.000     0.000    581.85    228.67
 0.002973       60.       60.       60.         1         0         0      0.00      9.37    238.05

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   108.00      1.12    583.05      0.00      0.00    583.08      0.04      0.13      0.00100000.00
      10.        0.       10.        0.        0.        7.        0.        0.        0.  100000.00
     0.02      0.00      1.52      0.00     0.000     0.035     0.000     0.000    581.92    228.40
 0.002449       48.       48.       48.         2         0         0      0.00     10.08    238.48

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=        9.000
   114.00      1.09    583.05      0.00      0.00    583.09      0.04      0.01      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.02      0.00      1.60      0.00     0.000     0.020     0.000     0.000    581.96    228.50
 0.000782        6.        6.        6.         1         0         0      0.00      8.50    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
   120.00      1.06    583.05      0.00      0.00    583.10      0.05      0.00      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.02      0.00      1.78      0.00     0.000     0.020     0.000     0.000    581.99    230.00
 0.000780        6.        6.        6.         0         0         0      0.00      6.00    236.00
```

```
   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 121.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
   121.00      1.05    583.05      0.00      0.00    583.10      0.05      0.00      0.00100000.00
      10.        0.       10.        0.        0.        5.        0.        0.        0.  100000.00
     0.02      0.00      1.83      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000861        1.        1.        1.         0         0         0     -0.04      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   135.00      1.06    583.06      0.00      0.00    583.12      0.05      0.01      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.02      0.00      1.81      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000835       14.       14.       14.         0         0         0     -0.04      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   148.00      1.08    583.08      0.00      0.00    583.13      0.05      0.01      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.78      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000804       13.       13.       13.         0         0         0     -0.04      6.00    236.00

*SECNO 175.000

3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
```

```
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00      1.10    583.10      0.00      0.00    583.15      0.05      0.02      0.00100000.00
      10.        0.        10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.74      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000751       27.       27.       27.         0         0         0     -0.05      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00      1.10    583.10      0.00      0.00    583.15      0.05      0.00      0.00100000.00
      10.        0.        10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.72      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000710        1.        1.        1.         0         0         0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   179.00      1.12    583.12      0.00      0.00    583.16      0.04      0.00      0.00100000.00
      10.        0.        10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.54      0.00     0.000     0.035     0.000     0.000    582.00    228.44
 0.002534        3.        3.        3.         1         0         0      0.00      9.96    238.40

CCHV=    0.100 CEHV=    0.300
*SECNO 326.000

3265 DIVIDED FLOW

   326.00      0.93    583.33      0.00      0.00    583.34      0.01      0.18      0.00    584.10
      10.        0.        10.        0.        2.        12.        0.        0.        0.    584.60
     0.08      0.09      0.85      0.00     0.070     0.035     0.000     0.000    582.40     34.23
 0.000716      147.      147.      147.         2         0         0      0.00     49.40    245.45

*SECNO 476.000

3265 DIVIDED FLOW

        CROSS SECTION AT BAR LAKE
   476.00      1.01    583.41      0.00      0.00    583.42      0.01      0.08      0.00    584.10
      10.        1.         9.        0.        6.        13.        0.        0.        0.    584.60
     0.14      0.10      0.71      0.00     0.070     0.035     0.000     0.000    582.40     24.91
 0.000450      150.      150.      150.         2         0         0      0.00     99.26    245.76
```

THIS RUN EXECUTED 10 SEP 86 10:47:29

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 30 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0. | 3. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 2

CCHV=   0.100 CEHV=   0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.11    582.81    582.81    580.14    583.14      0.33      0.00      0.00    583.30
      30.        0.       30.        0.        0.        7.        0.        0.        0.    586.90
     0.00      0.00      4.60      0.00     0.000     0.035     0.000     0.000    581.70    228.43
 0.022534        0.        0.        0.         0        19         0      0.00     10.00    238.43

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      1.67    583.52      0.00      0.00    583.59      0.07      0.42      0.03    583.95
      30.        0.       30.        0.        0.       14.        0.        0.        0.    587.05
     0.01      0.00      2.15      0.00     0.000     0.035     0.000     0.000    581.85    226.42
 0.003376       60.       60.       60.         3         0         0      0.00     16.34    242.76

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   108.00      1.73    583.66      0.00      0.00    583.73      0.08      0.14      0.00100000.00
      30.        0.       30.        0.        0.       14.        0.        0.        0.  100000.00
     0.01      0.00      2.20      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.002640       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=   0.300 CEHV=   0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=        9.000
   114.00      1.70    583.65      0.00      0.00    583.76      0.10      0.01      0.01100000.00
      30.        0.       30.        0.        0.       12.        0.        0.        0.  100000.00
     0.01      0.00      2.58      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.001109        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
```

```
  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

  120.00     1.64    583.63      0.00      0.00    583.80      0.17      0.01      0.03100000.00
     30.       0.       30.        0.        0.        9.        0.        0.        0.  100000.00
    0.01      0.00     3.32      0.00     0.000     0.020     0.000     0.000    581.99    230.00
0.001767       6.        6.        6.         2         0         0      0.00      6.00    236.00

*SECNO 121.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
  121.00     1.62    583.62      0.00      0.00    583.81      0.19      0.00      0.01100000.00
     30.       0.       30.        0.        0.        9.        0.        0.        0.  100000.00
    0.02      0.00     3.50      0.00     0.000     0.020     0.000     0.000    582.00    230.00
0.002186       1.        1.        1.         0         0         0     -0.40      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
  135.00     1.66    583.66      0.00      0.00    583.84      0.19      0.03      0.00100000.00
     30.       0.       30.        0.        0.        9.        0.        0.        0.  100000.00
    0.02      0.00     3.46      0.00     0.000     0.020     0.000     0.000    582.00    230.00
0.002122      14.       14.       14.         0         0         0     -0.42      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
  148.00     1.69    583.69      0.00      0.00    583.87      0.18      0.03      0.00100000.00
     30.       0.       30.        0.        0.        9.        0.        0.        0.  100000.00
    0.02      0.00     3.39      0.00     0.000     0.020     0.000     0.000    582.00    230.00
0.002008      13.       13.       13.         0         0         0     -0.46      6.00    236.00
```

```
   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 175.000

3370 NORMAL BRIDGE,NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00     1.76   583.76     0.00      0.00   583.93     0.17      0.05      0.00100000.00
      30.       0.      30.       0.        0.      9.        0.        0.        0.  100000.00
     0.02     0.00     3.26     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.001813      27.      27.      27.         1        0        0     -0.54      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00     1.80   583.80     0.00      0.00   583.94     0.14      0.00      0.01100000.00
      30.       0.      30.       0.        0.     10.        0.        0.        0.  100000.00
     0.02     0.00     3.01     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.001334       1.       1.       1.         2        0        0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=      12.000
   179.00     1.91   583.91     0.00      0.00   583.97     0.06      0.00      0.03100000.00
      30.       0.      30.       0.        0.     16.        0.        0.        0.  100000.00
     0.02     0.00     1.90     0.00     0.000    0.035    0.000     0.000    582.00    227.00
 0.001669       3.       3.       3.         2        0        0      0.00     12.00    239.00

CCHV=   0.100 CEHV=   0.300
*SECNO 326.000

3265 DIVIDED FLOW

   326.00     1.61   584.01     0.00      0.00   584.02     0.00      0.05      0.01    584.10
      30.      17.      13.       0.       106.     26.        0.        0.        0.    584.60
     0.15     0.16     0.51     0.00     0.070    0.035    0.000     0.000    582.40     20.35
 0.000125      147.     147.     147.         2        0        0      0.00    223.66    247.91
```

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

*SECNO 476.000

3265 DIVIDED FLOW

CROSS SECTION AT BAR LAKE

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 476.00 | 1.63 | 584.03 | 0.00 | 0.00 | 584.03 | 0.00 | 0.02 | 0.00 | 584.10 |
| 30. | 17. | 13. | 0. | 109. | 26. | 0. | 1. | 1. | 584.60 |
| 0.29 | 0.16 | 0.49 | 0.00 | 0.070 | 0.035 | 0.000 | 0.000 | 582.40 | 20.21 |
| 0.000114 | 150. | 150. | 150. | 2 | 0 | 0 | 0.00 | 224.75 | 247.97 |

THIS RUN EXECUTED 10 SEP 86 10:47:30

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 50 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0. | 4. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 3

CCHV=    0.100 CEHV=    0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.43    583.13    583.13    580.14    583.49      0.36      0.00      0.00    583.30
      50.        0.       50.        0.        0.       10.        0.        0.        0.    586.90
     0.00      0.00      4.81      0.00     0.000     0.035     0.000     0.000    581.70    226.26
 0.021434        0.        0.        0.         0        22         0      0.00     14.62    240.88

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      2.01    583.86      0.00      0.00    583.96      0.10      0.44      0.03    583.95
      50.        0.       50.        0.        0.       20.        0.        0.        0.    587.05
     0.01      0.00      2.50      0.00     0.000     0.035     0.000     0.000    581.85    225.30
 0.003642       60.       60.       60.         3         0         0      0.00     20.05    245.35

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   108.00      2.08    584.01      0.00      0.00    584.13      0.12      0.17      0.01100000.00
      50.        0.       50.        0.        0.       18.        0.        0.        0.  100000.00
     0.01      0.00      2.82      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.003258       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=        9.000
   114.00      2.03    583.99      0.00      0.00    584.17      0.18      0.01      0.03100000.00
      50.        0.       50.        0.        0.       15.        0.        0.        0.  100000.00
     0.01      0.00      3.42      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.001546        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
```

```
   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

   120.00      1.94    583.93      0.00      0.00    584.26      0.33      0.01      0.07100000.00
      50.        0.       50.        0.        0.       11.        0.        0.        0.  100000.00
     0.01      0.00      4.62      0.00     0.000     0.020     0.000     0.000    581.99    230.00
 0.002951        6.        6.        6.         2         0         0      0.00      6.00    236.00

*SECNO 121.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
   121.00      1.90    583.90      0.00      0.00    584.29      0.40      0.00      0.03100000.00
      50.        0.       50.        0.        0.       10.        0.        0.        0.  100000.00
     0.01      0.00      5.06      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.004171        1.        1.        1.         2         0         0     -0.71      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   135.00      2.00    584.00      0.00      0.00    584.36      0.36      0.05      0.01100000.00
      50.        0.       50.        0.        0.       10.        0.        0.        0.  100000.00
     0.01      0.00      4.83      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.003692       14.       14.       14.         2         0         0     -0.84      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   148.00      2.07    584.07      0.00      0.00    584.41      0.34      0.05      0.01100000.00
      50.        0.       50.        0.        0.       11.        0.        0.        0.  100000.00
     0.01      0.00      4.68      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.003396       13.       13.       13.         2         0         0     -0.95      6.00    236.00
```

```
  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 175.000

3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00     2.20   584.20     0.00      0.00   584.51     0.31      0.09      0.01100000.00
     50.        0.      50.       0.        0.      11.       0.        0.        0.  100000.00
     0.02     0.00     4.44     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.002974      27.      27.      27.         2        0        0     -1.16      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00     2.31   584.31     0.00      0.00   584.53     0.23      0.00      0.02100000.00
     50.        0.      50.       0.        0.      13.       0.        0.        0.  100000.00
     0.02     0.00     3.83     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.001761       1.       1.       1.         2        0        0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=      12.000
   179.00     2.51   584.51     0.00      0.00   584.59     0.07      0.00      0.05100000.00
     50.        0.      50.       0.        0.      23.       0.        0.        0.  100000.00
     0.02     0.00     2.17     0.00     0.000    0.035    0.000     0.000    582.00    227.00
 0.001474       3.       3.       3.         2        0        0      0.00     12.00    239.00

CCHV=   0.100 CEHV=   0.300
*SECNO 326.000
   326.00     2.21   584.61     0.00      0.00   584.61     0.00      0.02      0.01    584.10
     50.       35.      15.       0.       229.      40.       0.        1.        0.    584.60
     0.20     0.15     0.38     0.00     0.070    0.035    0.000     0.000    582.40     15.83
 0.000044      147.     147.     147.         2        0        0      0.00    234.26    250.09

*SECNO 476.000
        CROSS SECTION AT BAR LAKE
   476.00     2.22   584.62     0.00      0.00   584.62     0.00      0.01      0.00    584.10
     50.       35.      15.       0.       230.      40.       0.        1.        1.    584.60
     0.39     0.15     0.38     0.00     0.070    0.035    0.000     0.000    582.40     15.77
 0.000043      150.     150.     150.         2        0        0      0.00    234.37    250.14
```

THIS RUN EXECUTED 10 SEP 86 10:47:31

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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
*****************************************************
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T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 75 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 5. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 4.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         GLOB      GCH       GROB      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=    0.100 CEHV=    0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.68    583.38    583.38    580.14    583.80      0.41      0.00      0.00    583.30
      75.        0.       75.        0.        0.       15.        0.        0.        0.    586.90
     0.00      0.03      5.17      0.00     0.070     0.035     0.000     0.000    581.70    224.83
 0.020477        0.        0.        0.         0        14         0      0.00     17.99    242.82

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      2.30    584.15      0.00      0.00    584.28      0.13      0.45      0.03    583.95
      75.        0.       75.        0.        0.       26.        0.        0.        0.    587.05
     0.01      0.01      2.85      0.00     0.070     0.035     0.000     0.000    581.85    224.51
 0.003874       60.       60.       60.         3         0         0      0.00     23.09    247.61

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=        12.000
   108.00      2.37    584.30      0.00      0.00    584.49      0.19      0.19      0.02100000.00
      75.        0.       75.        0.        0.       21.        0.        0.        0.  100000.00
     0.01      0.00      3.51      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.004172       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=         9.000
   114.00      2.30    584.26      0.00      0.00    584.56      0.30      0.02      0.05100000.00
      75.        0.       75.        0.        0.       17.        0.        0.        0.  100000.00
     0.01      0.00      4.39      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.002205        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=         6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
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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

  120.00      2.14     584.13       0.00       0.00     584.73      0.60       0.02       0.15100000.00
     75.        0.        75.        0.         0.        12.        0.         0.          0.  100000.00
    0.01       0.00      6.22       0.00      0.000      0.020     0.000      0.000     581.99    230.00
0.004922        6.        6.         6.         2          0         0        0.00       6.00    236.00

*SECNO 121.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
  121.00      2.05     584.05       0.00       0.00     584.83      0.78       0.01       0.09100000.00
     75.        0.        75.        0.         0.        11.        0.         0.          0.  100000.00
    0.01       0.00      7.10       0.00      0.000      0.020     0.000      0.000     582.00    230.00
0.007868        1.        1.         1.         2          0         0       -0.91       6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
  135.00      2.35     584.35       0.00       0.00     584.97      0.62       0.09       0.05100000.00
     75.        0.        75.        0.         0.        12.        0.         0.          0.  100000.00
    0.01       0.00      6.31       0.00      0.000      0.020     0.000      0.000     582.00    230.00
0.005855       14.       14.        14.         3          0         0       -1.41       6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
  148.00      2.50     584.50       0.00       0.00     585.06      0.56       0.07       0.02100000.00
     75.        0.        75.        0.         0.        13.        0.         0.          0.  100000.00
    0.01       0.00      5.99       0.00      0.000      0.020     0.000      0.000     582.00    230.00
0.005154       13.       13.        13.         2          0         0       -1.71       6.00    236.00
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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 175.000

3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00     2.72   584.72     0.00      0.00   585.21     0.49      0.13      0.02100000.00
      75.       0.      75.       0.        0.     13.       0.        0.        0.  100000.00
     0.01     0.00     5.63     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.004530      27.      27.      27.         2        0        0     -2.19      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00     2.97   584.97     0.00      0.00   585.27     0.30      0.00      0.06100000.00
      75.       0.      75.       0.        0.     17.       0.        0.        0.  100000.00
     0.01     0.00     4.39     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.001924       1.       1.       1.         2        0        0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=      12.000
   179.00     3.26   585.26     0.00      0.00   585.34     0.09      0.00      0.06100000.00
      75.       0.      75.       0.        0.     32.       0.        0.        0.  100000.00
     0.01     0.00     2.35     0.00     0.000    0.035    0.000     0.000    582.00    227.00
 0.001265       3.       3.       3.         2        0        0      0.00     12.00    239.00

CCHV=    0.100 CEHV=    0.300
*SECNO 326.000
   326.00     2.96   585.36     0.00      0.00   585.36     0.00      0.01      0.01    584.10
      75.      55.      19.       0.      387.     58.       2.        1.        0.     584.60
     0.23     0.14     0.33     0.05     0.070    0.035    0.070     0.000    582.40     10.17
 0.000020     147.     147.     147.         2        0        0      0.00    245.94    256.11

*SECNO 476.000
        CROSS SECTION AT BAR LAKE
   476.00     2.96   585.36     0.00      0.00   585.36     0.00      0.00      0.00    584.10
      75.      55.      19.       0.      388.     59.       2.        2.        1.     584.60
     0.44     0.14     0.33     0.05     0.070    0.035    0.070     0.000    582.40     10.14
 0.000020     150.     150.     150.         2        0        0      0.00    245.99    256.14
```

THIS RUN EXECUTED 10 SEP 86 10:47:32

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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
*****************************************************
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T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 100 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0. | 6. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 15.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 5

CCHV=    0.100 CEHV=    0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.88    583.58    583.58    580.14    584.05      0.47      0.00      0.00    583.30
     100.        0.      100.        0.        0.       18.        0.        0.        0.    586.90
     0.00      0.03      5.52      0.00     0.070     0.035     0.000     0.000    581.70    224.43
 0.019332        0.        0.        0.         0        17         0      0.00     19.88    244.31

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      2.53    584.38      0.00      0.00    584.54      0.15      0.46      0.03    583.95
     100.        0.      100.        0.        0.       32.        0.        0.        0.    587.05
     0.01      0.46      3.14      0.00     0.070     0.035     0.000     0.000    581.85    223.95
 0.004040       60.       60.       60.         3         0         0      0.00     25.46    249.41

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=        12.000
   108.00      2.60    584.52      0.00      0.00    584.79      0.27      0.22      0.03100000.00
     100.        0.      100.        0.        0.       24.        0.        0.        0.  100000.00
     0.01      0.00      4.15      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.005167       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=         9.000
   114.00      2.50    584.46      0.00      0.00    584.90      0.44      0.02      0.08100000.00
     100.        0.      100.        0.        0.       19.        0.        0.        0.  100000.00
     0.01      0.00      5.30      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.002929        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3301 HV CHANGED MORE THAN HVINS
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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


3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
   120.00      2.22    584.21    584.17      0.00    585.20      0.99      0.03      0.28100000.00
     100.        0.      100.        0.        0.       13.        0.        0.        0.  100000.00
     0.01      0.00      7.97      0.00     0.000     0.020     0.000     0.000    581.99    230.00
 0.007840        6.        6.        6.         6        11         0      0.00      6.00    236.00

*SECNO 121.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
   121.00      2.16    584.16    584.16      0.00    585.43      1.27      0.01      0.14100000.00
     100.        0.      100.        0.        0.       11.        0.        0.        0.  100000.00
     0.01      0.00      9.03      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.012417        1.        1.        1:         3        12         0     -1.09      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
   135.00      2.90    584.90      0.00      0.00    585.70      0.80      0.13      0.14100000.00
     100.        0.      100.        0.        0.       14.        0.        0.        0.  100000.00
     0.01      0.00      7.18      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.007412       14.       14.       14.         5         0         0     -2.68      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
   148.00      3.06    585.06      0.00      0.00    585.81      0.75      0.09      0.02100000.00
     100.        0.      100.        0.        0.       14.        0.        0.        0.  100000.00
     0.01      0.00      6.95      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.007008       13.       13.       13.         2         0         0     -3.16      6.00    236.00
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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       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 175.000

3370 NORMAL BRIDGE,NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=      6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00     3.32   585.32      0.00      0.00   586.01      0.69      0.18      0.02100000.00
     100.       0.     100.        0.        0.      15.        0.        0.        0.  100000.00
     0.01     0.00     6.65      0.00     0.000    0.020     0.000     0.000    582.00    230.00
 0.006570      27.      27.       27.         2        0         0     -4.10      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=      6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00     3.80   585.80      0.00      0.00   586.12      0.32      0.00      0.11100000.00
     100.       0.     100.        0.        0.      22.        0.        0.        0.  100000.00
     0.01     0.00     4.54      0.00     0.000    0.020     0.000     0.000    582.00    230.00
 0.001772       1.       1.        1.         3        0         0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=     12.000
   179.00     4.11   586.11      0.00      0.00   586.20      0.09      0.00      0.07100000.00
     100.       0.     100.        0.        0.      42.        0.        0.        0.  100000.00
     0.01     0.00     2.37      0.00     0.000    0.035     0.000     0.000    582.00    227.00
 0.001016       3.       3.        3.         2        0         0      0.00     12.00    239.00

CCHV=   0.100 CEHV=   0.300
*SECNO 326.000
   326.00     3.81   586.21      0.00      0.00   586.21      0.00      0.01      0.01    584.10
     100.      76.      24.        1.      573.      80.       10.        1.        1.    584.60
     0.25     0.13     0.30      0.06     0.070    0.035     0.070     0.000    582.40      3.71
 0.000011     147.     147.      147.         2        0         0      0.00    259.27    262.98

*SECNO 476.000
        CROSS SECTION AT BAR LAKE
   476.00     3.81   586.21      0.00      0.00   586.21      0.00      0.00      0.00    584.10
     100.      76.      24.        1.      573.      80.       10.        4.        1.    584.60
     0.50     0.13     0.30      0.06     0.070    0.035     0.070     0.000    582.40      3.70
 0.000011     150.     150.      150.         2        0         0      0.00    259.29    263.00
```

THIS RUN EXECUTED 10 SEP 86 10:47:34

```
*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
```

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

BACKWATER PROFILES - 10

SUMMARY PRINTOUT TABLE 150

| | SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 10.00 | 582.70 | 0.00 | 582.75 | 37.10 | 1.83 | 5.45 | 1.64 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 30.00 | 582.81 | 582.81 | 583.14 | 225.34 | 4.60 | 6.52 | 2.00 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 50.00 | 583.13 | 583.13 | 583.49 | 214.34 | 4.81 | 10.40 | 3.42 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 75.00 | 583.38 | 583.38 | 583.80 | 204.77 | 5.17 | 14.52 | 5.24 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 100.00 | 583.58 | 583.58 | 584.05 | 193.32 | 5.52 | 18.19 | 7.19 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 10.00 | 582.91 | 0.00 | 582.95 | 29.73 | 1.66 | 6.04 | 1.83 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 30.00 | 583.52 | 0.00 | 583.59 | 33.76 | 2.15 | 13.93 | 5.16 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 50.00 | 583.86 | 0.00 | 583.96 | 36.42 | 2.50 | 20.04 | 8.29 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 75.00 | 584.15 | 0.00 | 584.28 | 38.74 | 2.85 | 26.34 | 12.05 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 100.00 | 584.38 | 0.00 | 584.54 | 40.40 | 3.14 | 31.99 | 15.73 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 10.00 | 583.05 | 0.00 | 583.08 | 24.49 | 1.52 | 6.58 | 2.02 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 30.00 | 583.66 | 0.00 | 583.73 | 26.40 | 2.20 | 13.63 | 5.84 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 50.00 | 584.01 | 0.00 | 584.13 | 32.58 | 2.82 | 17.73 | 8.76 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 75.00 | 584.30 | 0.00 | 584.49 | 41.72 | 3.51 | 21.35 | 11.61 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 100.00 | 584.52 | 0.00 | 584.79 | 51.67 | 4.15 | 24.09 | 13.91 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 10.00 | 583.05 | 0.00 | 583.09 | 7.82 | 1.60 | 6.26 | 3.58 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 30.00 | 583.65 | 0.00 | 583.76 | 11.09 | 2.58 | 11.61 | 9.01 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 50.00 | 583.99 | 0.00 | 584.17 | 15.46 | 3.42 | 14.62 | 12.71 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 75.00 | 584.26 | 0.00 | 584.56 | 22.05 | 4.39 | 17.08 | 15.97 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 100.00 | 584.46 | 0.00 | 584.90 | 29.29 | 5.30 | 18.88 | 18.48 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 10.00 | 583.05 | 0.00 | 583.10 | 7.80 | 1.78 | 5.63 | 3.58 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 30.00 | 583.63 | 0.00 | 583.80 | 17.67 | 3.32 | 9.03 | 7.14 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 50.00 | 583.93 | 0.00 | 584.26 | 29.51 | 4.62 | 10.82 | 9.20 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 75.00 | 584.13 | 0.00 | 584.73 | 49.22 | 6.22 | 12.05 | 10.69 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 100.00 | 584.21 | 584.17 | 585.20 | 78.40 | 7.97 | 12.55 | 11.29 |

| | SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.05 | 0.00 | 583.10 | 8.61 | 1.83 | 5.48 | 3.41 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.62 | 0.00 | 583.81 | 21.86 | 3.50 | 8.58 | 6.42 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 50.00 | 583.90 | 0.00 | 584.29 | 41.71 | 5.06 | 9.87 | 7.74 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.05 | 0.00 | 584.83 | 78.68 | 7.10 | 10.57 | 8.46 |
| * | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 100.00 | 584.16 | 584.16 | 585.43 | 124.17 | 9.03 | 11.07 | 8.97 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.06 | 0.00 | 583.12 | 8.35 | 1.81 | 5.53 | 3.46 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.66 | 0.00 | 583.84 | 21.22 | 3.46 | 8.67 | 6.51 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.00 | 0.00 | 584.36 | 36.92 | 4.83 | 10.35 | 8.23 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.35 | 0.00 | 584.97 | 58.55 | 6.31 | 11.88 | 9.80 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 100.00 | 584.90 | 0.00 | 585.70 | 74.12 | 7.18 | 13.92 | 11.62 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.08 | 0.00 | 583.13 | 8.04 | 1.78 | 5.61 | 3.53 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.69 | 0.00 | 583.87 | 20.08 | 3.39 | 8.85 | 6.69 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.07 | 0.00 | 584.41 | 33.96 | 4.68 | 10.69 | 8.58 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.50 | 0.00 | 585.06 | 51.54 | 5.99 | 12.52 | 10.45 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 100.00 | 585.06 | 0.00 | 585.81 | 70.08 | 6.95 | 14.38 | 11.95 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.10 | 0.00 | 583.15 | 7.51 | 1.74 | 5.74 | 3.65 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.76 | 0.00 | 583.93 | 18.13 | 3.26 | 9.19 | 7.05 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.20 | 0.00 | 584.51 | 29.74 | 4.44 | 11.26 | 9.17 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.72 | 0.00 | 585.21 | 45.30 | 5.63 | 13.33 | 11.14 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 100.00 | 585.32 | 0.00 | 586.01 | 65.70 | 6.65 | 15.04 | 12.34 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 10.00 | 583.10 | 0.00 | 583.15 | 7.10 | 1.72 | 5.81 | 3.75 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 30.00 | 583.80 | 0.00 | 583.94 | 13.34 | 3.01 | 9.98 | 8.21 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.31 | 0.00 | 584.53 | 17.61 | 3.83 | 13.05 | 11.91 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 75.00 | 584.97 | 0.00 | 585.27 | 19.24 | 4.39 | 17.08 | 17.10 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 100.00 | 585.80 | 0.00 | 586.12 | 17.72 | 4.54 | 22.00 | 23.75 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 10.00 | 583.12 | 0.00 | 583.16 | 25.34 | 1.54 | 6.48 | 1.99 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 30.00 | 583.91 | 0.00 | 583.97 | 16.69 | 1.90 | 15.80 | 7.34 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.51 | 0.00 | 584.59 | 14.74 | 2.17 | 23.05 | 13.03 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 75.00 | 585.26 | 0.00 | 585.34 | 12.65 | 2.35 | 31.96 | 21.09 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 100.00 | 586.11 | 0.00 | 586.20 | 10.16 | 2.37 | 42.20 | 31.38 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 10.00 | 583.33 | 0.00 | 583.34 | 7.16 | 0.85 | 13.59 | 3.74 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 30.00 | 584.01 | 0.00 | 584.02 | 1.25 | 0.51 | 131.05 | 26.87 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.61 | 0.00 | 584.61 | 0.44 | 0.38 | 268.80 | 75.29 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 75.00 | 585.36 | 0.00 | 585.36 | 0.20 | 0.33 | 448.13 | 166.90 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 100.00 | 586.21 | 0.00 | 586.21 | 0.11 | 0.30 | 663.36 | 307.34 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 10.00 | 583.41 | 0.00 | 583.42 | 4.50 | 0.71 | 19.14 | 4.71 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 30.00 | 584.03 | 0.00 | 584.03 | 1.14 | 0.49 | 135.38 | 28.04 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.62 | 0.00 | 584.62 | 0.43 | 0.38 | 270.44 | 76.00 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 75.00 | 585.36 | 0.00 | 585.36 | 0.20 | 0.33 | 448.90 | 167.35 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 100.00 | 586.21 | 0.00 | 586.21 | 0.11 | 0.30 | 663.78 | 307.64 |

BACKWATER PROFILES - 10

SUMMARY PRINTOUT TABLE 150

| | SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|---|
| | 0.000 | 10.00 | 582.70 | 0.00 | 0.00 | 2.56 | 8.55 | 0.00 |
| * | 0.000 | 30.00 | 582.81 | 0.11 | 0.00 | 2.67 | 10.00 | 0.00 |
| * | 0.000 | 50.00 | 583.13 | 0.32 | 0.00 | 2.99 | 14.62 | 0.00 |
| * | 0.000 | 75.00 | 583.38 | 0.25 | 0.00 | 3.24 | 17.99 | 0.00 |
| * | 0.000 | 100.00 | 583.58 | 0.19 | 0.00 | 3.44 | 19.88 | 0.00 |
| | 60.000 | 10.00 | 582.91 | 0.00 | 0.21 | 0.00 | 9.37 | 60.00 |
| | 60.000 | 30.00 | 583.52 | 0.61 | 0.70 | 0.00 | 16.34 | 60.00 |
| | 60.000 | 50.00 | 583.86 | 0.34 | 0.73 | 0.00 | 20.05 | 60.00 |
| | 60.000 | 75.00 | 584.15 | 0.29 | 0.77 | 0.00 | 23.09 | 60.00 |
| | 60.000 | 100.00 | 584.38 | 0.23 | 0.81 | 0.00 | 25.46 | 60.00 |
| | 108.000 | 10.00 | 583.05 | 0.00 | 0.14 | 0.00 | 10.08 | 48.00 |
| | 108.000 | 30.00 | 583.66 | 0.61 | 0.14 | 0.00 | 12.00 | 48.00 |
| | 108.000 | 50.00 | 584.01 | 0.35 | 0.15 | 0.00 | 12.00 | 48.00 |
| | 108.000 | 75.00 | 584.30 | 0.29 | 0.15 | 0.00 | 12.00 | 48.00 |
| | 108.000 | 100.00 | 584.52 | 0.23 | 0.14 | 0.00 | 12.00 | 48.00 |
| | 114.000 | 10.00 | 583.05 | 0.00 | 0.01 | 0.00 | 8.50 | 6.00 |
| | 114.000 | 30.00 | 583.65 | 0.60 | 0.00 | 0.00 | 9.00 | 6.00 |
| | 114.000 | 50.00 | 583.99 | 0.33 | -0.02 | 0.00 | 9.00 | 6.00 |
| | 114.000 | 75.00 | 584.26 | 0.27 | -0.04 | 0.00 | 9.00 | 6.00 |
| | 114.000 | 100.00 | 584.46 | 0.20 | -0.06 | 0.00 | 9.00 | 6.00 |
| | 120.000 | 10.00 | 583.05 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 30.00 | 583.63 | 0.58 | -0.03 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 50.00 | 583.93 | 0.30 | -0.06 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 75.00 | 584.13 | 0.20 | -0.13 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 100.00 | 584.21 | 0.08 | -0.25 | 0.00 | 6.00 | 6.00 |
| | 121.000 | 10.00 | 583.05 | 0.00 | 0.00 | 0.00 | 6.00 | 1.00 |
| | 121.000 | 30.00 | 583.62 | 0.57 | -0.01 | 0.00 | 6.00 | 1.00 |
| | 121.000 | 50.00 | 583.90 | 0.28 | -0.03 | 0.00 | 6.00 | 1.00 |
| | 121.000 | 75.00 | 584.05 | 0.15 | -0.08 | 0.00 | 6.00 | 1.00 |
| * | 121.000 | 100.00 | 584.16 | 0.11 | -0.05 | 0.00 | 6.00 | 1.00 |
| | 135.000 | 10.00 | 583.06 | 0.00 | 0.01 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 30.00 | 583.66 | 0.59 | 0.04 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 50.00 | 584.00 | 0.34 | 0.10 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 75.00 | 584.35 | 0.35 | 0.31 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 100.00 | 584.90 | 0.54 | 0.74 | 0.00 | 6.00 | 14.00 |
| | 148.000 | 10.00 | 583.08 | 0.00 | 0.01 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 30.00 | 583.69 | 0.62 | 0.04 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 50.00 | 584.07 | 0.38 | 0.08 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 75.00 | 584.50 | 0.43 | 0.15 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 100.00 | 585.06 | 0.55 | 0.16 | 0.00 | 6.00 | 13.00 |

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 175.000 | 10.00 | 583.10 | 0.00 | 0.02 | 0.00 | 6.00 | 27.00 |
| 175.000 | 30.00 | 583.76 | 0.66 | 0.07 | 0.00 | 6.00 | 27.00 |
| 175.000 | 50.00 | 584.20 | 0.44 | 0.13 | 0.00 | 6.00 | 27.00 |
| 175.000 | 75.00 | 584.72 | 0.52 | 0.22 | 0.00 | 6.00 | 27.00 |
| 175.000 | 100.00 | 585.32 | 0.60 | 0.27 | 0.00 | 6.00 | 27.00 |
| 176.000 | 10.00 | 583.10 | 0.00 | 0.00 | 0.00 | 6.00 | 1.00 |
| 176.000 | 30.00 | 583.80 | 0.69 | 0.03 | 0.00 | 6.00 | 1.00 |
| 176.000 | 50.00 | 584.31 | 0.51 | 0.10 | 0.00 | 6.00 | 1.00 |
| 176.000 | 75.00 | 584.97 | 0.67 | 0.25 | 0.00 | 6.00 | 1.00 |
| 176.000 | 100.00 | 585.80 | 0.83 | 0.48 | 0.00 | 6.00 | 1.00 |
| 179.000 | 10.00 | 583.12 | 0.00 | 0.02 | 0.00 | 9.96 | 3.00 |
| 179.000 | 30.00 | 583.91 | 0.79 | 0.11 | 0.00 | 12.00 | 3.00 |
| 179.000 | 50.00 | 584.51 | 0.60 | 0.21 | 0.00 | 12.00 | 3.00 |
| 179.000 | 75.00 | 585.26 | 0.74 | 0.28 | 0.00 | 12.00 | 3.00 |
| 179.000 | 100.00 | 586.11 | 0.85 | 0.31 | 0.00 | 12.00 | 3.00 |
| 326.000 | 10.00 | 583.33 | 0.00 | 0.21 | 0.00 | 49.40 | 147.00 |
| 326.000 | 30.00 | 584.01 | 0.69 | 0.10 | 0.00 | 223.66 | 147.00 |
| 326.000 | 50.00 | 584.61 | 0.60 | 0.10 | 0.00 | 234.26 | 147.00 |
| 326.000 | 75.00 | 585.36 | 0.75 | 0.10 | 0.00 | 245.94 | 147.00 |
| 326.000 | 100.00 | 586.21 | 0.85 | 0.10 | 0.00 | 259.27 | 147.00 |
| 476.000 | 10.00 | 583.41 | 0.00 | 0.09 | 0.00 | 99.26 | 150.00 |
| 476.000 | 30.00 | 584.03 | 0.62 | 0.02 | 0.00 | 224.75 | 150.00 |
| 476.000 | 50.00 | 584.62 | 0.58 | 0.01 | 0.00 | 234.37 | 150.00 |
| 476.000 | 75.00 | 585.36 | 0.74 | 0.00 | 0.00 | 245.99 | 150.00 |
| 476.000 | 100.00 | 586.21 | 0.85 | 0.00 | 0.00 | 259.29 | 150.00 |

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     0.000  PROFILE= 2  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.000  PROFILE= 3  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.000  PROFILE= 4  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.000  PROFILE= 5  CRITICAL DEPTH ASSUMED

CAUTION  SECNO=   121.000  PROFILE= 5  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=   121.000  PROFILE= 5  MINIMUM SPECIFIC ENERGY
```

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp.

3) WATERCOURSE: Bar Lake Outlet

4) DOCUMENT TYPE: 100year flood (50 cfs)

00BREAK00

MANISTEE TWP FIS
BAR LAKE OUTLET
100 YR DISCHARGE (50cfs)
IDP = BAR.H3

```
EEEEEE   EEEEEE        L       EEEEEE   EEEEEE
E        E             L       E        E
E        E             L       E        E
EEEE     EEEE          L       EEEE     EEEE
E        E             L       E        E
EEEEEE   EEEEEE        LLLLLL  EEEEEE   EEEEEE
```

USACOE DETROIT H800 VOS 5.1.1  PRINTER: 6

EE LEE  12 JAN 87 12:48:44

TERMINAL: 125

```
1*****************************************************
 *  WATER SURFACE PROFILES                           *
 *  VERSION OF NOVEMBER 1976                         *
 *  UPDATED MAY 1984                                 *
 *                                                   *
 *  RUN DATE  12 JAN 87 TIME   12:47:46              *
 *****************************************************
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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
*************************************
```

```
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
```

1

12 JAN 87  12:47:47  PAGE  1

THIS RUN EXECUTED 12 JAN 87  12:47:47

```
*************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*************************************************
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```
C
T1      MANISTEE TOWNSHIP - FIS
T2      BAR LAKE OUTLET OF LAKE MICHIGAN
T3      100-YEAR FLOOD, 50 CFS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       0.       0.       0.   0.000000    0.00     0.0     50.    580.140   0.000

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    -1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

NC     0.070     0.070     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
       CROSS SECTION AT MOUTH OF LAKE
X1     0.000    18.000   225.000   270.000     0.000     0.000     0.000     0.000     0.000     0.000
GR   586.400     0.000   586.300    50.000   586.200   100.000   586.400   150.000   586.600   200.000
GR   586.700   218.000   583.300   225.000   582.900   228.000   582.500   230.000   581.700   231.000
GR   581.700   235.000   582.500   236.000   586.900   270.000   587.500   300.000   588.100   350.000
GR   588.300   400.000   588.300   450.000   588.500   500.000     0.000     0.000     0.000     0.000

       CROSS SECTION DOWNSTREAM OF BRIDGE
X1    60.000    19.000   225.000   270.000    60.000    60.000    60.000     0.000    -0.150     0.000
GR   586.700     0.000   586.600    50.000   586.500   100.000   586.700   150.000   586.900   200.000
GR   587.000   218.000   584.100   225.000   583.200   228.000   582.800   230.000   582.000   231.000
GR   582.000   233.000   582.000   235.000   582.800   236.000   587.200   270.000   587.800   300.000
GR   588.400   350.000   588.600   400.000   588.600   450.000   588.800   500.000     0.000     0.000
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X1     108.000      0.000      0.000      0.000     48.000     48.000     48.000      0.000      0.075      0.000
X3       0.000      0.000      0.000    227.000      0.000    239.000      0.000      0.000      0.000      0.000

NC       0.000      0.000      0.020      0.300      0.500      0.000      0.000      0.000      0.000      0.000
X1     114.000      0.000      0.000      0.000      6.000      6.000      6.000      0.000      0.032      0.000
X3       0.000      0.000      0.000    228.000      0.000    237.000      0.000      0.000      0.000      0.000

         CROSS SECTION DOWNSTREAM OF BRIDGE
X1     120.000      0.000      0.000      0.000      6.000      6.000      6.000      0.000      0.032      0.000
X3       0.000      0.000      0.000    230.000      0.000    236.000      0.000      0.000      0.000      0.000

         DOWNSTREAM FACE OF HWY 110 BRIDGE
X1     121.000     19.000    225.000    270.000      1.000      1.000      1.000      0.000      0.000      0.000
X3       0.000      0.000      0.000    230.000      0.000    236.000      0.000      0.000      0.000      0.000
BT     -17.000      0.000    586.700      0.000     50.000    586.600      0.000    100.000    586.500      0.000
BT       0.000    150.000    586.700      0.000    200.000    586.900      0.000    218.000    587.000      0.000
BT       0.000    230.000    586.900    582.800    231.000    587.000    584.500    233.000    587.000    586.300
1
 12 JAN 87     12:47:47                                                                                    PAGE     2

BT       0.000    235.000    587.100    584.500    236.000    587.100    582.800    270.000    587.200      0.000
BT       0.000    300.000    587.800      0.000    350.000    588.400      0.000    400.000    588.600      0.000
BT       0.000    450.000    588.600      0.000    500.000    588.800      0.000      0.000      0.000      0.000
GR     586.700      0.000    586.600     50.000    586.500    100.000    586.700    150.000    586.900    200.000
GR     587.000    218.000    584.100    225.000    583.200    228.000    582.800    230.000    582.000    231.000
GR     582.000    233.000    582.000    235.000    582.800    236.000    587.200    270.000    587.800    300.000
GR     588.400    350.000    588.600    400.000    588.600    450.000    588.800    500.000      0.000      0.000

X1     135.000      0.000      0.000      0.000     14.000     14.000     14.000      0.000      0.000      0.000
X2       0.000      0.000      0.000      0.000      0.000      0.000      1.000      0.000      0.000      0.000
X3       0.000      0.000      0.000    230.000      0.000    236.000      0.000      0.000      0.000      0.000

X1     148.000      0.000      0.000      0.000     13.000     13.000     13.000      0.000      0.000      0.000
X2       0.000      0.000      0.000      0.000      0.000      0.000      1.000      0.000      0.000      0.000
X3       0.000      0.000      0.000    230.000      0.000    236.000      0.000      0.000      0.000      0.000

         UPSTREAM FACE OF HWY 110 BRIDGE
X1     175.000     22.000    225.000    270.000     27.000     27.000     27.000      0.000      0.000      0.000
X3       0.000      0.000      0.000    230.000      0.000    236.000      0.000      0.000      0.000      0.000
BT     -16.000      0.000    586.700      0.000     50.000    586.600      0.000    100.000    586.500      0.000
BT       0.000    150.000    586.700      0.000    200.000    586.900      0.000    230.000    586.900    582.800
BT       0.000    231.000    587.000    584.500    233.000    587.000    586.300    235.000    587.100    584.500
BT       0.000    236.000    587.100    582.800    270.000    587.200      0.000    300.000    587.800      0.000
BT       0.000    350.000    588.400      0.000    400.000    588.600      0.000    450.000    588.600      0.000
BT       0.000    500.000    588.800      0.000      0.000      0.000      0.000      0.000      0.000      0.000
GR     586.700      0.000    583.400     25.000    583.200     50.000    583.400     75.000    583.600    100.000
GR     583.700    125.000    583.400    150.000    583.400    175.000    583.500    200.000    584.100    225.000
GR     583.200    228.000    582.800    230.000    582.000    231.000    582.000    233.000    582.000    235.000
GR     582.800    236.000    587.200    270.000    587.800    300.000    588.400    350.000    588.600    400.000
GR     588.600    450.000    588.800    500.000      0.000      0.000      0.000      0.000      0.000      0.000

         CROSS SECTION UPSTREAM OF BRIDGE
X1     176.000      0.000      0.000      0.000      1.000      1.000      1.000      0.000      0.000      0.000
X3       0.000      0.000      0.000    230.000      0.000    236.000      0.000      0.000      0.000      0.000

NC       0.000      0.000      0.035      0.000      0.000      0.000      0.000      0.000      0.000      0.000
X1     179.000      0.000      0.000      0.000      3.000      3.000      3.000      0.000      0.000      0.000
X3       0.000      0.000      0.000    227.000      0.000    239.000      0.000      0.000      0.000      0.000

NC       0.000      0.000      0.000      0.100      0.300      0.000      0.000      0.000      0.000      0.000
         CROSS SECTION A
X1     326.000     26.000    225.000    250.000    147.000    147.000    147.000      0.000      0.000      0.000
GR     586.700      0.000    583.400     25.000    583.200     50.000    583.400     75.000    583.600    100.000
GR     583.700    125.000    583.400    150.000    583.400    175.000    583.500    200.000    584.100    225.000
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GR     583.200     228.000     582.800     230.000     582.400     235.000     582.400     240.000     583.200     245.000
GR     584.600     250.000     587.700     275.000     590.200     300.000     591.900     325.000     589.800     350.000
GR     590.100     375.000     589.700     400.000     593.600     425.000     590.000     450.000     588.500     475.000
GR     588.400     500.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000
1
  12 JAN 87     12:47:47                                                                                          PAGE     3


          CROSS SECTION AT BAR LAKE
X1     476.000      26.000     225.000     250.000     150.000     150.000     150.000       0.000       0.000       0.000
GR     586.700       0.000     583.400      25.000     583.200      50.000     583.400      75.000     583.600     100.000
GR     583.700     125.000     583.400     150.000     583.400     175.000     583.500     200.000     584.100     225.000
GR     583.200     228.000     582.800     230.000     582.400     235.000     582.400     240.000     583.200     245.000
GR     584.600     250.000     587.700     275.000     590.200     300.000     591.900     325.000     589.800     350.000
GR     590.100     375.000     589.700     400.000     593.600     425.000     590.000     450.000     588.500     475.000
GR     588.400     500.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000
EJ       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000
1
  12 JAN 87     12:47:47                                                                                          PAGE     4


    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=    0.100 CEHV=    0.300
 *SECNO 0.000
 3720 CRITICAL DEPTH ASSUMED
          CROSS SECTION AT MOUTH OF LAKE
      0.00      1.43    583.13    583.13    580.14    583.49      0.36      0.00      0.00    583.30
       50.        0.       50.        0.        0.       10.        0.        0.        0.    586.90
      0.00      0.00      4.81      0.00     0.000     0.035     0.000     0.000    581.70    226.26
  0.021434        0.        0.        0.         0        22         0      0.00     14.62    240.88
0
 *SECNO 60.000
          CROSS SECTION DOWNSTREAM OF BRIDGE
     60.00      2.01    583.86      0.00      0.00    583.96      0.10      0.44      0.03    583.95
       50.        0.       50.        0.        0.       20.        0.        0.        0.    587.05
      0.01      0.00      2.50      0.00     0.000     0.035     0.000     0.000    581.85    225.30
  0.003642       60.       60.       60.         3         0         0      0.00     20.06    245.35
0
 *SECNO 108.000

 3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=        12.000
    108.00      2.08    584.01      0.00      0.00    584.13      0.12      0.17      0.01100000.00
       50.        0.       50.        0.        0.       18.        0.        0.        0.  100000.00
      0.01      0.00      2.82      0.00     0.000     0.035     0.000     0.000    581.92    227.00
  0.003258       48.       48.       48.         2         0         0      0.00     12.00    239.00
0
 CCHV=    0.300 CEHV=    0.500
 *SECNO 114.000

 3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=         9.000
    114.00      2.03    583.99      0.00      0.00    584.17      0.18      0.01      0.03100000.00
       50.        0.       50.        0.        0.       15.        0.        0.        0.  100000.00
      0.01      0.00      3.42      0.00     0.000     0.020     0.000     0.000    581.96    228.00
  0.001546        6.        6.        6.         2         0         0      0.00      9.00    237.00
0
 *SECNO 120.000

 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=         6.000
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        CROSS SECTION DOWNSTREAM OF BRIDGE
1
  12 JAN 87     12:47:47                                                                                                PAGE     5

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS    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

    120.00     1.94    583.93      0.00      0.00    584.26      0.33      0.01      0.07100000.00
       50.       0.       50.       0.        0.       11.        0.        0.        0.  100000.00
      0.01      0.00     4.62      0.00     0.000     0.020     0.000     0.000    581.99    230.00
  0.002951       6.        6.        6.         2         0         0      0.00      6.00    236.00
0
 *SECNO 121.000

 3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
    121.00     1.90    583.90      0.00      0.00    584.29      0.40      0.00      0.03100000.00
       50.       0.       50.       0.        0.       10.        0.        0.        0.  100000.00
      0.01      0.00     5.06      0.00     0.000     0.020     0.000     0.000    582.00    230.00
  0.004171       1.        1.        1.         2         0         0     -0.71      6.00    236.00
0
 *SECNO 135.000

 3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
    135.00     2.00    584.00      0.00      0.00    584.36      0.36      0.05      0.01100000.00
       50.       0.       50.       0.        0.       10.        0.        0.        0.  100000.00
      0.01      0.00     4.83      0.00     0.000     0.020     0.000     0.000    582.00    230.00
  0.003693      14.       14.       14.         2         0         0     -0.84      6.00    236.00
0
 *SECNO 148.000

 3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
    148.00     2.07    584.07      0.00      0.00    584.41      0.34      0.05      0.01100000.00
       50.       0.       50.       0.        0.       11.        0.        0.        0.  100000.00
      0.01      0.00     4.68      0.00     0.000     0.020     0.000     0.000    582.00    230.00
  0.003396      13.       13.       13.         2         0         0     -0.95      6.00    236.00
0
1
  12 JAN 87     12:47:47                                                                                                PAGE     6

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS    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 175.000

 3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
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        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00      2.20    584.20      0.00      0.00    584.51      0.31      0.09      0.01100000.00
     50.        0.       50.        0.        0.       11.        0.        0.        0.  100000.00
    0.02       0.00      4.44      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.002974       27.       27.       27.         2         0         0     -1.16      6.00    236.00
0
 *SECNO 176.000

 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00      2.31    584.31      0.00      0.00    584.53      0.23      0.00      0.02100000.00
     50.        0.       50.        0.        0.       13.        0.        0.        0.  100000.00
    0.02       0.00      3.83      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.001761        1.        1.        1.         2         0         0      0.00      6.00    236.00
0
 *SECNO 179.000

 3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   179.00      2.51    584.51      0.00      0.00    584.59      0.07      0.00      0.05100000.00
     50.        0.       50.        0.        0.       23.        0.        0.        0.  100000.00
    0.02       0.00      2.17      0.00     0.000     0.035     0.000     0.000    582.00    227.00
 0.001474        3.        3.        3.         2         0         0      0.00     12.00    239.00
0
 CCHV=    0.100 CEHV=    0.300
 *SECNO 326.000
        CROSS SECTION A
   326.00      2.21    584.61      0.00      0.00    584.61      0.00      0.02      0.01    584.10
     50.       35.       15.        0.       229.       40.        0.        1.        0.    584.60
    0.20       0.15      0.38      0.00     0.070     0.035     0.000     0.000    582.40     15.83
 0.000044      147.      147.      147.         2         0         0      0.00    234.26    250.09
0
 *SECNO 476.000
        CROSS SECTION AT BAR LAKE
1
  12 JAN 87     12:47:47                                                                          PAGE     7

    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

   476.00      2.22    584.62      0.00      0.00    584.62      0.00      0.01      0.00    584.10
     50.       35.       15.        0.       230.       40.        0.        1.        1.    584.60
    0.39       0.15      0.38      0.00     0.070     0.035     0.000     0.000    582.40     15.77
 0.000043      150.      150.      150.         2         0         0      0.00    234.37    250.14
0
1
  12 JAN 87     12:47:47                                                                          PAGE     8


                                                                THIS RUN EXECUTED 12 JAN 87    12:47:50
 ************************************************
   HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
   ERROR CORR -  01,02,03,04,05,06
   MODIFICATION -  50,51,52,53,54,55,56
 ************************************************

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

 100-YEAR FLOOD, 50 CFS
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loss ok.

SUMMARY PRINTOUT TABLE 150

| | SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 50.00 | 583.13 | 583.13 | 583.49 | 214.34 | 4.81 | 10.40 | 3.42 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 50.00 | 583.86 | 0.00 | 583.96 | 36.42 | 2.50 | 20.04 | 8.29 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 50.00 | 584.01 | 0.00 | 584.13 | 32.58 | 2.82 | 17.73 | 8.76 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 50.00 | 583.99 | 0.00 | 584.17 | 15.46 | 3.42 | 14.62 | 12.71 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 50.00 | 583.93 | 0.00 | 584.26 | 29.51 | 4.62 | 10.82 | 9.20 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 50.00 | 583.90 | 0.00 | 584.29 | 41.71 | 5.06 | 9.87 | 7.74 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.00 | 0.00 | 584.36 | 36.93 | 4.83 | 10.35 | 8.23 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.07 | 0.00 | 584.41 | 33.96 | 4.68 | 10.69 | 8.58 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.20 | 0.00 | 584.51 | 29.74 | 4.44 | 11.26 | 9.17 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.31 | 0.00 | 584.53 | 17.61 | 3.83 | 13.05 | 11.91 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.51 | 0.00 | 584.59 | 14.74 | 2.17 | 23.05 | 13.03 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.61 | 0.00 | 584.61 | 0.44 | 0.38 | 268.81 | 75.29 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.62 | 0.00 | 584.62 | 0.43 | 0.38 | 270.45 | 76.00 |

1



100-YEAR FLOOD, 50 CFS

SUMMARY PRINTOUT TABLE 150

| | SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|---|
| * | 0.000 | 50.00 | 583.13 | 0.00 | 0.00 | 2.99 | 14.62 | 0.00 |
| | 60.000 | 50.00 | 583.86 | 0.00 | 0.73 | 0.00 | 20.06 | 60.00 |
| | 108.000 | 50.00 | 584.01 | 0.00 | 0.15 | 0.00 | 12.00 | 48.00 |
| | 114.000 | 50.00 | 583.99 | 0.00 | -0.02 | 0.00 | 9.00 | 6.00 |
| | 120.000 | 50.00 | 583.93 | 0.00 | -0.06 | 0.00 | 6.00 | 6.00 |
| | 121.000 | 50.00 | 583.90 | 0.00 | -0.03 | 0.00 | 6.00 | 1.00 |
| | 135.000 | 50.00 | 584.00 | 0.00 | 0.10 | 0.00 | 6.00 | 14.00 |
| | 148.000 | 50.00 | 584.07 | 0.00 | 0.08 | 0.00 | 6.00 | 13.00 |
| | 175.000 | 50.00 | 584.20 | 0.00 | 0.13 | 0.00 | 6.00 | 27.00 |
| | 176.000 | 50.00 | 584.31 | 0.00 | 0.10 | 0.00 | 6.00 | 1.00 |
| | 179.000 | 50.00 | 584.51 | 0.00 | 0.21 | 0.00 | 12.00 | 3.00 |
| | 326.000 | 50.00 | 584.61 | 0.00 | 0.10 | 0.00 | 234.26 | 147.00 |

476.000 50.00 584.62 0.00 0.01 0.00 234.37 150.00

1
12 JAN 87 12:47:47 PAGE 10

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 0.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

1
12 JAN 87 12:47:51 PAGE 1

THIS RUN EXECUTED 12 JAN 87 12:47:51

```
*************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*************************************************
```

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp.

3) WATERCOURSE: Bar Lake Outlet

4) DOCUMENT TYPE: 100year flood (50 cfs)

00BREAK00

MANISTEE TWP FIS
BAR LAKE OUTLET
100 YR DISCHARGE (50cfs)
IDP = BAR.H3

```
EEEEEE   EEEEEE          L        EEEEEE   EEEEEE
E        E               L        E        E
E        E               L        E        E
EEEE     EEEE            L        EEEE     EEEE
E        E               L        E        E
EEEEEE   EEEEEE          LLLLLL   EEEEEE   EEEEEE


USACOE DETROIT H800 VOS 5.1.1     PRINTER.  6

EE LEE                      12 JAN 87 12:48:44

TERMINAL: 125
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1*****************************************************
 *  WATER SURFACE PROFILES                           *
 *  VERSION OF NOVEMBER 1976                         *
 *  UPDATED MAY 1984                                 *
 *                                                   *
 *  RUN DATE  12 JAN 87 TIME   12:47:46              *
 *****************************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS
*  THE HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616
*  (916) 440-2105 (FTS) 448-2105
*************************************
```

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

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1
 12 JAN 87    12:47:47                                                                    PAGE    1
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THIS RUN EXECUTED 12 JAN 87  12:47.47

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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
*************************************************
```

```
C
T1       MANISTEE TOWNSHIP - FIS
T2       BAR LAKE OUTLET OF LAKE MICHIGAN
T3       100-YEAR FLOOD, 50 CFS

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0.        0.        0.        0.   0.000000    0.00      0.0       50.    580.140    0.000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     -1.000    0.000    -1.000    0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC      0.070     0.070     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
         CROSS SECTION AT MOUTH OF LAKE
X1      0.000    18.000   225.000   270.000     0.000     0.000     0.000     0.000     0.000     0.000
GR    586.400     0.000   586.300    50.000   586.200   100.000   586.400   150.000   586.600   200.000
GR    586.700   218.000   583.300   225.000   582.900   228.000   582.500   230.000   581.700   231.000
GR    581.700   235.000   582.500   236.000   586.900   270.000   587.500   300.000   588.100   350.000
GR    588.300   400.000   588.300   450.000   588.500   500.000     0.000     0.000     0.000     0.000

         CROSS SECTION DOWNSTREAM OF BRIDGE
X1     60.000    19.000   225.000   270.000    60.000    60.000    60.000     0.000    -0.150     0.000
GR    586.700     0.000   586.600    50.000   586.500   100.000   586.700   150.000   586.900   200.000
GR    587.000   218.000   584.100   225.000   583.200   228.000   582.800   230.000   582.000   231.000
GR    582.000   233.000   582.000   235.000   582.800   236.000   587.200   270.000   587.800   300.000
GR    588.400   350.000   588.600   400.000   588.600   450.000   588.800   500.000     0.000     0.000
```

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 108 000 | 0.000 | 0.000 | 0 000 | 48 000 | 48.000 | 48.000 | 0.000 | 0 075 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 227.000 | 0.000 | 239.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0 000 | 0 000 | 0.020 | 0 300 | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 114 000 | 0.000 | 0.000 | 0.000 | 6.000 | 6 000 | 6.000 | 0 000 | 0 032 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 228.000 | 0.000 | 237.000 | 0.000 | 0.000 | 0.000 | 0 000 |
| | CROSS SECTION DOWNSTREAM OF BRIDGE | | | | | | | | | |
| X1 | 120.000 | 0.000 | 0.000 | 0.000 | 6 000 | 6.000 | 6.000 | 0.000 | 0.032 | 0 000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0 000 |
| | DOWNSTREAM FACE OF HWY 110 BRIDGE | | | | | | | | | |
| X1 | 121.000 | 19.000 | 225.000 | 270.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -17.000 | 0.000 | 586.700 | 0.000 | 50.000 | 586.600 | 0.000 | 100.000 | 586 500 | 0.000 |
| BT | 0.000 | 150.000 | 586.700 | 0.000 | 200 000 | 586.900 | 0.000 | 218.000 | 587.000 | 0.000 |
| BT | 0.000 | 230.000 | 586.900 | 582.800 | 231.000 | 587.000 | 584.500 | 233.000 | 587.000 | 586.300 |

1



| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| BT | 0.000 | 235.000 | 587.100 | 584.500 | 236.000 | 587.100 | 582.800 | 270.000 | 587.200 | 0.000 |
| BT | 0.000 | 300 000 | 587.800 | 0 000 | 350.000 | 588.400 | 0 000 | 400.000 | 588.600 | 0.000 |
| BT | 0.000 | 450.000 | 588.600 | 0.000 | 500.000 | 588.800 | 0.000 | 0.000 | 0.000 | 0 000 |
| GR | 586.700 | 0 000 | 586.600 | 50 000 | 586.500 | 100.000 | 586.700 | 150.000 | 586.900 | 200.000 |
| GR | 587.000 | 218.000 | 584 100 | 225.000 | 583.200 | 228.000 | 582.800 | 230.000 | 582.000 | 231.000 |
| GR | 582.000 | 233.000 | 582.000 | 235.000 | 582 800 | 236.000 | 587.200 | 270.000 | 587.800 | 300.000 |
| GR | 588.400 | 350.000 | 588.600 | 400.000 | 588.600 | 450.000 | 588.800 | 500.000 | 0 000 | 0 000 |
| X1 | 135.000 | 0.000 | 0.000 | 0.000 | 14.000 | 14.000 | 14.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0 000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 148.000 | 0.000 | 0 000 | 0.000 | 13.000 | 13.000 | 13.000 | 0 000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1 000 | 0 000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | UPSTREAM FACE OF HWY 110 BRIDGE | | | | | | | | | |
| X1 | 175.000 | 22.000 | 225.000 | 270.000 | 27.000 | 27.000 | 27.000 | 0.000 | 0.000 | 0 000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -16.000 | 0.000 | 586.700 | 0.000 | 50.000 | 586.600 | 0.000 | 100.000 | 586.500 | 0.000 |
| BT | 0.000 | 150.000 | 586.700 | 0.000 | 200.000 | 586.900 | 0.000 | 230.000 | 586.900 | 582.800 |
| BT | 0.000 | 231.000 | 587.000 | 584.500 | 233.000 | 587.000 | 586.300 | 235 000 | 587.100 | 584 500 |
| BT | 0.000 | 236.000 | 587.100 | 582.800 | 270.000 | 587 200 | 0.000 | 300.000 | 587.800 | 0.000 |
| BT | 0.000 | 350.000 | 588.400 | 0.000 | 400.000 | 588.600 | 0.000 | 450.000 | 588 600 | 0.000 |
| BT | 0.000 | 500.000 | 588.800 | 0.000 | 0.000 | 0 000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 583.400 | 25.000 | 583.200 | 50.000 | 583.400 | 75.000 | 583.600 | 100.000 |
| GR | 583 700 | 125 000 | 583.400 | 150 000 | 583.400 | 175.000 | 583.500 | 200.000 | 584.100 | 225.000 |
| GR | 583.200 | 228 000 | 582 800 | 230 000 | 582.000 | 231.000 | 582.000 | 233.000 | 582.000 | 235 000 |
| GR | 582.800 | 236.000 | 587 200 | 270.000 | 587.800 | 300.000 | 588.400 | 350.000 | 588 600 | 400.000 |
| GR | 588.600 | 450.000 | 588.800 | 500.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | CROSS SECTION UPSTREAM OF BRIDGE | | | | | | | | | |
| X1 | 176.000 | 0.000 | 0.000 | 0.000 | 1 000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0 000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.035 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 000 | 0.000 |
| X1 | 179.000 | 0.000 | 0.000 | 0.000 | 3.000 | 3.000 | 3.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0 000 | 227 000 | 0.000 | 239.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.000 | 0.100 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0 000 |
| | CROSS SECTION A | | | | | | | | | |
| X1 | 326.000 | 26.000 | 225.000 | 250.000 | 147.000 | 147.000 | 147.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0 000 | 583.400 | 25.000 | 583 200 | 50.000 | 583.400 | 75.000 | 583 600 | 100.000 |
| GR | 583 700 | 125.000 | 583.400 | 150.000 | 583.400 | 175.000 | 583 500 | 200.000 | 584 100 | 225.000 |

```
GR     583.200     228 000     582.800     230.000     582.400     235.000     582.400     240 000     583 200     245 000
GR     584 600     250.000     587.700     275 000     590.200     300.000     591 900     325.000     589.800     350.000
GR     590 100     375.000     589.700     400.000     593.600     425.000     590.000     450.000     588.500     475.000
GR     588.400     500.000       0.000       0.000       0.000       0.000       0 000       0.000       0.000       0.000
1
 12 JAN 87     12:47:47                                                                                          PAGE     3


        CROSS SECTION AT BAR LAKE
X1     476.000      26.000     225.000     250.000     150.000     150.000     150.000       0.000       0 000       0.000
GR     586 700       0.000     583.400      25 000     583.200      50.000     583.400      75.000     583.600     100 000
GR     583.700     125.000     583.400     150.000     583.400     175.000     583.500     200.000     584.100     225.000
GR     583.200     228.000     582.800     230.000     582 400     235.000     582.400     240.000     583.200     245.000
GR     584.600     250.000     587.700     275.000     590.200     300.000     591.900     325.000     589.800     350.000
GR     590.100     375.000     589.700     400.000     593.600     425.000     590.000     450 000     588.500     475.000
GR     588.400     500.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000
EJ       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000       0.000
1
 12 JAN 87     12.47 47                                                                                          PAGE     4


   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=    0.100 CEHV=    0.300
*SECND 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00       1.43     583.13     583.13     580 14     583.49       0.36       0.00       0.00     583.30
      50.         0.        50.         0.         0.        10.         0.         0.         0.     586.90
     0 00       0.00       4.81       0.00      0.000      0.035      0.000      0.000     581.70     226.26
  0.021434        0.         0.          0          0         22          0       0.00      14.62     240.88
0
 *SECND 60 000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00       2.01     583.86       0.00       0.00     583.96       0.10       0 44       0.03     583.95
      50.         0.        50.         0.          0        20.         0.         0.         0.     587.05
     0.01       0.00       2.50       0.00      0.000      0.035      0.000      0.000     581.85     225.30
  0.003642       60.        60.        60.          3          0          0       0.00      20.06     245.35
0
 *SECND 108.000

 3470 ENCROACHMENT STATIONS=      227.0      239 0  TYPE=      1  TARGET=        12.000
    108 00       2.08     584 01       0.00       0.00     584.13       0.12       0.17       0 01100000.00
      50.         0.        50.         0.         0.        18.         0.         0.         0.  100000.00
     0.01       0.00       2.82       0.00      0.000      0.035      0.000      0.000     581.92     227 00
  0.003258        48.        48.        48.          2          0          0       0.00      12.00     239.00
0
 CCHV=    0.300 CEHV=    0 500
 *SECND 114.000

 3470 ENCROACHMENT STATIONS=      228 0      237.0  TYPE=      1  TARGET=         9.000
    114.00       2.03     583.99       0.00       0 00     584.17       0 18       0.01       0.03100000.00
      50          0.        50.         0.          0        15.         0          0.         0  100000.00
     0.01       0.00       3.42       0.00      0.000      0.020      0.000      0.000     581.96     228.00
  0 001546        6.         6.         6.          2          0          0       0.00       9.00     237.00
0
 *SECND 120.000

 3470 ENCRO CHMENT STATIONS=      230 0      236 0  TYPE=      1  T.RGET=         6.000
```

CROSS SECTION DOWNSTREAM OF BRIDGE

1



```
   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS    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

   120.00     1.94    583.93      0.00      0.00    584.26      0.33      0.01      0.07100000.00
     50.        0       50.        0         0.       11.        0.        0.         0.  100000.00
    0.01      0.00     4.62      0.00     0.000     0.020     0.000     0.000    581.99    230 00
  0.002951     6.       6.        6.         2         0         0      0.00      6.00    236.00
0
 *SECNO 121 000

 3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30


 3470 ENCROACHMENT STATIONS=      230.0      236 0  TYPE=      1  TARGET=        6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
   121.00     1.90    583.90      0.00      0.00    584.29      0.40      0.00      0.03100000.00
     50.        0       50.        0.        0.       10.        0.        0.         0.  100000.00
    0 01      0.00     5.06      0.00     0.000     0.020     0.000     0.000    582 00    230.00
  0.004171     1        1.        1.         2         0         0     -0.71      6.00    236.00
0
 *SECND 135.000

 3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30


 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
   135.00     2.00    584 00      0.00      0.00    584.36      0.36      0.05      0.01100000.00
     50.        0.       50        0.        0.       10.        0.        0.         0.  100000.00
    0.01      0.00     4 83      0.00     0.000     0.020     0.000     0 000    582.00    230 00
  0.003693    14        14.       14.         2         0         0     -0.84      6.00    236.00
0
 *SECND 148.000

 3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30


 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
   148.00     2.07    584.07      0.00      0.00    584.41      0.34      0.05      0.01100000 00
     50.        0.       50.        0.        0.       11        0.        0.         0.  100000.00
    0.01      0 00     4 68      0.00     0.000     0.020     0.000     0.000    582 00    230.00
  0.003396    13        13.       13         2         0         0     -0.95      6.00    236.00
0
1
```



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

 *SECND 175.000

 3370 NORMAL BRIDGE,NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30


 3470 ENCROACHMENT STATIONS=      230.0      236 0  TYPE=      1  T RGET=        6.000
```

```
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00      2.20    584 20      0.00      0.00    584.51      0 31      0.09      0.01100000.00
     50.         0.       50.        0.        0.       11.        0.        0.        0.  100000.00
     0.02      0.00      4 44      0.00     0.000     0.020     0.000     0.000    582.00    230.00
  0.002974      27.       27        27.         2         0         0     -1 16      6 00    236.00
0
 *SECNO 176.000

 3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00      2.31    584.31      0.00      0 00    584.53      0.23      0.00      0.02100000.00
     50.         0.       50         0.        0.       13.        0.        0.        0.  100000.00
     0 02      0.00      3 83      0.00     0.000     0.020     0.000     0.000    582.00    230.00
  0.001761        1        1.        1.         2         0         0      0.00      6.00    236.00
0
 *SECNO 179.000

 3470 ENCROACHMENT STATIONS=      227.0      239 0  TYPE=      1  TARGET=       12 000
   179.00      2.51    584.51      0.00      0.00    584.59      0.07      0 00      0.05100000.00
     50.         0.       50.        0.        0.       23         0.        0.        0.  100000 00
     0.02      0.00      2.17      0.00     0.000     0.035     0.000     0.000    582.00    227.00
  0 001474       3.        3.        3         2         0         0      0 00     12.00    239.00
0
 CCHV=   0 100 CEHV=   0.300
 *SECNO 326.000
        CROSS SECTION A
   326.00      2.21    584.61      0.00      0 00    584.61      0.00      0.02      0.01    584.10
     50.        35.       15.        0.      229.       40.        0.        1.        0.    584.60
     0 20      0.15      0.38      0.00     0 070     0.035     0.000     0.000    582.40     15.83
  0.000044     147.      147.      147.         2         0         0      0.00    234.26    250.09
0
 *SECNO 476.000
        CROSS SECTION AT BAR LAKE
1
  12 JAN 87     12:47:47                                                                          PAGE     7

    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

    476 00      2 22    584.62      0.00      0.00    584.62      0.00      0.01      0 00    584.10
       50.        35       15.        0.      230.       40.        0         1.        1.     584.60
     0 39      0.15      0 38      0.00     0.070     0.035     0.000     0.000    582.40     15.77
  0.000043     150.      150.      150.         2         0         0      0.00    234.37    250.14
0
1
  12 JAN 87     12:47:47                                                                          PAGE     8


                                                                    THIS RUN EXECUTED 12 JAN 87    12:47:50
 ***************************************************
   HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
   ERROR CORR -  01,02,03,04,05,06
   MODIFICATION -  50,51,52,53,54,55,56
 ***************************************************

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

 100-YEAR FLOOD, 50 CFS
```

SUMMARY PRINTOUT TABLE 150

| | SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | OIK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 50.00 | 583.13 | 583.13 | 583.49 | 214.34 | 4.81 | 10.40 | 3.42 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 50.00 | 583.86 | 0.00 | 583.96 | 36.42 | 2.50 | 20.04 | 8.29 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 50.00 | 584 01 | 0.00 | 584.13 | 32.58 | 2.82 | 17.73 | 8.76 |
| | 114.000 | 6.00 | 0 00 | 0.00 | 581.96 | 50.00 | 583 99 | 0.00 | 584.17 | 15.46 | 3.42 | 14.62 | 12.71 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 50.00 | 583.93 | 0.00 | 584.26 | 29.51 | 4.62 | 10.82 | 9.20 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 50.00 | 583.90 | 0.00 | 584.29 | 41.71 | 5.06 | 9 87 | 7.74 |
| | 135.000 | 14.00 | 586 50 | 586.30 | 582 00 | 50.00 | 584.00 | 0.00 | 584.36 | 36.93 | 4.83 | 10.35 | 8.23 |
| | 148.000 | 13 00 | 586.50 | 586.30 | 582.00 | 50.00 | 584 07 | 0.00 | 584.41 | 33.96 | 4.68 | 10.69 | 8.58 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.20 | 0 00 | 584.51 | 29.74 | 4.44 | 11.26 | 9 17 |
| | 176.000 | 1 00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.31 | 0.00 | 584.53 | 17 61 | 3 83 | 13 05 | 11.91 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.51 | 0.00 | 584.59 | 14.74 | 2.17 | 23 05 | 13 03 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.61 | 0.00 | 584.61 | 0.44 | 0.38 | 268 81 | 75.29 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.62 | 0.00 | 584.62 | 0.43 | 0.38 | 270.45 | 76 00 |

1



100-YEAR FLOOD, 50 CFS

SUMMARY PRINTOUT TABLE 150

| | SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|---|
| * | 0.000 | 50.00 | 583 13 | 0.00 | 0.00 | 2.99 | 14 62 | 0.00 |
| | 60.000 | 50.00 | 583.86 | 0.00 | 0.73 | 0.00 | 20 06 | 60.00 |
| | 108.000 | 50.00 | 584.01 | 0.00 | 0.15 | 0.00 | 12.00 | 48 00 |
| | 114 000 | 50 00 | 583.99 | 0.00 | -0.02 | 0.00 | 9.00 | 6.00 |
| | 120.000 | 50.00 | 583.93 | 0.00 | -0.06 | 0.00 | 6.00 | 6.00 |
| | 121.000 | 50.00 | 583.90 | 0.00 | -0.03 | 0.00 | 6 00 | 1.00 |
| | 135.000 | 50.00 | 584.00 | 0.00 | 0.10 | 0 00 | 6.00 | 14.00 |
| | 148.000 | 50.00 | 584.07 | 0.00 | 0 08 | 0.00 | 6.00 | 13.00 |
| | 175.000 | 50.00 | 584 20 | 0.00 | 0.13 | 0.00 | 6.00 | 27.00 |
| | 176.000 | 50 00 | 584.31 | 0.00 | 0.10 | 0.00 | 6.00 | 1.00 |
| | 179.000 | 50.00 | 584 51 | 0.00 | 0.21 | 0.00 | 12.00 | 3 00 |
| | 326.000 | 50 00 | 58[illegible] 61 | 0 00 | 0.10 | 0.00 | 234 26 | 147.00 |

476.000 50.00 584.62 0.00 0.01 0.00 234.37 150.00



SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 0.000 PROFILE= 1 CRITICAL DEPTH ASSUMED



THIS RUN EXECUTED 12 JAN 87 12:47:51

```
*************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*************************************************
```

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp.

3) WATERCOURSE: Manistee River
Bar Lake Outlet

4) DOCUMENT TYPE: Analysis

00BREAK00

DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027

IN REPLY REFER TO

April 7, 1987

Great Lakes Hydraulics and Hydrology Branch

Mr. Dan Morgan, P.E.
Department Liaison
Land and Water Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Dear Mr. Morgan:

Submitted for your review and approval is a copy of the revised hydraulic calculations for the Manistee Township, Michigan Limited Detail Flood Insurance Study. Enclosed are the HEC-2 100-year runs for the Manistee River, including a run made for the additional channel which exists in the left overbank, and a brief write up dealing with the revisions made in response to your concerns as outlined in your January 21, 1987 correspondence.

From the hydraulic analyses performed on the channel which exists in the left overbank of the Manistee River, it was determined that this channel will carry approximately 45 percent of the 100-year flow. Therefore, as you suspected, the resulting flood stages are significantly lower than those determined previously for the Manistee River. In addition, the floodway will be drawn to include the channel and bridge opening in the left overbank.

Since FEMA has requested the submittal of this report as soon as possible, a response from your office within two weeks would be appreciated. If you have any questions regarding the enclosed data, please contact Mr. Jeff Weiser at (313) 226-4886.

Sincerely,

P. M. O'Dell, P.E.
Chief, Engineering Division

Enclosures

CF: Norb Schwartz, Region V, FEMA

RECEIVED
APR 08 1987
NATURAL RESOURCES
LAND & WATER MGMT.

MANISTEE TOWNSHIP, MICHIGAN
LIMITED DETAIL FLOOD INSURANCE STUDY
REVISED HYDRAULIC COMPUTATION BACKGROUND INFORMATION

The Manistee River splits into two channels 2500 feet upstream of Manistee Lake which enter the lake at separate locations. In the Corps' initial submittal, just the Manistee River main channel was modeled without consideration of the flow carrying capacity of the secondary channel. In this submittal the secondary channel was analyzed from Manistee Lake to the confluence with the main channel for a range of flows up to 50 percent of the 100-year flow. The main channel was also rerun for an appropriate range of flows. An equal energy grade line was determined at the confluence of the two channels which resulted in a flow in each channel totaling up to the 100-year discharge of 8520 cfs. This analysis resulted in a flow of 4640 cfs for the Manistee River from Manistee Lake to cross section 2500., and a flow of 8520 cfs from that point to the study limits.

The revised Manistee River HEC-2 run resulted in flood stages significantly lower than those originally obtained, to the point that all but the farthest upstream cross section flood stage are below the Lake Michigan elevation of 583.8. Therefore, the flood stages will be equal to the Lake Michigan 100-year elevation for the majority of the Manistee River.

SEP 18 1986

Received
Hydrology
Nov 17, 1986
Leap

call Bruce H
when Reviewed

Planning Division - SS

Mr. Lawrence N. Witte, Chief
Engineering - Water Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

RECEIVED
SEP 25 1986
ENGINEERING-WATER
MANAGEMENT

Dear Mr. Witte:

Submitted for your review and approval is a copy of the hydrology developed for the Township of Manistee, Michigan Limited Detail Flood Insurance Study. Enclosed is a write up dealing with the analysis. Other items that will assist the review process are included.

If you have any questions regarding the enclosed data, please contact Mr. Joe Wanielista at (313) 226-6773.

Sincerely,

Original Signed

C. Argiroff, P.E.
Chief, Planning Division

Enclosures

CF: NCEED-L
NCEPD-SS

11-24-86
requested soils info.
described difference
in RO vol. Barlake
Manistee. ok
AH

The original report and letter were sent previously under separate cover without enclosures. This copy accompanies the enclosures for your convenience.

Township of Manistee, Michigan
Flood Insurance Study
Hydrologic Analysis

The Flood Insurance Study for the Township of Manistee, Michigan is a limited detail study. The Lake Michigan coastline, Bar Lake, Bar Lake outlet, and the Manistee River from Manistee Lake to 1.2 miles upstream are included. Figure 1 shows the study area.

The 100-year frequency elevation, 583.8 ft. NGVD, will be used to determine flooding along the coastline. This value is for Reach B of Lake Michigan taken from the report on Great Lakes Open-Coast Flood Levels (Reference 1).

used 1980 1952 not 1981 why not thru 1985 or 1986

The hydrologic analysis of the Manistee River was taken from the City of Manistee Flood Insurance Study (Reference 2). The analysis was based on peak annual flows obtained from a U.S. Geological Survey gage located on the Manistee River approximately six miles ~~upstream~~ from Manistee Lake. The period of record was from 1952 to 1981. A flood flow frequency analysis was performed using Weibull plotting positions and the log Pearson III distribution (HECWRC program, Reference 3). A copy of the output from the flood flow frequency analysis is presented as Enclosure 1. The flows were then adjusted from the gage site to the edge of Manistee Lake by the drainage area ratio method with a coefficient of 0.8. The 100-year frequency flood flow at the gage site and at Manistee Lake's edge are shown in Table 1. The adjusted flow at Manistee Lake will be used as the flow for the Manistee River in this study.

we use .947 for this region

Table 1.
Manistee River
100-Year Frequency Flows

| Location | Drainage Area (sq. mi.) | Flow (cfs) |
|---|---|---|
| gage | 1780 approx | 8370 |
| Manistee Lake's edge | 1822 1819? | 8520 |

Suggest 8630 cfs

1985 book shows DA at Lake Mich 2000 sq miles (US 31)

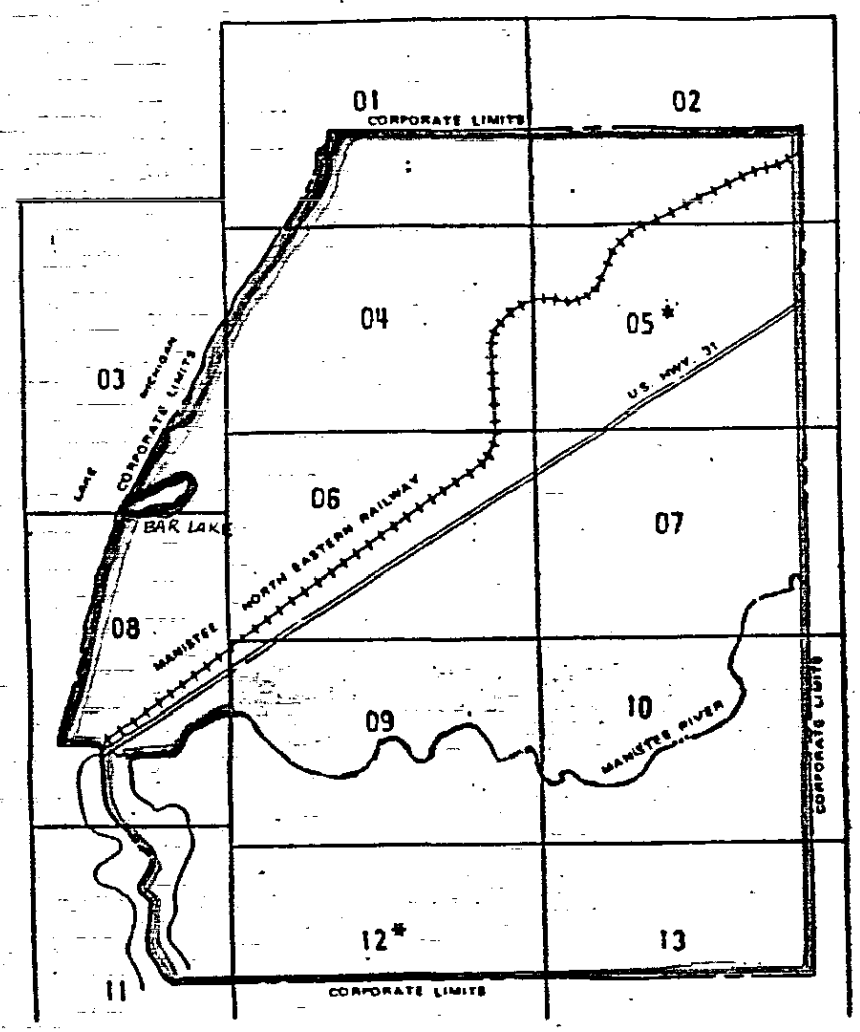
The hydrologic analysis for Bar Lake and its outlet was done with the HEC-1 Flood Hydrograph Package (Reference 4). An inflow hydrograph, a storage-elevation relationship, and a discharge-elevation relationship were developed to model the routing of a 10-day duration, 100-year frequency rainfall through Bar Lake and its outlet.

5.42 .14 NC / 5.28 P

cont file less NC = 5.3 sq miles

The SCS method was used to model the excess rainfall runoff. The drainage area of 5.42 square miles was delineated on the provisional Onekama and Parkdale 7.5 minute quadrangles from the U.S. Geological Survey. An SCS curve number of 60 was determined by a weighted average based on soil types in the drainage basin. The soil types and their relative percentages were taken from a

a Moor, Bar Lake Swamp has tons of creeks




CORPORATE LIMITS

LIMITED DETAIL STUDY

FIGURE 1.

where are they?

soil type map provided by the National Forest Service. A time of concentration, $t_c$, of 3.72 hours was calculated using the provisional quadrangles referenced above and the following equation:

$t_c$ = 6.9 hr

not 3.72 hr.

$$t_c = \frac{\text{length, ft.}}{V \times 3600}$$

where the velocity, V in feet/sec., is a function of slope, S in percent, and flow type. The velocity was calculated using the following equations:

$V = 2.1\ S^{0.5}$ (small tributaries and swamps with channels)

$V = 1.2\ S^{0.5}$ (waterways and swamps without channels)

$V = 0.48\ S^{0.5}$ (sheet flow).

Tp =

The storage-elevation relationship was developed by planimetering the surface area of Bar Lake at elevations of 582.4 ft. (177.5 m.), 585.7 ft. (178.5 m.), and 590.6 ft. (180 m.). The map used was the 7.5 minute provisional Parkdale Quadrangle. The conic method provided by the HEC-1 model was used to compute the reservoir volume from the surface area versus elevation data.

The elevation-discharge relationship at Bar Lake outlet was developed through the use of the HEC-2 Water Surface Profiles program (Reference 5). The starting water surface elevation of Lake Michigan was the period of record average water surface elevation of 580.1 ft. NGVD (Reference 6). Manning's "n" values were .02 to .035 for the channel and .07 for the overbanks. Backwater profiles were run for various flows up to 100 cfs. The elevations 100 yards upstream of State Highway 110 bridge were plotted versus the discharges to develop the elevation-discharge curve. Enclosure 2 is the HEC-2 program output.

The results of the HEC-1 routing are shown in Table 2. The HEC-1 output is included in Enclosure 3. Since the 100-year frequency Bar Lake stage is higher than Lake Michigan's 100-year frequency stage, 583.8 ft. NGVD, routings were not required to determine if Lake Michigan's levels control the Bar Lake level.

Table 2.
HEC-1 Results for Bar Lake
100-Year Frequency

| Peak Inflow | Peak Outflow | Peak Stage |
|---|---|---|
| 1002 cfs | 50 cfs | 584.6 ft. NGVD |

Table 3. summarizes the proposed 100-year frequency flows and stages to be used for this study.

Table 3.
Summary of Proposed Flows and Stages

| Location | Flow (cfs) | Stage (ft. NGVD) |
|---|---|---|
| Lake Michigan Coastline | | 583.8 |
| Bar Lake | | 584.6 |
| Bar Lake Outlet | 50 | |
| Manistee River | 8520 | |

## References


(1) U.S. Army Corps of Engineers, Report on Great Lakes Open-Coast Flood Levels, February 1977.

(2) Federal Emergency Management Agency, Flood Insurance Study, City of Manistee, Michigan, 1985.

(3) U.S. Army Corps of Engineers, Flood Flow Frequency Analysis, Generalized Computer Program 723-X6-L7550, June 1976.

(4) U.S. Amy Corps of Engineers, Flood Hydrograph Package, Computer Program 723-6-L2010, July 1982.

(5) U.S. Army Corps of Engineers, Water Surface Profiles, Computer Program 723-X6-L202A, May 1984.

(6) U.S. Army Corps of Engineers, Detroit District, Monthly Bulletin of Lake Levels for the Great Lakes, July 1986.

DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027

IN REPLY REFER TO

January 13, 1987

NCEED-L

Mr. Lawrence N. Witte, Chief
Engineering - Water Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Dear Mr. Witte:

Submitted for your review and approval is a copy of the hydraulic calculations for the Manistee Township, Michigan Limited Detail Flood Insurance Study. Enclosed are the HEC-2 100-year unencroached and encroached runs, a map showing the location of cross sections along with the corresponding section numbers in the computer run, copies of the bridge sketches in the field notes, and a brief write up dealing with items that will assist the review process.

According to FEMA guidelines, the information supplied to aid in the review process is not intended for flood plain management purposes or distribution to other individuals at this time. Before using or distributing this information, approval should be obtained from FEMA.

Since FEMA has requested the submittal of this report as soon as possible, a response from your office within two weeks would be appreciated. If you have any questions regarding the enclosed data, please contact Mr. Bruce Holbrook at (313) 226-6772.

Sincerely,

for P. M. O'Dell, P.E.
Chief, Engineering Division

Enclosures

MANISTEE TOWNSHIP, MICHIGAN
LIMITED DETAIL FLOOD INSURANCE STUDY
HYDRAULIC COMPUTATION BACKGROUND INFORMATION

Two streams were studied, the Manistee River and Bar Lake Outlet. The Manistee River was studied from Manistee Lake, the downstream corporate limit, to 420 feet upstream of the M-55 Highway Bridge. Bar Lake Outlet was studied from Lake Michigan to Bar Lake.

During the hydrologic analysis of Bar Lake stages, it was necessary to develop an outlet rating curve. To accomplish this, a backwater run was made on Bar Lake Outlet and submitted with the hydrologic analysis. That run was approved with the hydrology and will not be resubmitted at this time. No encroached run was made due to the minimal topwidths obtained downstream of Bar Lake.

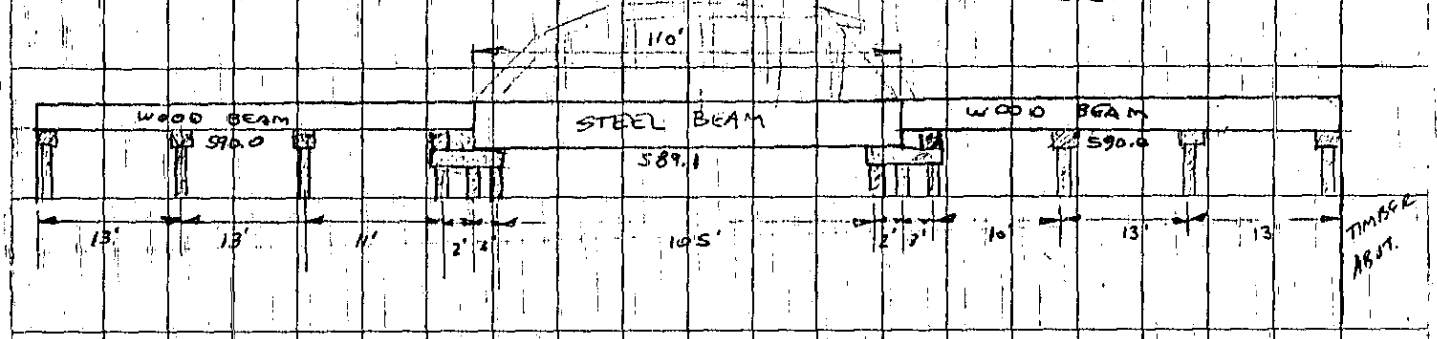
Manning's "n" values were obtained for the study during a site visit.

The starting water surface elevation on the Manistee River was taken from values determined during the City of Manistee FIS. During that study, one of the conditions investigated was a normal stage on Lake Michigan with 100-year discharge on the Manistee River, including routing through Manistee Lake. The stage obtained on Manistee Lake is the value being used in this study.

MANISTEE, MICH. 10/20/86 11:45 AM

W/S 581.73

RR BRIDGE D/S OF M-55 HWY ON MAIN BRANCH OF MANISTEE RIVER




BRIDGE IS SINGLE TRACK

4S STEEL BEAM 589.1

4S WOOD TIMBER 590.0

HEC-2 Cross Section # 1121.0

MANISTEE RIVER

1

P 17

MANISTEE MKD. F.S.

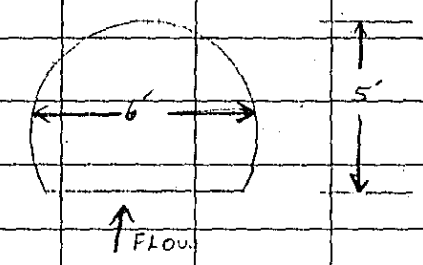
DATA FOR C.M.P. UNDER LAKESHORE DRIVE (M-110) AT BAR LAKE.

℄ ROAD ELEVATIONS AT CMP @ BAR LAKE

2

P-19

CMP AT BAR LAKE OUTLET TO LAKE MICHIGAN




(BOTTOM OF PIPE IS FLAT)

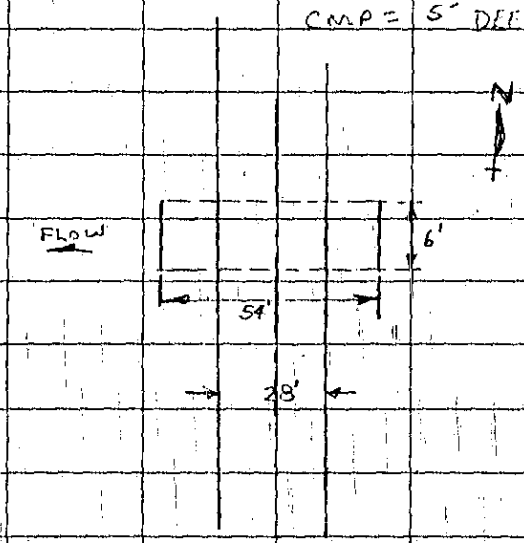
NO SKEW

ROAD = 28' WIDE

CMP = 54' LONG

CMP = 6' WIDE

CMP = 5' DEEP



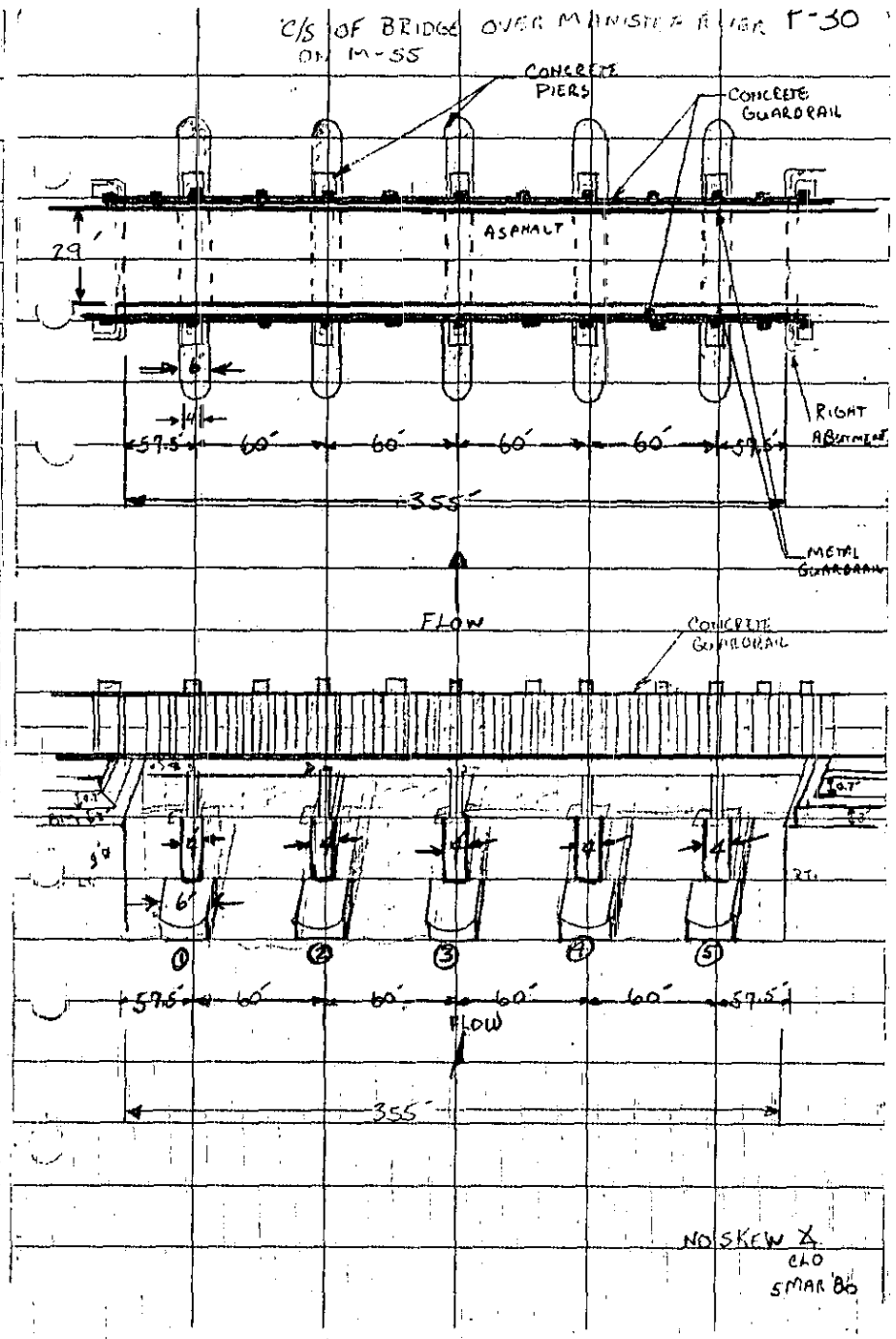

HEC-2 Cross Section

| | | |
|---|---|---|
| X1 | 121.0 | (D/S FACE) |
| X1 | 175.0 | (U/S FACE) |

BAR LAKE OUTLET

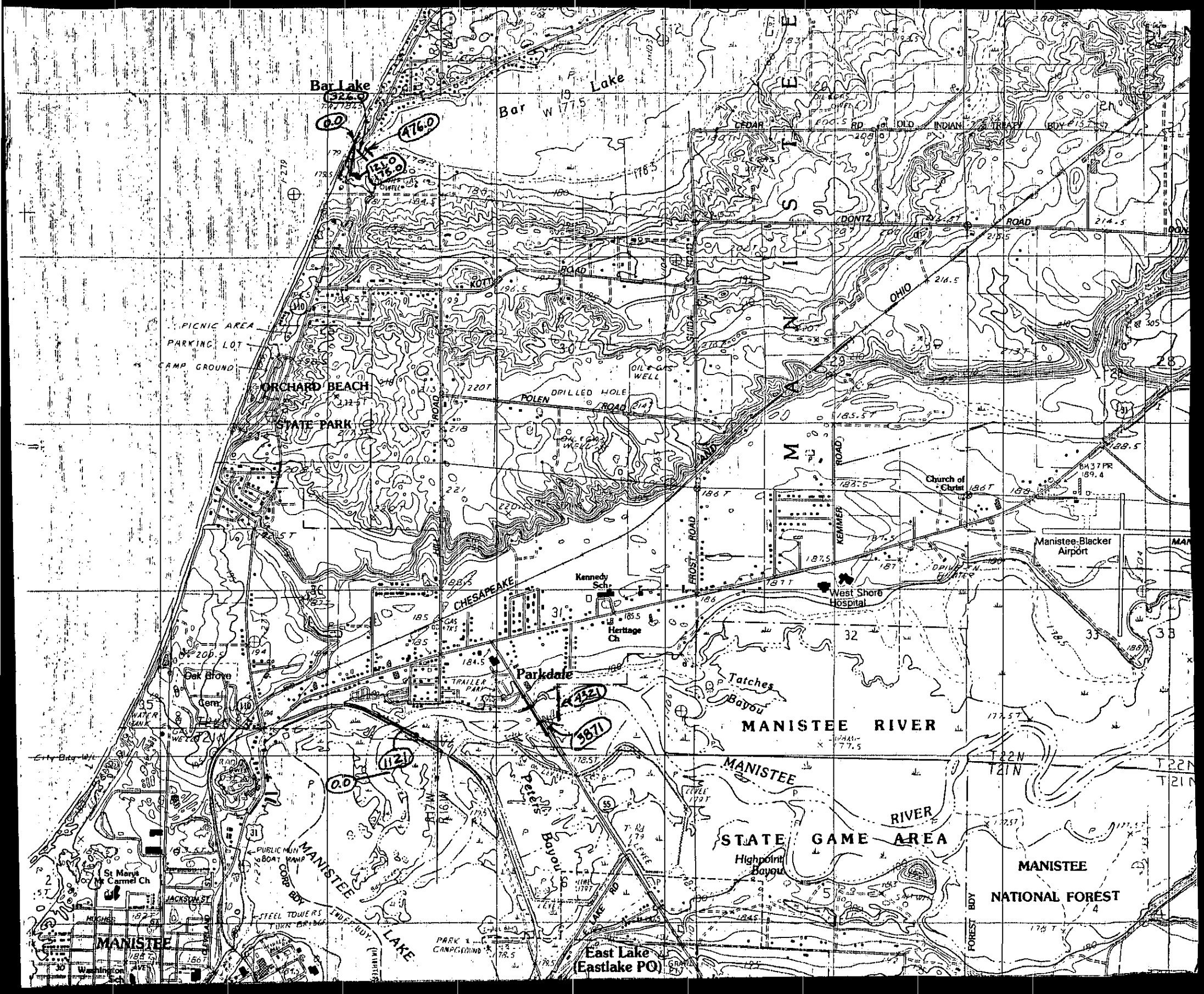
P-26

Bridge c/s MANISTEE mich
over MANISTEE River M-55




HEC-2 CROSS SECTION XI 3871.0

MANISTEE RIVER


Bar Lake
Bar Lake
326.0
0.0
476.0
121.0
475.0
CEDAR RD
OLD INDIAN TREATY BDY
DONTZ ROAD
KOTT ROAD
OHIO
PICNIC AREA
PARKING LOT
CAMP GROUND
ORCHARD BEACH STATE PARK
POLEN ROAD
DRILLED HOLE
OIL & GAS WELL
Church of Christ
Manistee-Blacker Airport
KEMMER ROAD
FROST ROAD
CHESAPEAKE
Kennedy Sch
Herttage Ch
West Shore Hospital
Parkdale
TRAILER PARK
Tatches Bayou
MANISTEE RIVER
MANISTEE RIVER
STATE GAME AREA
Highpoint Bayou
MANISTEE NATIONAL FOREST
FOREST BDY
Oak Grove Cem
WATER TANK
432
3871
1121
0.0
Peters Bayou
PUBLIC MUN BOAT RAMP
MANISTEE LAKE
CORP BDY
STEEL TOWERS
TURN BRIDGE
PARK & CAMPGROUND
East Lake (Eastlake PO)
St Marys
Mt Carmel Ch
JACKSON ST
HUGHES
MANISTEE
Washington Sch
T22N
T21N
R17W
R16W

00BREAK00

1) COUNTY: Manatee

2) STUDY NAME: Manistee Twp

3) WATERCOURSE: Bar Lake Outlet
enclosure 2

4) DOCUMENT TYPE: 100year flood

00BREAK00

```
*****************************************************
*  WATER SURFACE PROFILES                           *
*  VERSION OF NOVEMBER 1976                         *
*  UPDATED MAY 1984                                 *
*                                                   *
*  RUN DATE  10 SEP 86 TIME   10:47:26              *
*****************************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  THE HYDROLOGIC ENGINEERING CENTER *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616          *
*  (916) 440-2105 (FTS) 448-2105    *
*************************************
```

```
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
```

✓ OK

MANISTEE TWNSHP
HEC-2
BAR LAKE OUTLET

ENCLOSURE 2

THIS RUN EXECUTED 10 SEP 86 10:47:26

```
*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
```

```
C
T1      MANISTEE TOWNSHIP - FIS
T2      BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3      BACKWATER PROFILES - 10 CFS

J1  ICHECK    ING       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0.       2.       0.        0.   0.000000     0.00      0.0       0.    580.140    0.000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     1.000    0.000    -1.000    0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC      0.070     0.070     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
QT      6.000    10.000    30.000    50.000    75.000   100.000     0.000     0.000     0.000     0.000
        CROSS SECTION AT MOUTH OF LAKE
X1      0.000    18.000   225.000   270.000     0.000     0.000     0.000     0.000     0.000     0.000
GR    586.400     0.000   586.300    50.000   586.200   100.000   586.400   150.000   586.600   200.000
GR    586.700   218.000   583.300   225.000   582.900   228.000   582.500   230.000   581.700   231.000
GR    581.700   235.000   582.500   236.000   586.900   270.000   587.500   300.000   588.100   350.000
GR    588.300   400.000   588.300   450.000   588.500   500.000     0.000     0.000     0.000     0.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
X1     60.000    19.000   225.000   270.000    60.000    60.000    60.000     0.000    -0.150     0.000
GR    586.700     0.000   586.600    50.000   586.500   100.000   586.700   150.000   586.900   200.000
GR    587.000   218.000   584.100   225.000   583.200   228.000   582.800   230.000   582.000   231.000
GR    582.000   233.000   582.000   235.000   582.800   236.000   587.200   270.000   587.800   300.000
GR    588.400   350.000   588.600   400.000   588.600   450.000   588.800   500.000     0.000     0.000

X1    108.000     0.000     0.000     0.000    48.000    48.000    48.000     0.000     0.075     0.000
X3      0.000     0.000     0.000   227.000     0.000   239.000     0.000     0.000     0.000     0.000

NC      0.000     0.000     0.020     0.300     0.500     0.000     0.000     0.000     0.000     0.000
X1    114.000     0.000     0.000     0.000     6.000     6.000     6.000     0.000     0.032     0.000
X3      0.000     0.000     0.000   228.000     0.000   237.000     0.000     0.000     0.000     0.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
X1    120.000     0.000     0.000     0.000     6.000     6.000     6.000     0.000     0.032     0.000
X3      0.000     0.000     0.000   230.000     0.000   236.000     0.000     0.000     0.000     0.000
```

DOWNSTREAM FACE OF HWY 110 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 121.000 | 19.000 | 225.000 | 270.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -17.000 | 0.000 | 586.700 | 0.000 | 50.000 | 586.600 | 0.000 | 100.000 | 586.500 | 0.000 |
| BT | 0.000 | 150.000 | 586.700 | 0.000 | 200.000 | 586.900 | 0.000 | 218.000 | 587.000 | 0.000 |
| BT | 0.000 | 230.000 | 586.900 | 582.800 | 231.000 | 587.000 | 584.500 | 233.000 | 587.000 | 586.300 |
| BT | 0.000 | 235.000 | 587.100 | 584.500 | 236.000 | 587.100 | 582.800 | 270.000 | 587.200 | 0.000 |
| BT | 0.000 | 300.000 | 587.800 | 0.000 | 350.000 | 588.400 | 0.000 | 400.000 | 588.600 | 0.000 |
| BT | 0.000 | 450.000 | 588.600 | 0.000 | 500.000 | 588.800 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 586.600 | 50.000 | 586.500 | 100.000 | 586.700 | 150.000 | 586.900 | 200.000 |
| GR | 587.000 | 218.000 | 584.100 | 225.000 | 583.200 | 228.000 | 582.800 | 230.000 | 582.000 | 231.000 |
| GR | 582.000 | 233.000 | 582.000 | 235.000 | 582.800 | 236.000 | 587.200 | 270.000 | 587.800 | 300.000 |
| GR | 588.400 | 350.000 | 588.600 | 400.000 | 588.600 | 450.000 | 588.800 | 500.000 | 0.000 | 0.000 |
| X1 | 135.000 | 0.000 | 0.000 | 0.000 | 14.000 | 14.000 | 14.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 148.000 | 0.000 | 0.000 | 0.000 | 13.000 | 13.000 | 13.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |

UPSTREAM FACE OF HWY 110 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 175.000 | 22.000 | 225.000 | 270.000 | 27.000 | 27.000 | 27.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -16.000 | 0.000 | 586.700 | 0.000 | 50.000 | 586.600 | 0.000 | 100.000 | 586.500 | 0.000 |
| BT | 0.000 | 150.000 | 586.700 | 0.000 | 200.000 | 586.900 | 0.000 | 230.000 | 586.900 | 582.800 |
| BT | 0.000 | 231.000 | 587.000 | 584.500 | 233.000 | 587.000 | 586.300 | 235.000 | 587.100 | 584.500 |
| BT | 0.000 | 236.000 | 587.100 | 582.800 | 270.000 | 587.200 | 0.000 | 300.000 | 587.800 | 0.000 |
| BT | 0.000 | 350.000 | 588.400 | 0.000 | 400.000 | 588.600 | 0.000 | 450.000 | 588.600 | 0.000 |
| BT | 0.000 | 500.000 | 588.800 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 583.400 | 25.000 | 583.200 | 50.000 | 583.400 | 75.000 | 583.600 | 100.000 |
| GR | 583.700 | 125.000 | 583.400 | 150.000 | 583.400 | 175.000 | 583.500 | 200.000 | 584.100 | 225.000 |
| GR | 583.200 | 228.000 | 582.800 | 230.000 | 582.000 | 231.000 | 582.000 | 233.000 | 582.000 | 235.000 |
| GR | 582.800 | 236.000 | 587.200 | 270.000 | 587.800 | 300.000 | 588.400 | 350.000 | 588.600 | 400.000 |
| GR | 588.600 | 450.000 | 588.800 | 500.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION UPSTREAM OF BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 176.000 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 230.000 | 0.000 | 236.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.035 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 179.000 | 0.000 | 0.000 | 0.000 | 3.000 | 3.000 | 3.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 227.000 | 0.000 | 239.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.000 | 0.100 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 326.000 | 26.000 | 225.000 | 250.000 | 147.000 | 147.000 | 147.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 583.400 | 25.000 | 583.200 | 50.000 | 583.400 | 75.000 | 583.600 | 100.000 |
| GR | 583.700 | 125.000 | 583.400 | 150.000 | 583.400 | 175.000 | 583.500 | 200.000 | 584.100 | 225.000 |
| GR | 583.200 | 228.000 | 582.800 | 230.000 | 582.400 | 235.000 | 582.400 | 240.000 | 583.200 | 245.000 |
| GR | 584.600 | 250.000 | 587.700 | 275.000 | 590.200 | 300.000 | 591.900 | 325.000 | 589.800 | 350.000 |
| GR | 590.100 | 375.000 | 589 700 | 400.000 | 593.600 | 425.000 | 590.000 | 450.000 | 588.500 | 475.000 |
| GR | 588.400 | 500.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT BAR LAKE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 476.000 | 26.000 | 225.000 | 250.000 | 150.000 | 150.000 | 150.000 | 0.000 | 0.000 | 0.000 |
| GR | 586.700 | 0.000 | 583.400 | 25.000 | 583.200 | 50.000 | 583.400 | 75.000 | 583.600 | 100.000 |
| GR | 583.700 | 125.000 | 583.400 | 150.000 | 583.400 | 175.000 | 583.500 | 200.000 | 584.100 | 225.000 |
| GR | 583.200 | 228.000 | 582.800 | 230.000 | 582.400 | 235.000 | 582.400 | 240.000 | 583.200 | 245.000 |
| GR | 584.600 | 250.000 | 587.700 | 275.000 | 590.200 | 300.000 | 591.900 | 325.000 | 589.800 | 350.000 |
| GR | 590.100 | 375.000 | 589.700 | 400.000 | 593.600 | 425.000 | 590.000 | 450.000 | 588.500 | 475.000 |
| GR | 588.400 | 500.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| EJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 1

CCHV=    0.100 CEHV=    0.300
*SECNO 0.000
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.00    582.70      0.00    580.14    582.75      0.05      0.00      0.00    583.30
      10.        0.       10.        0.        0.        5.        0.        0.        0.    586.90
     0.00      0.00      1.83      0.00     0.000     0.035     0.000     0.000    581.70    229.00
 0.003710        0.        0.        0.         0         0         0      0.00      8.55    237.55

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      1.06    582.91      0.00      0.00    582.95      0.04      0.20      0.00    583.95
      10.        0.       10.        0.        0.        6.        0.        0.        0.    587.05
     0.01      0.00      1.66      0.00     0.000     0.035     0.000     0.000    581.85    228.67
 0.002973       60.       60.       60.         1         0         0      0.00      9.37    238.05

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   108.00      1.12    583.05      0.00      0.00    583.08      0.04      0.13      0.00100000.00
      10.        0.       10.        0.        0.        7.        0.        0.        0.  100000.00
     0.02      0.00      1.52      0.00     0.000     0.035     0.000     0.000    581.92    228.40
 0.002449       48.       48.       48.         2         0         0      0.00     10.08    238.48

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=        9.000
   114.00      1.09    583.05      0.00      0.00    583.09      0.04      0.01      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.02      0.00      1.60      0.00     0.000     0.020     0.000     0.000    581.96    228.50
 0.000782        6.        6.        6.         1         0         0      0.00      8.50    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
   120.00      1.06    583.05      0.00      0.00    583.10      0.05      0.00      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.02      0.00      1.78      0.00     0.000     0.020     0.000     0.000    581.99    230.00
 0.000780        6.        6.        6.         0         0         0      0.00      6.00    236.00
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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 121.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
   121.00      1.05    583.05      0.00      0.00    583.10      0.05      0.00      0.00100000.00
      10.        0.       10.        0.        0.        5.        0.        0.        0.  100000.00
     0.02      0.00      1.83      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000861        1.        1.        1.         0         0         0     -0.04      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   135.00      1.06    583.06      0.00      0.00    583.12      0.05      0.01      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.02      0.00      1.81      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000835       14.       14.       14.         0         0         0     -0.04      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   148.00      1.08    583.08      0.00      0.00    583.13      0.05      0.01      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.78      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000804       13.       13.       13.         0         0         0     -0.04      6.00    236.00

*SECNO 175.000

3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
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        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00      1.10    583.10      0.00      0.00    583.15      0.05      0.02      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.74      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000751       27.       27.       27.         0         0         0     -0.05      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00      1.10    583.10      0.00      0.00    583.15      0.05      0.00      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.72      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.000710        1.        1.        1.         0         0         0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=      12.000
   179.00      1.12    583.12      0.00      0.00    583.16      0.04      0.00      0.00100000.00
      10.        0.       10.        0.        0.        6.        0.        0.        0.  100000.00
     0.03      0.00      1.54      0.00     0.000     0.035     0.000     0.000    582.00    228.44
 0.002534        3.        3.        3.         1         0         0      0.00      9.96    238.40

CCHV=   0.100 CEHV=   0.300
*SECNO 326.000

3265 DIVIDED FLOW

   326.00      0.93    583.33      0.00      0.00    583.34      0.01      0.18      0.00    584.10
      10.        0.       10.        0.        2.       12.        0.        0.        0.    584.60
     0.08      0.09      0.85      0.00     0.070     0.035     0.000     0.000    582.40     34.23
 0.000716      147.      147.      147.         2         0         0      0.00     49.40    245.45

*SECNO 476.000

3265 DIVIDED FLOW

        CROSS SECTION AT BAR LAKE
   476.00      1.01    583.41      0.00      0.00    583.42      0.01      0.08      0.00    584.10
      10.        1.        9.        0.        6.       13.        0.        0.        0.    584.60
     0.14      0.10      0.71      0.00     0.070     0.035     0.000     0.000    582.40     24.91
 0.000450      150.      150.      150.         2         0         0      0.00     99.26    245.76
```

THIS RUN EXECUTED 10 SEP 86 10:47:29

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 30 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0. | 3. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 2

CCHV=    0.100 CEHV=    0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.11    582.81    582.81    580.14    583.14      0.33      0.00      0.00    583.30
      30.        0.       30.        0.        0.        7.        0.        0.        0.    586.90
     0.00      0.00      4.60      0.00     0.000     0.035     0.000     0.000    581.70    228.43
 0.022534        0.        0.        0.         0        19         0      0.00     10.00    238.43

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      1.67    583.52      0.00      0.00    583.59      0.07      0.42      0.03    583.95
      30.        0.       30.        0.        0.       14.        0.        0.        0.    587.05
     0.01      0.00      2.15      0.00     0.000     0.035     0.000     0.000    581.85    226.42
 0.003376       60.       60.       60.         3         0         0      0.00     16.34    242.76

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   108.00      1.73    583.66      0.00      0.00    583.73      0.08      0.14      0.00100000.00
      30.        0.       30.        0.        0.       14.        0.        0.        0.  100000.00
     0.01      0.00      2.20      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.002640       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=        9.000
   114.00      1.70    583.65      0.00      0.00    583.76      0.10      0.01      0.01100000.00
      30.        0.       30.        0.        0.       12.        0.        0.        0.  100000.00
     0.01      0.00      2.58      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.001109        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
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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

  120.00     1.64    583.63     0.00      0.00    583.80     0.17      0.01      0.03100000.00
     30.       0.       30.       0.        0.        9.       0.        0.        0.  100000.00
    0.01     0.00      3.32     0.00     0.000     0.020    0.000     0.000    581.99    230.00
0.001767       6.        6.       6.         2         0        0      0.00      6.00    236.00

*SECNO 121.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
  121.00     1.62    583.62     0.00      0.00    583.81     0.19      0.00      0.01100000.00
     30.       0.       30.       0.        0.        9.       0.        0.        0.  100000.00
    0.02     0.00      3.50     0.00     0.000     0.020    0.000     0.000    582.00    230.00
0.002186       1.        1.       1.         0         0        0     -0.40      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
  135.00     1.66    583.66     0.00      0.00    583.84     0.19      0.03      0.00100000.00
     30.       0.       30.       0.        0.        9.       0.        0.        0.  100000.00
    0.02     0.00      3.46     0.00     0.000     0.020    0.000     0.000    582.00    230.00
0.002122      14.       14.      14.         0         0        0     -0.42      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
  148.00     1.69    583.69     0.00      0.00    583.87     0.18      0.03      0.00100000.00
     30.       0.       30.       0.        0.        9.       0.        0.        0.  100000.00
    0.02     0.00      3.39     0.00     0.000     0.020    0.000     0.000    582.00    230.00
0.002008      13.       13.      13.         0         0        0     -0.46      6.00    236.00
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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 175.000

3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00      1.76    583.76      0.00      0.00    583.93      0.17      0.05      0.00100000.00
      30.        0.       30.        0.        0.       9.        0.        0.        0.  100000.00
     0.02      0.00      3.26      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.001813       27.       27.       27.         1         0         0     -0.54      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00      1.80    583.80      0.00      0.00    583.94      0.14      0.00      0.01100000.00
      30.        0.       30.        0.        0.      10.        0.        0.        0.  100000.00
     0.02      0.00      3.01      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.001334        1.        1.        1.         2         0         0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=      12.000
   179.00      1.91    583.91      0.00      0.00    583.97      0.06      0.00      0.03100000.00
      30.        0.       30.        0.        0.      16.        0.        0.        0.  100000.00
     0.02      0.00      1.90      0.00     0.000     0.035     0.000     0.000    582.00    227.00
 0.001669        3.        3.        3.         2         0         0      0.00     12.00    239.00

CCHV=    0.100 CEHV=    0.300
*SECNO 326.000

3265 DIVIDED FLOW

   326.00      1.61    584.01      0.00      0.00    584.02      0.00      0.05      0.01    584.10
      30.       17.       13.        0.       106.      26.        0.        0.        0.    584.60
     0.15      0.16      0.51      0.00     0.070     0.035     0.000     0.000    582.40     20.35
 0.000125      147.      147.      147.         2         0         0      0.00    223.66    247.91
```

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

#SECNO 476.000

3265 DIVIDED FLOW

CROSS SECTION AT BAR LAKE

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 476.00 | 1.63 | 584.03 | 0.00 | 0.00 | 584.03 | 0.00 | 0.02 | 0.00 | 584.10 |
| 30. | 17. | 13. | 0. | 109. | 26. | 0. | 1. | 1. | 584.60 |
| 0.29 | 0.16 | 0.49 | 0.00 | 0.070 | 0.035 | 0.000 | 0.000 | 582.40 | 20.21 |
| 0.000114 | 150. | 150. | 150. | 2 | 0 | 0 | 0.00 | 224.75 | 247.97 |

THIS RUN EXECUTED 10 SEP 86 10:47:30

```
*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
```

T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 50 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0. | 4. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 3

CCHV=    0.100 CEHV=    0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.43    583.13    583.13    580.14    583.49      0.36      0.00      0.00    583.30
      50.        0.       50.        0.        0.       10.        0.        0.        0.    586.90
     0.00      0.00      4.81      0.00     0.000     0.035     0.000     0.000    581.70    226.26
 0.021434        0.        0.        0.         0        22         0      0.00     14.62    240.88

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      2.01    583.86      0.00      0.00    583.96      0.10      0.44      0.03    583.95
      50.        0.       50.        0.        0.       20.        0.        0.        0.    587.05
     0.01      0.00      2.50      0.00     0.000     0.035     0.000     0.000    581.85    225.30
 0.003642       60.       60.       60.         3         0         0      0.00     20.05    245.35

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   108.00      2.08    584.01      0.00      0.00    584.13      0.12      0.17      0.01100000.00
      50.        0.       50.        0.        0.       18.        0.        0.        0.  100000.00
     0.01      0.00      2.82      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.003258       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=        9.000
   114.00      2.03    583.99      0.00      0.00    584.17      0.18      0.01      0.03100000.00
      50.        0.       50.        0.        0.       15.        0.        0.        0.  100000.00
     0.01      0.00      3.42      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.001546        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
```

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS   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

  120.00     1.94    583.93      0.00      0.00    584.26      0.33      0.01      0.07100000.00
     50.       0.       50.        0.        0.       11.        0.        0.        0.  100000.00
    0.01      0.00     4.62      0.00     0.000     0.020     0.000     0.000    581.99    230.00
0.002951       6.        6.        6.         2         0         0      0.00      6.00    236.00

*SECNO 121.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
  121.00     1.90    583.90      0.00      0.00    584.29      0.40      0.00      0.03100000.00
     50.       0.       50.        0.        0.       10.        0.        0.        0.  100000.00
    0.01      0.00     5.06      0.00     0.000     0.020     0.000     0.000    582.00    230.00
0.004171       1.        1.        1.         2         0         0     -0.71      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
  135.00     2.00    584.00      0.00      0.00    584.36      0.36      0.05      0.01100000.00
     50.       0.       50.        0.        0.       10.        0.        0.        0.  100000.00
    0.01      0.00     4.83      0.00     0.000     0.020     0.000     0.000    582.00    230.00
0.003692      14.       14.       14.         2         0         0     -0.84      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
  148.00     2.07    584.07      0.00      0.00    584.41      0.34      0.05      0.01100000.00
     50.       0.       50.        0.        0.       11.        0.        0.        0.  100000.00
    0.01      0.00     4.68      0.00     0.000     0.020     0.000     0.000    582.00    230.00
0.003396      13.       13.       13.         2         0         0     -0.95      6.00    236.00
```

```
  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 175.000

3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00     2.20    584.20     0.00      0.00    584.51     0.31      0.09      0.01100000.00
      50.       0.       50.       0.        0.       11.       0.        0.        0.  100000.00
     0.02     0.00      4.44     0.00     0.000     0.020    0.000     0.000    582.00    230.00
 0.002974      27.       27.      27.         2         0        0     -1.16      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00     2.31    584.31     0.00      0.00    584.53     0.23      0.00      0.02100000.00
      50.       0.       50.       0.        0.       13.       0.        0.        0.  100000.00
     0.02     0.00      3.83     0.00     0.000     0.020    0.000     0.000    582.00    230.00
 0.001761       1.        1.       1.         2         0        0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=      12.000
   179.00     2.51    584.51     0.00      0.00    584.59     0.07      0.00      0.05100000.00
      50.       0.       50.       0.        0.       23.       0.        0.        0.  100000.00
     0.02     0.00      2.17     0.00     0.000     0.035    0.000     0.000    582.00    227.00
 0.001474       3.        3.       3.         2         0        0      0.00     12.00    239.00

CCHV=   0.100 CEHV=   0.300
*SECNO 326.000
   326.00     2.21    584.61     0.00      0.00    584.61     0.00      0.02      0.01    584.10
      50.      35.       15.       0.       229.       40.       0.        1.        0.    584.60
     0.20     0.15      0.38     0.00     0.070     0.035    0.000     0.000    582.40     15.83
 0.000044     147.      147.     147.         2         0        0      0.00    234.26    250.09

*SECNO 476.000
        CROSS SECTION AT BAR LAKE
   476.00     2.22    584.62     0.00      0.00    584.62     0.00      0.01      0.00    584.10
      50.      35.       15.       0.       230.       40.       0.        1.        1.    584.60
     0.39     0.15      0.38     0.00     0.070     0.035    0.000     0.000    582.40     15.77
 0.000043     150.      150.     150.         2         0        0      0.00    234.37    250.14
```

THIS RUN EXECUTED 10 SEP 86 10:47:31

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 75 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 5. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 4.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         GLOB      GCH       GROB      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=   0.100 CEHV=   0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.68    583.38    583.38    580.14    583.80      0.41      0.00      0.00    583.30
      75.        0.       75.        0.        0.       15.        0.        0.        0.    586.90
     0.00      0.03      5.17      0.00     0.070     0.035     0.000     0.000    581.70    224.83
 0.020477        0.        0.        0.         0        14         0      0.00     17.99    242.82

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      2.30    584.15      0.00      0.00    584.28      0.13      0.45      0.03    583.95
      75.        0.       75.        0.        0.       26.        0.        0.        0.    587.05
     0.01      0.01      2.85      0.00     0.070     0.035     0.000     0.000    581.85    224.51
 0.003874       60.       60.       60.         3         0         0      0.00     23.09    247.61

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=       12.000
   108.00      2.37    584.30      0.00      0.00    584.49      0.19      0.19      0.02100000.00
      75.        0.       75.        0.        0.       21.        0.        0.        0.  100000.00
     0.01      0.00      3.51      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.004172       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=   0.300 CEHV=   0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=        9.000
   114.00      2.30    584.26      0.00      0.00    584.56      0.30      0.02      0.05100000.00
      75.        0.       75.        0.        0.       17.        0.        0.        0.  100000.00
     0.01      0.00      4.39      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.002205        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
```

```
   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
   Q         GLOB      GCH       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

   120.00     2.14    584.13      0.00      0.00    584.73      0.60      0.02      0.15100000.00
      75.       0.       75.        0.        0.       12.        0.        0.        0.  100000.00
     0.01      0.00     6.22      0.00     0.000     0.020     0.000     0.000    581.99    230.00
 0.004922        6.        6.        6.         2         0         0      0.00      6.00    236.00

*SECNO 121.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
   121.00     2.05    584.05      0.00      0.00    584.83      0.78      0.01      0.09100000.00
      75.       0.       75.        0.        0.       11.        0.        0.        0.  100000.00
     0.01      0.00     7.10      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.007868        1.        1.        1.         2         0         0     -0.91      6.00    236.00

*SECNO 135.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   135.00     2.35    584.35      0.00      0.00    584.97      0.62      0.09      0.05100000.00
      75.       0.       75.        0.        0.       12.        0.        0.        0.  100000.00
     0.01      0.00     6.31      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.005855       14.       14.       14.         3         0         0     -1.41      6.00    236.00

*SECNO 148.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
   148.00     2.50    584.50      0.00      0.00    585.06      0.56      0.07      0.02100000.00
      75.       0.       75.        0.        0.       13.        0.        0.        0.  100000.00
     0.01      0.00     5.99      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.005154       13.       13.       13.         2         0         0     -1.71      6.00    236.00
```

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
  Q         GLOB      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 175.000

3370 NORMAL BRIDGE,NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00     2.72   584.72     0.00      0.00   585.21     0.49      0.13      0.02100000.00
     75.        0.     75.        0.        0.     13.        0.        0.        0.  100000.00
     0.01     0.00     5.63     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.004530      27.      27.      27.         2        0        0     -2.19      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00     2.97   584.97     0.00      0.00   585.27     0.30      0.00      0.06100000.00
     75.        0.     75.        0.        0.     17.        0.        0.        0.  100000.00
     0.01     0.00     4.39     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.001924       1.       1.       1.         2        0        0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=      12.000
   179.00     3.26   585.26     0.00      0.00   585.34     0.09      0.00      0.06100000.00
     75.        0.     75.        0.        0.     32.        0.        0.        0.  100000.00
     0.01     0.00     2.35     0.00     0.000    0.035    0.000     0.000    582.00    227.00
 0.001265       3.       3.       3.         2        0        0      0.00     12.00    239.00

CCHV=   0.100 CEHV=   0.300
*SECNO 326.000
   326.00     2.96   585.36     0.00      0.00   585.36     0.00      0.01      0.01    584.10
     75.       55.     19.        0.       387.     58.        2.        1.        0.     584.60
     0.23     0.14     0.33     0.05     0.070    0.035    0.070     0.000    582.40     10.17
 0.000020     147.     147.     147.         2        0        0      0.00    245.94    256.11

*SECNO 476.000
        CROSS SECTION AT BAR LAKE
   476.00     2.96   585.36     0.00      0.00   585.36     0.00      0.00      0.00    584.10
     75.       55.     19.        0.       388.     59.        2.        2.        1.     584.60
     0.44     0.14     0.33     0.05     0.070    0.035    0.070     0.000    582.40     10.14
 0.000020     150.     150.     150.         2        0        0      0.00    245.99    256.14
```

THIS RUN EXECUTED 10 SEP 86 10:47:32

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP - FIS
T2 BAR LAKE OUTLET TO MOUTH OF LAKE MICHIGAN
T3 BACKWATER PROFILES - 100 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 6. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 580.140 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 15.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 5

CCHV=    0.100 CEHV=    0.300
*SECNO 0.000
3720 CRITICAL DEPTH ASSUMED
        CROSS SECTION AT MOUTH OF LAKE
     0.00      1.88    583.58    583.58    580.14    584.05      0.47      0.00      0.00    583.30
     100.        0.      100.        0.        0.       18.        0.        0.        0.    586.90
     0.00      0.03      5.52      0.00     0.070     0.035     0.000     0.000    581.70    224.43
 0.019332        0.        0.        0.         0        17         0      0.00     19.88    244.31

*SECNO 60.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
    60.00      2.53    584.38      0.00      0.00    584.54      0.15      0.46      0.03    583.95
     100.        0.      100.        0.        0.       32.        0.        0.        0.    587.05
     0.01      0.46      3.14      0.00     0.070     0.035     0.000     0.000    581.85    223.95
 0.004040       60.       60.       60.         3         0         0      0.00     25.46    249.41

*SECNO 108.000

3470 ENCROACHMENT STATIONS=      227.0      239.0  TYPE=      1  TARGET=        12.000
   108.00      2.60    584.52      0.00      0.00    584.79      0.27      0.22      0.03100000.00
     100.        0.      100.        0.        0.       24.        0.        0.        0.  100000.00
     0.01      0.00      4.15      0.00     0.000     0.035     0.000     0.000    581.92    227.00
 0.005167       48.       48.       48.         2         0         0      0.00     12.00    239.00

CCHV=    0.300 CEHV=    0.500
*SECNO 114.000

3470 ENCROACHMENT STATIONS=      228.0      237.0  TYPE=      1  TARGET=         9.000
   114.00      2.50    584.46      0.00      0.00    584.90      0.44      0.02      0.08100000.00
     100.        0.      100.        0.        0.       19.        0.        0.        0.  100000.00
     0.01      0.00      5.30      0.00     0.000     0.020     0.000     0.000    581.96    228.00
 0.002929        6.        6.        6.         2         0         0      0.00      9.00    237.00

*SECNO 120.000

3301 HV CHANGED MORE THAN HVINS
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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


3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        CROSS SECTION DOWNSTREAM OF BRIDGE
   120.00      2.22    584.21    584.17      0.00    585.20      0.99      0.03      0.28100000.00
     100.        0.      100.        0.        0.       13.        0.        0.        0.  100000.00
     0.01      0.00      7.97      0.00     0.000     0.020     0.000     0.000    581.99    230.00
 0.007840        6.        6.        6.         6        11         0      0.00      6.00    236.00


*SECNO 121.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
        DOWNSTREAM FACE OF HWY 110 BRIDGE
   121.00      2.16    584.16    584.16      0.00    585.43      1.27      0.01      0.14100000.00
     100.        0.      100.        0.        0.       11.        0.        0.        0.  100000.00
     0.01      0.00      9.03      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.012417        1.        1.        1.         3        12         0     -1.09      6.00    236.00


*SECNO 135.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30


3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
   135.00      2.90    584.90      0.00      0.00    585.70      0.80      0.13      0.14100000.00
     100.        0.      100.        0.        0.       14.        0.        0.        0.  100000.00
     0.01      0.00      7.18      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.007412       14.       14.       14.         5         0         0     -2.68      6.00    236.00


*SECNO 148.000

3370 NORMAL BRIDGE,NRD= 17 MIN ELTRD=  586.50 MAX ELLC=  586.30


3470 ENCROACHMENT STATIONS=      230.0      236.0  TYPE=      1  TARGET=        6.000
   148.00      3.06    585.06      0.00      0.00    585.81      0.75      0.09      0.02100000.00
     100.        0.      100.        0.        0.       14.        0.        0.        0.  100000.00
     0.01      0.00      6.95      0.00     0.000     0.020     0.000     0.000    582.00    230.00
 0.007008       13.       13.       13.         2         0         0     -3.16      6.00    236.00
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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 175.000

3370 NORMAL BRIDGE,NRD= 16 MIN ELTRD=  586.50 MAX ELLC=  586.30

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        UPSTREAM FACE OF HWY 110 BRIDGE
   175.00     3.32   585.32     0.00      0.00   586.01     0.69      0.18      0.02100000.00
     100.       0.     100.       0.        0.     15.       0.        0.        0.  100000.00
     0.01     0.00     6.65     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.006570      27.      27.      27.         2        0        0     -4.10      6.00    236.00

*SECNO 176.000

3470 ENCROACHMENT STATIONS=     230.0     236.0  TYPE=     1  TARGET=       6.000
        CROSS SECTION UPSTREAM OF BRIDGE
   176.00     3.80   585.80     0.00      0.00   586.12     0.32      0.00      0.11100000.00
     100.       0.     100.       0.        0.     22.       0.        0.        0.  100000.00
     0.01     0.00     4.54     0.00     0.000    0.020    0.000     0.000    582.00    230.00
 0.001772       1.       1.       1.         3        0        0      0.00      6.00    236.00

*SECNO 179.000

3470 ENCROACHMENT STATIONS=     227.0     239.0  TYPE=     1  TARGET=      12.000
   179.00     4.11   586.11     0.00      0.00   586.20     0.09      0.00      0.07100000.00
     100.       0.     100.       0.        0.     42.       0.        0.        0.  100000.00
     0.01     0.00     2.37     0.00     0.000    0.035    0.000     0.000    582.00    227.00
 0.001016       3.       3.       3.         2        0        0      0.00     12.00    239.00

CCHV=   0.100 CEHV=   0.300
*SECNO 326.000
   326.00     3.81   586.21     0.00      0.00   586.21     0.00      0.01      0.01    584.10
     100.      76.      24.       1.      573.     80.      10.        1.        1.     584.60
     0.25     0.13     0.30     0.06     0.070    0.035    0.070     0.000    582.40      3.71
 0.000011     147.     147.     147.         2        0        0      0.00    259.27    262.98

*SECNO 476.000
        CROSS SECTION AT BAR LAKE
   476.00     3.81   586.21     0.00      0.00   586.21     0.00      0.00      0.00    584.10
     100.      76.      24.       1.      573.     80.      10.        4.        1.     584.60
     0.50     0.13     0.30     0.06     0.070    0.035    0.070     0.000    582.40      3.70
 0.000011     150.     150.     150.         2        0        0      0.00    259.29    263.00
```

THIS RUN EXECUTED 10 SEP 86 10:47:34

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

BACKWATER PROFILES - 10

SUMMARY PRINTOUT TABLE 150

| | SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 10.00 | 582.70 | 0.00 | 582.75 | 37.10 | 1.83 | 5.45 | 1.64 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 30.00 | 582.81 | 582.81 | 583.14 | 225.34 | 4.60 | 6.52 | 2.00 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 50.00 | 583.13 | 583.13 | 583.49 | 214.34 | 4.81 | 10.40 | 3.42 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 75.00 | 583.38 | 583.38 | 583.80 | 204.77 | 5.17 | 14.52 | 5.24 |
| * | 0.000 | 0.00 | 0.00 | 0.00 | 581.70 | 100.00 | 583.58 | 583.58 | 584.05 | 193.32 | 5.52 | 18.19 | 7.19 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 10.00 | 582.91 | 0.00 | 582.95 | 29.73 | 1.66 | 6.04 | 1.83 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 30.00 | 583.52 | 0.00 | 583.59 | 33.76 | 2.15 | 13.93 | 5.16 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 50.00 | 583.86 | 0.00 | 583.96 | 36.42 | 2.50 | 20.04 | 8.29 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 75.00 | 584.15 | 0.00 | 584.28 | 38.74 | 2.85 | 26.34 | 12.05 |
| | 60.000 | 60.00 | 0.00 | 0.00 | 581.85 | 100.00 | 584.38 | 0.00 | 584.54 | 40.40 | 3.14 | 31.99 | 15.73 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 10.00 | 583.05 | 0.00 | 583.08 | 24.49 | 1.52 | 6.58 | 2.02 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 30.00 | 583.66 | 0.00 | 583.73 | 26.40 | 2.20 | 13.63 | 5.84 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 50.00 | 584.01 | 0.00 | 584.13 | 32.58 | 2.82 | 17.73 | 8.76 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 75.00 | 584.30 | 0.00 | 584.49 | 41.72 | 3.51 | 21.35 | 11.61 |
| | 108.000 | 48.00 | 0.00 | 0.00 | 581.92 | 100.00 | 584.52 | 0.00 | 584.79 | 51.67 | 4.15 | 24.09 | 13.91 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 10.00 | 583.05 | 0.00 | 583.09 | 7.82 | 1.60 | 6.26 | 3.58 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 30.00 | 583.65 | 0.00 | 583.76 | 11.09 | 2.58 | 11.61 | 9.01 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 50.00 | 583.99 | 0.00 | 584.17 | 15.46 | 3.42 | 14.62 | 12.71 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 75.00 | 584.26 | 0.00 | 584.56 | 22.05 | 4.39 | 17.08 | 15.97 |
| | 114.000 | 6.00 | 0.00 | 0.00 | 581.96 | 100.00 | 584.46 | 0.00 | 584.90 | 29.29 | 5.30 | 18.88 | 18.48 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 10.00 | 583.05 | 0.00 | 583.10 | 7.80 | 1.78 | 5.63 | 3.58 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 30.00 | 583.63 | 0.00 | 583.80 | 17.67 | 3.32 | 9.03 | 7.14 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 50.00 | 583.93 | 0.00 | 584.26 | 29.51 | 4.62 | 10.82 | 9.20 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 75.00 | 584.13 | 0.00 | 584.73 | 49.22 | 6.22 | 12.05 | 10.69 |
| | 120.000 | 6.00 | 0.00 | 0.00 | 581.99 | 100.00 | 584.21 | 584.17 | 585.20 | 78.40 | 7.97 | 12.55 | 11.29 |

| | SECND | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.05 | 0.00 | 583.10 | 8.61 | 1.83 | 5.48 | 3.41 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.62 | 0.00 | 583.81 | 21.86 | 3.50 | 8.58 | 6.42 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 50.00 | 583.90 | 0.00 | 584.29 | 41.71 | 5.06 | 9.87 | 7.74 |
| | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.05 | 0.00 | 584.83 | 78.68 | 7.10 | 10.57 | 8.46 |
| * | 121.000 | 1.00 | 586.50 | 586.30 | 582.00 | 100.00 | 584.16 | 584.16 | 585.43 | 124.17 | 9.03 | 11.07 | 8.97 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.06 | 0.00 | 583.12 | 8.35 | 1.81 | 5.53 | 3.46 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.66 | 0.00 | 583.84 | 21.22 | 3.46 | 8.67 | 6.51 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.00 | 0.00 | 584.36 | 36.92 | 4.83 | 10.35 | 8.23 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.35 | 0.00 | 584.97 | 58.55 | 6.31 | 11.88 | 9.80 |
| | 135.000 | 14.00 | 586.50 | 586.30 | 582.00 | 100.00 | 584.90 | 0.00 | 585.70 | 74.12 | 7.18 | 13.92 | 11.62 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.08 | 0.00 | 583.13 | 8.04 | 1.78 | 5.61 | 3.53 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.69 | 0.00 | 583.87 | 20.08 | 3.39 | 8.85 | 6.69 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.07 | 0.00 | 584.41 | 33.96 | 4.68 | 10.69 | 8.58 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.50 | 0.00 | 585.06 | 51.54 | 5.99 | 12.52 | 10.45 |
| | 148.000 | 13.00 | 586.50 | 586.30 | 582.00 | 100.00 | 585.06 | 0.00 | 585.81 | 70.08 | 6.95 | 14.38 | 11.95 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 10.00 | 583.10 | 0.00 | 583.15 | 7.51 | 1.74 | 5.74 | 3.65 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 30.00 | 583.76 | 0.00 | 583.93 | 18.13 | 3.26 | 9.19 | 7.05 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 50.00 | 584.20 | 0.00 | 584.51 | 29.74 | 4.44 | 11.26 | 9.17 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 75.00 | 584.72 | 0.00 | 585.21 | 45.30 | 5.63 | 13.33 | 11.14 |
| | 175.000 | 27.00 | 586.50 | 586.30 | 582.00 | 100.00 | 585.32 | 0.00 | 586.01 | 65.70 | 6.65 | 15.04 | 12.34 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 10.00 | 583.10 | 0.00 | 583.15 | 7.10 | 1.72 | 5.81 | 3.75 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 30.00 | 583.80 | 0.00 | 583.94 | 13.34 | 3.01 | 9.98 | 8.21 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.31 | 0.00 | 584.53 | 17.61 | 3.83 | 13.05 | 11.91 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 75.00 | 584.97 | 0.00 | 585.27 | 19.24 | 4.39 | 17.08 | 17.10 |
| | 176.000 | 1.00 | 0.00 | 0.00 | 582.00 | 100.00 | 585.80 | 0.00 | 586.12 | 17.72 | 4.54 | 22.00 | 23.75 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 10.00 | 583.12 | 0.00 | 583.16 | 25.34 | 1.54 | 6.48 | 1.99 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 30.00 | 583.91 | 0.00 | 583.97 | 16.69 | 1.90 | 15.80 | 7.34 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 50.00 | 584.51 | 0.00 | 584.59 | 14.74 | 2.17 | 23.05 | 13.03 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 75.00 | 585.26 | 0.00 | 585.34 | 12.65 | 2.35 | 31.96 | 21.09 |
| | 179.000 | 3.00 | 0.00 | 0.00 | 582.00 | 100.00 | 586.11 | 0.00 | 586.20 | 10.16 | 2.37 | 42.20 | 31.38 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 10.00 | 583.33 | 0.00 | 583.34 | 7.16 | 0.85 | 13.59 | 3.74 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 30.00 | 584.01 | 0.00 | 584.02 | 1.25 | 0.51 | 131.05 | 26.87 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.61 | 0.00 | 584.61 | 0.44 | 0.38 | 268.80 | 75.29 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 75.00 | 585.36 | 0.00 | 585.36 | 0.20 | 0.33 | 448.13 | 166.90 |
| | 326.000 | 147.00 | 0.00 | 0.00 | 582.40 | 100.00 | 586.21 | 0.00 | 586.21 | 0.11 | 0.30 | 663.36 | 307.34 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 10.00 | 583.41 | 0.00 | 583.42 | 4.50 | 0.71 | 19.14 | 4.71 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 30.00 | 584.03 | 0.00 | 584.03 | 1.14 | 0.49 | 135.38 | 28.04 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 50.00 | 584.62 | 0.00 | 584.62 | 0.43 | 0.38 | 270.44 | 76.00 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 75.00 | 585.36 | 0.00 | 585.36 | 0.20 | 0.33 | 448.90 | 167.35 |
| | 476.000 | 150.00 | 0.00 | 0.00 | 582.40 | 100.00 | 586.21 | 0.00 | 586.21 | 0.11 | 0.30 | 663.78 | 307.64 |

BACKWATER PROFILES - 10

SUMMARY PRINTOUT TABLE 150

| | SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|---|
| | 0.000 | 10.00 | 582.70 | 0.00 | 0.00 | 2.56 | 8.55 | 0.00 |
| * | 0.000 | 30.00 | 582.81 | 0.11 | 0.00 | 2.67 | 10.00 | 0.00 |
| * | 0.000 | 50.00 | 583.13 | 0.32 | 0.00 | 2.99 | 14.62 | 0.00 |
| * | 0.000 | 75.00 | 583.38 | 0.25 | 0.00 | 3.24 | 17.99 | 0.00 |
| * | 0.000 | 100.00 | 583.58 | 0.19 | 0.00 | 3.44 | 19.88 | 0.00 |
| | 60.000 | 10.00 | 582.91 | 0.00 | 0.21 | 0.00 | 9.37 | 60.00 |
| | 60.000 | 30.00 | 583.52 | 0.61 | 0.70 | 0.00 | 16.34 | 60.00 |
| | 60.000 | 50.00 | 583.86 | 0.34 | 0.73 | 0.00 | 20.05 | 60.00 |
| | 60.000 | 75.00 | 584.15 | 0.29 | 0.77 | 0.00 | 23.09 | 60.00 |
| | 60.000 | 100.00 | 584.38 | 0.23 | 0.81 | 0.00 | 25.46 | 60.00 |
| | 108.000 | 10.00 | 583.05 | 0.00 | 0.14 | 0.00 | 10.08 | 48.00 |
| | 108.000 | 30.00 | 583.66 | 0.61 | 0.14 | 0.00 | 12.00 | 48.00 |
| | 108.000 | 50.00 | 584.01 | 0.35 | 0.15 | 0.00 | 12.00 | 48.00 |
| | 108.000 | 75.00 | 584.30 | 0.29 | 0.15 | 0.00 | 12.00 | 48.00 |
| | 108.000 | 100.00 | 584.52 | 0.23 | 0.14 | 0.00 | 12.00 | 48.00 |
| | 114.000 | 10.00 | 583.05 | 0.00 | 0.01 | 0.00 | 8.50 | 6.00 |
| | 114.000 | 30.00 | 583.65 | 0.60 | 0.00 | 0.00 | 9.00 | 6.00 |
| | 114.000 | 50.00 | 583.99 | 0.33 | -0.02 | 0.00 | 9.00 | 6.00 |
| | 114.000 | 75.00 | 584.26 | 0.27 | -0.04 | 0.00 | 9.00 | 6.00 |
| | 114.000 | 100.00 | 584.46 | 0.20 | -0.06 | 0.00 | 9.00 | 6.00 |
| | 120.000 | 10.00 | 583.05 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 30.00 | 583.63 | 0.58 | -0.03 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 50.00 | 583.93 | 0.30 | -0.06 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 75.00 | 584.13 | 0.20 | -0.13 | 0.00 | 6.00 | 6.00 |
| | 120.000 | 100.00 | 584.21 | 0.08 | -0.25 | 0.00 | 6.00 | 6.00 |
| | 121.000 | 10.00 | 583.05 | 0.00 | 0.00 | 0.00 | 6.00 | 1.00 |
| | 121.000 | 30.00 | 583.62 | 0.57 | -0.01 | 0.00 | 6.00 | 1.00 |
| | 121.000 | 50.00 | 583.90 | 0.28 | -0.03 | 0.00 | 6.00 | 1.00 |
| | 121.000 | 75.00 | 584.05 | 0.15 | -0.08 | 0.00 | 6.00 | 1.00 |
| * | 121.000 | 100.00 | 584.16 | 0.11 | -0.05 | 0.00 | 6.00 | 1.00 |
| | 135.000 | 10.00 | 583.06 | 0.00 | 0.01 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 30.00 | 583.66 | 0.59 | 0.04 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 50.00 | 584.00 | 0.34 | 0.10 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 75.00 | 584.35 | 0.35 | 0.31 | 0.00 | 6.00 | 14.00 |
| | 135.000 | 100.00 | 584.90 | 0.54 | 0.74 | 0.00 | 6.00 | 14.00 |
| | 148.000 | 10.00 | 583.08 | 0.00 | 0.01 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 30.00 | 583.69 | 0.62 | 0.04 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 50.00 | 584.07 | 0.38 | 0.08 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 75.00 | 584.50 | 0.43 | 0.15 | 0.00 | 6.00 | 13.00 |
| | 148.000 | 100.00 | 585.06 | 0.55 | 0.16 | 0.00 | 6.00 | 13.00 |

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 175.000 | 10.00 | 583.10 | 0.00 | 0.02 | 0.00 | 6.00 | 27.00 |
| 175.000 | 30.00 | 583.76 | 0.66 | 0.07 | 0.00 | 6.00 | 27.00 |
| 175.000 | 50.00 | 584.20 | 0.44 | 0.13 | 0.00 | 6.00 | 27.00 |
| 175.000 | 75.00 | 584.72 | 0.52 | 0.22 | 0.00 | 6.00 | 27.00 |
| 175.000 | 100.00 | 585.32 | 0.60 | 0.27 | 0.00 | 6.00 | 27.00 |
| 176.000 | 10.00 | 583.10 | 0.00 | 0.00 | 0.00 | 6.00 | 1.00 |
| 176.000 | 30.00 | 583.80 | 0.69 | 0.03 | 0.00 | 6.00 | 1.00 |
| 176.000 | 50.00 | 584.31 | 0.51 | 0.10 | 0.00 | 6.00 | 1.00 |
| 176.000 | 75.00 | 584.97 | 0.67 | 0.25 | 0.00 | 6.00 | 1.00 |
| 176.000 | 100.00 | 585.80 | 0.83 | 0.48 | 0.00 | 6.00 | 1.00 |
| 179.000 | 10.00 | 583.12 | 0.00 | 0.02 | 0.00 | 9.96 | 3.00 |
| 179.000 | 30.00 | 583.91 | 0.79 | 0.11 | 0.00 | 12.00 | 3.00 |
| 179.000 | 50.00 | 584.51 | 0.60 | 0.21 | 0.00 | 12.00 | 3.00 |
| 179.000 | 75.00 | 585.26 | 0.74 | 0.28 | 0.00 | 12.00 | 3.00 |
| 179.000 | 100.00 | 586.11 | 0.85 | 0.31 | 0.00 | 12.00 | 3.00 |
| 326.000 | 10.00 | 583.33 | 0.00 | 0.21 | 0.00 | 49.40 | 147.00 |
| 326.000 | 30.00 | 584.01 | 0.69 | 0.10 | 0.00 | 223.66 | 147.00 |
| 326.000 | 50.00 | 584.61 | 0.60 | 0.10 | 0.00 | 234.26 | 147.00 |
| 326.000 | 75.00 | 585.36 | 0.75 | 0.10 | 0.00 | 245.94 | 147.00 |
| 326.000 | 100.00 | 586.21 | 0.85 | 0.10 | 0.00 | 259.27 | 147.00 |
| 476.000 | 10.00 | 583.41 | 0.00 | 0.09 | 0.00 | 99.26 | 150.00 |
| 476.000 | 30.00 | 584.03 | 0.62 | 0.02 | 0.00 | 224.75 | 150.00 |
| 476.000 | 50.00 | 584.62 | 0.58 | 0.01 | 0.00 | 234.37 | 150.00 |
| 476.000 | 75.00 | 585.36 | 0.74 | 0.00 | 0.00 | 245.99 | 150.00 |
| 476.000 | 100.00 | 586.21 | 0.85 | 0.00 | 0.00 | 259.29 | 150.00 |

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     0.000  PROFILE= 2  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.000  PROFILE= 3  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.000  PROFILE= 4  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.000  PROFILE= 5  CRITICAL DEPTH ASSUMED

CAUTION  SECNO=   121.000  PROFILE= 5  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=   121.000  PROFILE= 5  MINIMUM SPECIFIC ENERGY
```

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp

3) WATERCOURSE: Manistee River

4) DOCUMENT TYPE: 10, 50, 500 & 100 year flood

00BREAK00

MANISTEE TOWNSHIP, FIS

MANISTEE RIVER, - CHANNEL 2
(SECONDARY CHANNEL)

100 YR FLOOD - VARIABLE FLOWS

INP = MNST.CH2

```
EEEEEE   EEEEEE          L        EEEEEE   EEEEEE
E        E               L        E        E
E        E               L        E        E
EEEE     EEEE            L        EEEE     EEEE
E        E               L        E        E
EEEEEE   EEEEEE          LLLLLL   EEEEEE   EEEEEE
```

USACOE DETROIT H800 VOS 5.1.1  PRINTER: 6

EE LEE  1 APR 87  9:08:54

TERMINAL: 105

RUN MADE ON SECONDARY CHANNEL WHICH EXISTS IN LEFT OVERBANK AREA OF MANISTEE RIVER MAIN CHANNEL - Results of this run were compared to MULTIPLE FLOW RUN MADE FOR MAIN CHANNEL TO DETERMINE FLOW SPLIT.

THIS RUN EXECUTED 1 APR 87  9:08:02

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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
*****************************************
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J
T1      MANISTEE TOWNSHIP, FIS
T2      MANISTEE RIVER-CHANNEL 2
T3      100 YEAR FLOOD--4260 CFS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       2        0.       0   0.000000    0.00     0.0      0.    579.800   0.000

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

NC      0.035     0.035     0.030     0.500     1.000     0.000     0.000     0.000     0.000     0.000
QT      5.000  4260.000  3520.000  2520.000  1520.000   520.000     0.000     0.000     0.000     0.000
          CROSS SECTION AT MANISTEE LAKE
X1      0.000    15.000   220.000   390.000     0.000     0.000     0.000     0.000     0.000     0.000
GR    582.000     0.000   582.000   100.000   582.000   220.000   579.700   228.000   577.500   238.000
GR    575.000   250.000   570.000   260.000   565.000   290.000   570.000   320.000   577.800   360.000
GR    579.800   370.000   580.400   380.000   582.000   390.000   582.000   450.000   582.000   610.000

X1   1000.000     0.000     0.000     0.000  1000.000  1000.000  1000.000     0.000     0.000     0.000

X1   1940.000     0.000     0.000     0.000   940.000   940.000   940.000     0.000     0.000     0.000
X3      0.000     0.000     0.000     5.000     0.000   605.000     0.000     0.000     0.000     0.000

X1   2200.000     0.000     0.000     0.000   260.000   260.000   260.000     0.000     0.000     0.000
X3      0.000     0.000     0.000    70.000     0.000   540.000     0.000     0.000     0.000     0.000

X1   2400.000     0.000     0.000     0.000   200.000   200.000   200.000     0.000     0.000     0.000
X3      0.000     0.000     0.000   120.000     0.000   490.000     0.000     0.000     0.000     0.000

X1   2600.000     0.000     0.000     0.000   200.000   200.000   200.000     0.000     0.000     0.000
X3      0.000     0.000     0.000   170.000     0.000   440.000     0.000     0.000     0.000     0.000

          OPENING OF BERMS
X1   2800.000    30.000   220.000   390.000   200.000   200.000   200.000     0.000     0.000     0.000
GR    583.700     0.000   584.000    25.000   584.300    50.000   584.400    75.000   585.000   100.000
GR    585.800   125.000   586.600   150.000   587.700   175.000   589.300   200.000   585.900   205.000
GR    587.800   210.000   586.400   220.000   579.700   228.000   577.500   238.000   575.000   250.000
GR    570.000   260.000   565.000   290.000   570.000   320.000   577.800   360.000   579.800   370.000
GR    580.400   380.000   581.900   390.000   589.200   400.000   588.600   425.000   587.200   450.000
GR    585.900   475.000   585.000   500.000   584.200   525.000   584.200   550.000   584.000   575.000
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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3000.000 | 15.000 | 1220.000 | 1390.000 | 200.000 | 200.000 | 200.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 830.000 | 0.000 | 1400.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 582.000 | 1000.000 | 582.000 | 1220.000 | 579.700 | 1228.000 | 577.500 | 1238.000 | 575.000 | 1250.000 |
| GR | 570.000 | 1260.000 | 565.000 | 1290.000 | 570.000 | 1320.000 | 577.800 | 1360.000 | 579.800 | 1370.000 |
| GR | 580.400 | 1380.000 | 582.000 | 1390.000 | 585.000 | 1400.000 | 582.000 | 1420.000 | 582.000 | 1500.000 |
| X1 | 3500.000 | 0.000 | 0.000 | 0.000 | 500.000 | 500.000 | 500.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1113.000 | 0.000 | 1400.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 4000.000 | 29.000 | 250.000 | 398.000 | 500.000 | 500.000 | 500.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 183.000 | 0.000 | 410.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 572.300 | 260.000 | 561.300 | 270.000 | 561.300 | 280.000 | 567.500 | 290.000 |
| GR | 567.700 | 300.000 | 565.700 | 310.000 | 560.000 | 320.000 | 560.000 | 330.000 | 560.400 | 340.000 |
| GR | 563.300 | 350.000 | 569.500 | 360.000 | 575.200 | 370.000 | 575.600 | 377.000 | 582.700 | 398.000 |
| GR | 585.000 | 410.000 | 582.000 | 430.000 | 582.000 | 450.000 | 582.000 | 500.000 | 0.000 | 0.000 |
| X1 | 4199.000 | 29.000 | 132.000 | 259.000 | 199.000 | 199.000 | 199.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 132.000 | 0.000 | 259.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 591.420 | 0.000 | 591.470 | 25.000 | 591.550 | 50.000 | 591.640 | 75.000 | 591.840 | 122.000 |
| GR | 574.500 | 131.000 | 574.500 | 132.000 | 572.800 | 142.000 | 561.800 | 152.000 | 561.300 | 162.000 |
| GR | 567.500 | 172.000 | 567.700 | 182.000 | 565.700 | 192.000 | 565.700 | 192.500 | 557.500 | 197.500 |
| GR | 557.500 | 202.000 | 559.800 | 212.000 | 560.400 | 222.000 | 563.300 | 232.000 | 569.500 | 242.000 |
| GR | 575.200 | 252.000 | 575.600 | 259.000 | 575.700 | 262.000 | 592.260 | 272.000 | 592.290 | 282.000 |
| GR | 592.290 | 317.000 | 592.280 | 342.000 | 592.240 | 367.000 | 592.310 | 392.000 | 0.000 | 0.000 |

DOWNSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4200.000 | 29.000 | 132.000 | 259.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| BT | -13.000 | 0.000 | 591.420 | 0.000 | 50.000 | 591.550 | 0.000 | 132.000 | 591.840 | 0.000 |
| BT | 0.000 | 132.000 | 591.840 | 574.500 | 132.000 | 591.840 | 588.500 | 192.500 | 592.000 | 588.500 |
| BT | 0.000 | 192.500 | 592.000 | 565.700 | 197.500 | 592.000 | 557.500 | 197.500 | 592.000 | 588.500 |
| BT | 0.000 | 262.000 | 592.230 | 588.500 | 262.000 | 592.230 | 575.700 | 262.000 | 592.230 | 0.000 |
| BT | 0.000 | 392.000 | 592.310 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 591.420 | 0.000 | 591.470 | 25.000 | 591.550 | 50.000 | 591.640 | 75.000 | 591.840 | 122.000 |
| GR | 591.840 | 131.000 | 574.500 | 132.000 | 572.800 | 142.000 | 561.800 | 152.000 | 561.300 | 162.000 |
| GR | 567.500 | 172.000 | 567.700 | 182.000 | 565.700 | 192.000 | 565.700 | 192.500 | 557.500 | 197.500 |
| GR | 557.500 | 202.000 | 559.800 | 212.000 | 560.400 | 222.000 | 563.300 | 232.000 | 569.500 | 242.000 |
| GR | 575.200 | 252.000 | 575.600 | 259.000 | 592.230 | 262.000 | 592.260 | 272.000 | 592.290 | 282.000 |
| GR | 592.290 | 317.000 | 592.280 | 342.000 | 592.240 | 367.000 | 592.310 | 392.000 | 0.000 | 0.000 |

UPSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4214.000 | 0.000 | 0.000 | 0.000 | 14.000 | 14.000 | 14.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X1 | 4215.000 | 29.000 | 132.000 | 259.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 131.000 | 0.000 | 260.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 591.420 | 0.000 | 591.470 | 25.000 | 591.550 | 50.000 | 591.640 | 75.000 | 591.840 | 122.000 |
| GR | 574.500 | 131.000 | 574.500 | 132.000 | 572.800 | 142.000 | 561.800 | 152.000 | 561.300 | 162.000 |
| GR | 567.500 | 172.000 | 567.700 | 182.000 | 565.700 | 192.000 | 565.700 | 192.500 | 557.500 | 197.500 |
| GR | 557.500 | 202.000 | 559.800 | 212.000 | 560.400 | 222.000 | 563.300 | 232.000 | 569.500 | 242.000 |
| GR | 575.200 | 252.000 | 575.600 | 259.000 | 575.700 | 262.000 | 592.260 | 272.000 | 592.290 | 282.000 |
| GR | 592.290 | 317.000 | 592.280 | 342.000 | 592.240 | 367.000 | 592.310 | 392.000 | 0.000 | 0.000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4225.000 | 36.000 | 250.000 | 398.000 | 10.000 | 10.000 | 10.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 250.000 | 0.000 | 399.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 572.800 | 260.000 | 561.800 | 270.000 | 561.300 | 280.000 | 567.500 | 290.000 |
| GR | 567.700 | 300.000 | 565.700 | 310.000 | 557.500 | 320.000 | 559.800 | 330.000 | 560.400 | 340.000 |
| GR | 563.300 | 350.000 | 569.500 | 360.000 | 575.200 | 370.000 | 575.600 | 377.000 | 582.700 | 398.000 |
| GR | 585.400 | 410.000 | 586.800 | 435.000 | 586.500 | 460.000 | 586.000 | 485.000 | 586.400 | 510.000 |
| GR | 585.900 | 535.000 | 590.400 | 560.000 | 589.000 | 585.000 | 586.300 | 610.000 | 585.000 | 635.000 |
| GR | 583.400 | 660.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 4600.000 | 22.000 | 250.000 | 398.000 | 375.000 | 375.000 | 375.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 577.000 | 270.000 | 573.000 | 290.000 | 570.000 | 310.000 | 567.000 | 320.000 |
| GR | 569.000 | 330.000 | 572.000 | 350.000 | 577.000 | 370.000 | 582.700 | 398.000 | 583.000 | 410.000 |
| GR | 583.000 | 435.000 | 583.000 | 600.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | CONFLUENCE WITH UPPER CHANNEL | | | | | | | | | |
| X1 | 4900.000 | 22.000 | 250.000 | 398.000 | 300.000 | 300.000 | 300.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 578.000 | 270.000 | 575.000 | 290.000 | 574.500 | 310.000 | 573.000 | 320.000 |
| GR | 574.500 | 330.000 | 576.000 | 350.000 | 577.000 | 370.000 | 582.700 | 398.000 | 583.000 | 410.000 |
| GR | 583.000 | 435.000 | 583.000 | 600.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| EJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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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=   0.500 CEHV=   1.000
*SECNO 0.000
          CROSS SECTION AT MANISTEE LAKE
     0.00     14.80    579.80      0.00    579.80    580.03      0.23      0.00      0.00    582.00
    4260.        0.     4260.        0.        0.     1112.        0.        0.        0.    582.00
     0.00      0.00      3.83      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000399        0.        0.        0.         0         0         0      0.00    142.35    370.00

*SECNO 1000.000
  1000.00     15.21    580.21      0.00      0.00    580.42      0.21      0.38      0.01    582.00
    4260.        0.     4260        0.        0.     1171.        0.       26.        3.    582.00
     0.08      0.00      3.64      0.00     0.000     0.030     0.000     0.000    565.00    226.24
 0.000361     1000.     1000.     1000.         1         0         0      0.00    150.52    376.76

*SECNO 1940.000

3470 ENCROACHMENT STATIONS=        5.0      605.0  TYPE=      1  TARGET=      600.000
  1940.00     15.56    580.56      0.00      0.00    580.75      0.19      0.32      0.01    582.00
    4260.        0.     4260.        0.        0.     1227.        0.       52.        7.    582.00
     0.15      0.00      3.47      0.00     0.000     0.030     0.000     0.000    565.00    224.97
 0.000324      940.      940.      940.         0         0         0      0.00    156.09    381.06

*SECNO 2200.000

3470 ENCROACHMENT STATIONS=       70.0      540.0  TYPE=      1  TARGET=      470.000
  2200.00     15.65    580.65      0.00      0.00    580.83      0.18      0.08      0.00    582.00
    4260.        0.     4260.        0.        0.     1240.        0.       59.        8.    582.00
     0.17      0.00      3.44      0.00     0.000     0.030     0.000     0.000    565.00    224.69
 0.000315      260.      260.      260.         0         0         0      0.00    156.87    381.57

*SECNO 2400.000

3470 ENCROACHMENT STATIONS=      120.0      490.0  TYPE=      1  TARGET=      370.000
  2400.00     15.72    580.72      0.00      0.00    580.90      0.18      0.06      0.00    582.00
    4260.        0.     4260.        0.        0.     1250.        0.       65.        8.    582.00
     0.19      0.00      3.41      0.00     0.000     0.030     0.000     0.000    565.00    224.47
 0.000308      200.      200.      200.         0         0         0      0.00    157.49    381.96
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 SECNO     DEPTH     CNSEL     CRTWS     WSELK     EG        HV        HL        DLOSS   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 2600.000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270.000
  2600.00     15.78    590.73     0.00      0.00    580.96     0.18      0.06      0.00    582.00
    4260.        0.     4260.       0.        0.     1260.       0.       71.        9.    582.00
     0.21      0.00      3.38     0.00     0.000     0.030    0.000     0.000    565.00    224.25
 0.000302      200.      200.     200.         0         0        0      0.00    158.13    382.37

*SECNO 2800.000
          OPENING OF BERMS
  2800.00     15.85    580.85     0.00      0.00    581.02     0.18      0.06      0.00    586.40
    4260.        0.     4260.       0.        0.     1269.       0.       77.       10.    581.90
     0.22      0.00      3.36     0.00     0.000     0.030    0.000     0.000    565.00    226.63
 0.000291      200.      200.     200.         0         0        0      0.00    156.32    382.96

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      830.0     1400.0  TYPE=      1  TARGET=      570.000
  3000.00     15.91    590.91     0.00      0.00    581.08     0.17      0.06      0.00    582.00
    4260.        0.     4260.       0.        0.     1280.       0.       83.       10.    582.00
     0.24      0.00      3.33     0.00     0.000     0.030    0.000     0.000    565.00   1223.81
 0.000289      200.      200.     200.         0         0        0      0.00    159.35   1383.15

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     16.06    591.06     0.00      0.00    581.22     0.17      0.14      0.00    582.00
    4260.        0.     4260.       0.        0.     1304.       0.       97.       12.    582.00
     0.28      0.00      3.27     0.00     0.000     0.030    0.000     0.000    565.00   1223.29
 0.000275      500.      500.     500.         0         0        0      0.00    160.79   1384.08

*SECNO 4000.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=      183.0      410.0  TYPE=      1  TARGET=      227.000
  4000.00     21.26    531.26     0.00      0.00    581.33     0.07      0.06      0.05    581.70
    4260.        0.     4260.       0.        0.     1955.       0.      116.       14.    582.70
     0.34      0.06      2.13     0.00     0.035     0.030    0.000     0.000    560.00    183.00
 0.000068       500       500.     500.         2         0        0      0.00    146.68    393.73
```

```
 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 4199.000

2470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00    23.77    591.27     0.00      0.00    581.35     0.07      0.01      0.00    574.50
    4260.       0.     4260.       0.        0.     1990.       0.      125.       15.  100000.00
     0.37     0.00      2.14     0.00     0.000     0.030    0.000     0.000    557.50    132.00
 0.000062     199.      199.     199.         1         0        0      0.00    127.00    259.00

*SECNO 4200.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00    23.77    581.27     0.00      0.00    581.35     0.08      0.00      0.01    574.50
    4260.       0.     4259.       1.        0.     1874.       3.      125.       15.    575.60
     0.37     0.00      2.27     0.27     0.000     0.030    0.035     0.000    557.50    131.61
 0.000098       1.        1.       1.         0         0        0  -116.09    128.41    260.02

*SECNO 4214.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00    23.78    581.28     0.00      0.00    581.36     0.08      0.00      0.00    574.50
    4260.       0.     4259       1.        0.     1874.       3.      126.       15.    575.60
     0.37     0.00      2.27     0.27     0.000     0.030    0.035     0.000    557.50    131.61
 0.000098      14.       14.      14.         0         0        0  -116.10    128.41    260.02

*SECNO 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00    23.79    581.29     0.00      0.00    581.36     0.07      0.00      0.00    574.50
    4260.       2.     4256.       2.        7.     1990.       6.      126.       15.    575.60
     0.37     0.29      2.14     0.28     0.035     0.030    0.035     0.000    557.50    131.00
 0.000055       1.         1       1.         1         0        0      0.00    129.00    260.00

*SECNO 4225.000

3470 ENCROACHMENT STATIONS=      260.0      399.0  TYPE=      1  TARGET=      149.000
```

| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | BANK ELEV |
|---|---|---|---|---|---|---|---|---|---|
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | LEFT/RIGHT |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |
| 4225.00 | 23.79 | 531.29 | 0.00 | 0.00 | 581.36 | 0.07 | 0.00 | 0.00 | 581.70 |
| 4260. | 0. | 4260. | 0. | 0. | 1987. | 0. | 126. | 15. | 582.70 |
| 0.37 | 0.00 | 2.14 | 0.00 | 0.000 | 0.030 | 0.000 | 0.000 | 557.50 | 250.46 |
| 0.000066 | 10. | 10. | 10. | 0 | 0 | 0 | 0.00 | 143.37 | 393.83 |

*SECNO 4600.000

3265 DIVIDED FLOW

3280 CROSS SECTION 4600.00 EXTENDED 0.44 FEET

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4600.00 | 14.34 | 581.34 | 0.00 | 0.00 | 581.59 | 0.24 | 0.05 | 0.17 | 581.70 |
| 4260. | 134. | 4126. | 0. | 145. | 1026. | 0. | 140. | 17. | 582.70 |
| 0.40 | 0.92 | 4.02 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 567.00 | 0.00 |
| 0.000476 | 375. | 375 | 375. | 2 | 0 | 0 | 0.00 | 323.50 | 391.33 |

*SECNO 4900.000

3265 DIVIDED FLOW

3280 CROSS SECTION 4900.00 EXTENDED 0.68 FEET

CONFLUENCE WITH UPPER CHANNEL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4900.00 | 8.56 | 581.58 | 0.00 | 0.00 | 582.02 | 0.44 | 0.23 | 0.20 | 581.70 |
| 4260. | 340. | 2920. | 0. | 169. | 709. | 0. | 147. | 19. | 582.70 |
| 0.42 | 1.80 | 5.53 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 573.00 | 0.00 |
| 0.001478 | 300. | 300. | 300. | 2 | 0 | 0 | 0.00 | 336.19 | 392.48 |

THIS RUN EXECUTED 1 APR 87 9:08:05

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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
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T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD--3520 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 3. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 579.800 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 2.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 2

CCHV=   0.500 CEHV=   1.000
*SECNO 0.000
          CROSS SECTION AT MANISTEE LAKE
    0.00     14.80    579.80      0.00    579.80    579.96      0.16      0.00      0.00    582.00
   3520.        0.     3520.        0.        0.     1112.        0.        0.        0.    582.00
    0.00      0.00      3.17      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000272        0.        0.        0.         0         0         0      0.00    142.35    370.00

*SECNO 1000.000
  1000.00     15.08    580.08      0.00      0.00    580.22      0.15      0.26      0.01    582.00
   3520.        0.     3520.        0.        0.     1151.        0.       26.        3.    582.00
    0.09      0.00      3.06      0.00     0.000     0.030     0.000     0.000    565.00    226.70
 0.000255     1000.     1000.     1000.         0         0         0      0.00    147.83    374.54

*SECNO 1940.000

3470 ENCROACHMENT STATIONS=        5.0      605.0  TYPE=      1  TARGET=      600.000
  1940.00     15.32    580.32      0.00      0.00    580.46      0.14      0.23      0.00    582.00
   3520.        0.     3520.        0.        0.     1189.        0.       51.        7.    582.00
    0.18      0.00      2.96      0.00     0.000     0.030     0.000     0.000    565.00    225.82
 0.000239      940.      940.      940.         0         0         0      0.00    152.96    378.78

*SECNO 2200.000

3470 ENCROACHMENT STATIONS=       70.0      540.0  TYPE=      1  TARGET=      470.000
  2200.00     15.39    580.39      0.00      0.00    580.52      0.13      0.06      0.00    582.00
   3520.        0.     3520.        0.        0.     1199.        0.       58.        7.    582.00
    0.20      0.00      2.94      0.00     0.000     0.030     0.000     0.000    565.00    225.60
 0.000235      260.      260.      260.         0         0         0      0.00    154.21    379.81

*SECNO 2400.000

3470 ENCROACHMENT STATIONS=      120.0      490.0  TYPE=      1  TARGET=      370.000
  2400.00     15.44    580.44      0.00      0.00    580.57      0.13      0.05      0.00    582.00
   3520.        0.     3520.        0.        0.     1206.        0.       64.        8.    582.00
    0.22      0.00      2.92      0.00     0.000     0.030     0.000     0.000    565.00    225.44
 0.000231      200.      200.      200.         0         0         0      0.00    154.79    380.23
```

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

*SECNO 2600.000

3470 ENCROACHMENT STATIONS=      170.0     440.0  TYPE=      1  TARGET=      270.000
  2600.00    15.49    580.49     0.00      0.00    580.62     0.13      0.05      0.00    582.00
    3520.       0.     3520.       0.        0.     1214.       0.       69.        9.    582.00
     0.24     0.00      2.90     0.00     0.000     0.030    0.000     0.000    565.00    225.27
 0.000228     200.      200      200.         0         0        0      0.00    155.27    380.53

*SECNO 2800.000
          OPENING OF BERMS
  2800.00    15.53    580.53     0.00      0.00    580.66     0.13      0.04      0.00    586.40
    3520.       0.     3520.       0.        0.     1220.       0.       75.       10.    581.90
     0.26     0.00      2.88     0.00     0.000     0.030    0.000     0.000    565.00    227.01
 0.000221     200.      200.     200.         0         0        0      0.00    153.88    380.89

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      830.0    1400.0  TYPE=      1  TARGET=      570.000
  3000.00    15.58    580.58     0.00      0.00    580.71     0.13      0.04      0.00    582.00
    3520.       0.     3520.       0.        0.     1228.       0.       81.       10.    582.00
     0.28     0.00      2.87     0.00     0.000     0.030    0.000     0.000    565.00   1224.94
 0.000221     200.      200.     200.         0         0        0      0.00    156.18   1381.12

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0    1400.0  TYPE=      1  TARGET=      287.000
  3500.00    15.69    580.69     0.00      0.00    580.82     0.12      0.11      0.00    582.00
    3520.       0.     3520.       0.        0.     1246.       0.       95.       12.    582.00
     0.33     0.00      2.82     0.00     0.000     0.030    0.000     0.000    565.00   1224.55
 0.000212     500.      500.     500.         0         0        0      0.00    157.27   1381.82

*SECNO 4000.000

3470 ENCROACHMENT STATIONS=      183.0     410.0  TYPE=      1  TARGET=      227.000
  4000.00    20.85    580.85     0.00      0.00    580.90     0.05      0.05      0.04    581.70
    3520.       0.     3520.       0.        0.     1896.       0.      113.       14.    582.70
     0.40     0.00      1.86     0.00     0.000     0.030    0.000     0.000    560.00    250.96
 0.000051     500.      500.     500.         2         0        0      0.00    141.56    392.52
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```
 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS    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     CDRAR     TOPWID      ENDST

*SECNO 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00     23.36    590.86      0.00      0.00    580.91      0.05      0.01      0.00    574.50
    3520.        0.     3520.        0.        0.     1937.        0.      122.       14.  100000.00
     0.43      0.00      1.82      0.00     0.000     0.030     0.000     0.000    557.50    132.00
 0.000046      199.      199.      199.         1         0         0      0.00    127.00    259.00

*SECNO 4200.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00     23.36    590.86      0.00      0.00    580.92      0.06      0.00      0.01    574.50
    3520.        0.     3519.        1.        0.     1825.        2.      122.       14.    575.60
     0.44      0.00      1.93      0.22     0.000     0.030     0.035     0.000    557.50    131.63
 0.000072        1.        1.        1.         0         0         0   -111.90    128.32    259.95

*SECNO 4214.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00     23.36    580.86      0.00      0.00    580.92      0.06      0.00      0.00    574.50
    3520.        0.     3519.        1.        0.     1326.        2.      122.       15.    575.60
     0.44      0.00      1.93      0.22     0.000     0.030     0.035     0.000    557.50    131.63
 0.000072       14.       14.       14.         0         0         0   -111.91    128.32    259.95

*SECNO 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00     23.37    580.87      0.00      0.00    580.92      0.05      0.00      0.00    574.50
    3520.        2.     3517.        1.        6.     1936.        5.      122.       15.    575.60
     0.44      0.25      1.82      0.24     0.035     0.030     0.035     0.000    557.50    131.00
 0.000041        1.        1.        1.         0         0         0      0.00    129.00    260.00

*SECNO 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         GLOB      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

 4225.00    23.37     590.87     0.00      0.00    580.92     0.05      0.00      0.00     581.70
   3520.       0.      3520.       0.        0.     1927.       0.      123.       15.     582.70
    0.44     0.00      1.83      0.00     0.000     0.030    0.000     0.000    557.50    250.93
0.000049      10.       10.       10.         0         0        0      0.00    141.66    392.59

*SECND 4600.000

3265 DIVIDED FLOW

3280 CROSS SECTION   4600.00 EXTENDED      0.01 FEET

 4600.00    13.91     590.91     0.00      0.00    581.11     0.20      0.04      0.15     581.70
   3520.       51.      3469.       0.        76      966.       0.      136.       16.     582.70
    0.47     0.67      3.59      0.00     0.035     0.030    0.000     0.000    567.00      0.00
0.000395     375.      375.      375.         2         0        0      0.00    271.64    389.21

*SECND 4900.000

3265 DIVIDED FLOW

3280 CROSS SECTION   4900.00 EXTENDED      0.21 FEET

            CONFLUENCE WITH UPPER CHANNEL
 4900.00     8.11     581.11     0.00      0.00    581.52     0.41      0.20      0.21     581.70
   3520.      152.      3368.       0.       106.      644.       0.      142.       18.     582.70
    0.48     1.43      5.23      0.00     0.035     0.030    0.000     0.000    573.00      0.00
0.001432     300.      300.      300.         2         0        0      0.00    295.40    390.21
```

THIS RUN EXECUTED 1 APR 87 9:08:06

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD--2520 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 4. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 579.800 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 3.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
  SECNO     DEPTH     CNSEL     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 3

CCHV=   0.500 CEHV=   1.000
*SECND 0.000
          CROSS SECTION AT MANISTEE LAKE
     0.00     14.80    579.80      0.00    579.80    579.88      0.08      0.00      0.00    582.00
    2520.        0.     2520.        0.        0.    1112.        0.        0.        0.    582.00
     0.00      0.00      2.27      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000140        0.        0.        0.         0         0         0      0.00    142.35    370.00

*SECND 1000.000
  1000.00     14.94    579.94      0.00      0.00    580.02      0.08      0.14      0.00    582.00
    2520.        0.     2520.        0.        0.    1132.        0.       26.        3.    582.00
     0.12      0.00      2.23      0.00     0.000     0.030     0.000     0.000    565.00    227.17
 0.000135     1000.     1000.     1000.         0         0         0      0.00    145.16    372.33

*SECND 1940.000

3470 ENCROACHMENT STATIONS=        5.0      605.0  TYPE=      1  TARGET=      600.000
  1940.00     15.07    580.07      0.00      0.00    580.14      0.07      0.12      0.00    582.00
    2520.        0.     2520.        0.        0.    1151.         0        50.        6.    582.00
     0.24      0.00      2.19      0.00     0.000     0.030     0.000     0.000    565.00    226.71
 0.000131      940.       940      940.         0         0         0      0.00    147.80    374.51

*SECND 2200.000

3470 ENCROACHMENT STATIONS=       70.0      540.0  TYPE=      1  TARGET=      470.000
  2200.00     15.10    580.10      0.00      0.00    580.18      0.07      0.03      0.00    582.00
    2520.        0.     2520.        0.        0.    1156.         0        57.        7.    582.00
     0.28      0.00      2.18      0.00     0.000     0.030     0.000     0.000    565.00    226.59
 0.000130      260.       260.      260.         0         0         0      0.00    148.48    375.08

*SECND 2400.000

3470 ENCROACHMENT STATIONS=      120.0      490.0  TYPE=      1  TARGET=      370.000
  2400.00     15.13    530.13      0.00      0.00    580.20      0.07      0.03      0.00    582.00
    2520.        0.     2520.        0.        0.    1160.         0        63.        8.    582.00
     0.30      0.00      2.17      0.00     0.000     0.030     0.000     0.000    565.00    226.50
 0.000129      200.       200.      200.         0         0         0      0.00    149.01    375.51
```

```
 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 2600.000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270.000
  2600.00     15.16    580.16      0.00      0.00    580.23      0.07      0.03      0.00    582.00
    2520.        0.     2520        0.        0.     1164.        0.       68.        9.    582.00
     0.33      0.00      2.17      0.00     0.000     0.030     0.000     0.000    565.00    226.41
 0.000128      200.      200.      200.         0         0         0      0.00    149.54    375.95

*SECNO 2800.000
          OPENING OF BERMS
  2800.00     15.18    580.18      0.00      0.00    580.26      0.07      0.03      0.00    586.40
    2520.        0.     2520.        0.        0.     1167.        0.       73.        9.    581.90
     0.35      0.00      2.16      0.00     0.000     0.030     0.000     0.000    565.00    227.42
 0.000126      200.      200.      200.         0         0         0      0.00    148.97    376.39

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      830.0     1400.0  TYPE=      1  TARGET=      570.000
  3000.00     15.21    580.21      0.00      0.00    580.28      0.07      0.03      0.00    582.00
    2520.        0.     2520.        0.        0.     1172.        0.       79.       10.    582.00
     0.38      0.00      2.15      0.00     0.000     0.030     0.000     0.000    565.00   1226.23
 0.000126      200.      200.      200.         0         0         0      0.00    150.59   1376.82

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     15.27    580.27      0.00      0.00    580.34      0.07      0.06      0.00    582.00
    2520.        0.     2520        0.        0.     1181.        0.       92.       12.    582.00
     0.45      0.00      2.13      0.00     0.000     0.030     0.000     0.000    565.00   1226.01
 0.000124      500.      500.      500.         0         0         0      0.00    151.87   1377.88

*SECNO 4000.000

3470 ENCROACHMENT STATIONS=      183.0      410.0  TYPE=      1  TARGET=      227.000
  4000.00     20.36    580.36      0.00      0.00    580.39      0.03      0.03      0.02    581.70
    2520.        0.     2520        0.        0.     1828.        0.      109.       13.    582.70
     0.55      0.00      1.38      0.00     0.000     0.030     0.000     0.000    560.00    251.50
 0.000029      500.      500.      500.         2         0         0      0.00    139.58    391.09
```

```
  SECND     DEPTH     CWSEL     CRIWS     WSELK     EQ        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

*SECND 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00    22.87    590.37     0.00      0.00    580.40     0.03      0.01      0.00    574.50
    2520.       0.     2520       0.        0.     1875.       0.      118.       14.  100000.00
     0.59     0.00      1.34     0.00     0.000     0.030    0.000     0.000    557.50    132.00
 0.000026     199.      199      199.        0         0        0      0.00    127.00    259.00

*SECND 4200.000

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00    22.87    580.37     0.00      0.00    580.40     0.03      0.00      0.00    574.50
    2520.       0.     2520.       0.        0.     1768.       2.      118.       14.     575.60
     0.59     0.00      1.43     0.15     0.000     0.030    0.035     0.000    557.50    131.66
 0.000040       1.        1.       1.        0         0        0   -107.15    128.20    259.86

*SECND 4214.000

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00    22.87    580.37     0.00      0.00    580.40     0.03      0.00      0.00    574.50
    2520.       0.     2520.       0.        0.     1768.       2.      118.       14.     575.60
     0.59     0.00      1.43     0.15     0.000     0.030    0.035     0.000    557.50    131.66
 0.000040      14.       14       14.        0         0        0   -107.15    128.20    259.86

*SECND 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00    22.88    580.38     0.00      0.00    580.40     0.03      0.00      0.00    574.50
    2520.       1.     2518.       1.        6.     1874.       5      119.       14.     575.60
     0.59     0.19      1.34     0.18     0.035     0.030    0.035     0.000    557.50    131.00
 0.000024       1.        1        1.        0         0        0      0.00    129.00    260.00

*SECND 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

| SECNO<br>Q<br>TIME<br>SLOPE | DEPTH<br>QLOB<br>VLOB<br>XLOBL | CWSEL<br>QCH<br>VCH<br>XLCH | CRIWS<br>QROB<br>VROB<br>XLCBR | WSELK<br>ALOB<br>XNL<br>ITRIAL | EG<br>ACH<br>XNCH<br>IDC | HV<br>AROB<br>XNR<br>ICONT | HL<br>VOL<br>WTN<br>CORAR | OLOSS<br>TWA<br>ELMIN<br>TOPWID | BANK ELEV<br>LEFT/RIGHT<br>SSTA<br>ENDST |
|---|---|---|---|---|---|---|---|---|---|
| 4225.00 | 22.38 | 580.23 | 0.00 | 0.00 | 580.40 | 0.03 | 0.00 | 0.00 | 581.70 |
| 2520. | 5. | 2520. | 0. | 0. | 1857. | 0 | 119. | 14 | 582.70 |
| 0.59 | 0.00 | 1.34 | 0.00 | 0.000 | 0.030 | 0.000 | 0.000 | 557.50 | 251.49 |
| 0.000025 | 10. | 10. | 10. | 0 | 0 | 0 | 0.00 | 139.64 | 391.13 |

*SECNO 4600.000

3265 DIVIDED FLOW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4600.00 | 13.40 | 580.40 | 0.00 | 0.00 | 580.52 | 0.12 | 0.02 | 0.09 | 581.70 |
| 2520. | 8. | 2512. | 0. | 21. | 897. | 0. | 131. | 16. | 582.70 |
| 0.63 | 0.38 | 2.80 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 567.00 | 69.21 |
| 0.000253 | 375. | 375. | 375. | 1 | 0 | 0 | 0.00 | 186.67 | 386.67 |

*SECNO 4900.000

3265 DIVIDED FLOW

CONFLUENCE WITH UPPER CHANNEL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4900.00 | 7.54 | 580.54 | 0.00 | 0.00 | 580.84 | 0.30 | 0.14 | 0.17 | 581.70 |
| 2520. | 29. | 2491. | 0. | 32. | 567. | 0. | 136. | 17. | 582.70 |
| 0.65 | 0.89 | 4.39 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 573.00 | 60.03 |
| 0.001128 | 300. | 300. | 300. | 2 | 0 | 0 | 0.00 | 224.37 | 387.39 |

THIS RUN EXECUTED 1 APR 87 9:08:08

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD--1520 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 5. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 579.800 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 4.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

*PROF 4

CCHV=   0.500 CEHV=   1.000
*SECND 0.000
          CROSS SECTION AT MANISTEE LAKE
     0.00     14.80    579.80      0.00    579.80    579.83      0.03      0.00      0.00    582.00
    1520.        0.     1520.        0.        0.     1112.         0        0.        0.    582.00
     0.00     0.00      1.37      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000051        0.        0.        0.         0         0         0      0.00    142.35    370.00

*SECND 1000.000
  1000.00     14.85    579.85      0.00      0.00    579.88      0.03      0.05      0.00    582.00
    1520.        0.     1520.        0.        0.     1119.        0.       26.        3.    582.00
     0.20     0.00      1.36      0.00     0.000     0.030     0.000     0.000    565.00    227.48
 0.000050     1000.     1000      1000.         0         0         0      0.00    143.37    370.85

*SECND 1940.000

3470 ENCROACHMENT STATIONS=        5.0      605.0  TYPE=      1  TARGET=      600.000
  1940.00     14.90    579.90      0.00      0.00    579.93      0.03      0.05      0.00    582.00
    1520.        0.     1520.        0.        0.     1126.        0.       50.        6.    582.00
     0.40     0.00      1.35      0.00     0.000     0.030     0.000     0.000    565.00    227.31
 0.000050      940.      940.      940.         0         0         0      0.00    144.33    371.64

*SECND 2200.000

3470 ENCROACHMENT STATIONS=       70.0      540.0  TYPE=      1  TARGET=      470.000
  2200.00     14.91    579.91      0.00      0.00    579.94      0.03      0.01      0.00    582.00
    1520.        0.     1520        0.        0     1128.        0.       57.        7.    582.00
     0.45     0.00      1.35      0.00     0.000     0.030     0.000     0.000    565.00    227.26
 0.000049      260.      260.      260.         0         0         0      0.00    144.59    371.86

*SECND 2400.000

3470 ENCROACHMENT STATIONS=      120.0      490.0  TYPE=      1  TARGET=      370.000
  2400.00     14.92    579.92      0.00      0.00    579.95      0.03      0.01      0.00    582.00
    1520.        0.     1520.        0.        0.     1129.        0.       62.        8.    582.00
     0.49     0.00      1.35      0.00     0.000     0.030     0.000     0.000    565.00    227.23
 0.000049      200.      200       200.         0         0         0      0.00    144.79    372.02
```

```
 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       WTN       ELMIN       SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 2600.000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270.000
  2600.00     14.93    579.93     0.00      0.00    579.96     0.03      0.01      0.00    582.00
    1520.        0.     1520       0.        0.     1130.       0.       67.        9.    582.00
     0.53      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00    227.20
 0.000049      200.      200.     200.         0         0        0      0.00    144.99    372.19

*SECNO 2800.000
          OPENING OF BERMS
  2800.00     14.94    579.94     0.00      0.00    579.97     0.03      0.01      0.00    586.40
    1520.        0.     1520.       0.        0.     1132.       0.       72.        9.    581.90
     0.58      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00    227.71
 0.000049      200.      200.     200.         0         0        0      0.00    144.64    372.35

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      530.0     1400.0  TYPE=      1  TARGET=      570.000
  3000.00     14.95    579.95     0.00      0.00    579.98     0.03      0.01      0.00    582.00
    1520.        0.     1520.       0.        0.     1133.       0.       77.       10.    582.00
     0.62      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00   1227.13
 0.000049      200.      200.     200.         0         0        0      0.00    145.39   1372.52

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     14.98    579.98     0.00      0.00    580.00     0.03      0.02      0.00    582.00
    1520.        0.     1520.       0.        0.     1137.       0.       90.       12.    582.00
     0.72      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00   1227.04
 0.000049      500.      500.     500.         0         0        0      0.00    145.89   1372.93

*SECNO 4000.000

3470 ENCROACHMENT STATIONS=      183.0      410.0  TYPE=      1  TARGET=      227.000
  4000.00     20.01    580.01     0.00      0.00    580.02     0.01      0.01      0.01    581.70
    1520.        0.     1520       0.        0.     1779.       0.      107.       13.    582.70
     0.88      0.00      0.85     0.00     0.000     0.030    0.000     0.000    560.00    251.90
 0.000011      500.      500      500.         1         0        0      0.00    138.13    390.03
```

```
 SECNO     DEPTH     CUSEL     CRIWS     WSELK     EG        HV        HL        DLOSS    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 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00     22.51    580.01      0.00      0.00    580.02      0.01      0.00      0.00    574.50
    1520.        0.     1520.        0.        0.    1329.        0.      115.       14.  100000.00
     0.95      0.00      0.83      0.00     0.000     0.030     0.000     0.000    557.50    132.00
 0.000010      199.      199.      199.         0         0         0      0.00    127.00    259.00

*SECNO 4200.000

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00     22.51    580.01      0.00      0.00    580.03      0.01      0.00      0.00    574.50
    1520.        0.     1520.        0.        0.    1726.        2.      115.       14.    575.60
     0.95      0.00      0.88      0.09     0.000     0.030     0.035     0.000    557.50    131.68
 0.000016        1.         1        1.         0         0         0   -103.80    128.11    259.80

*SECNO 4214.000

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00     22.51    580.01      0.00      0.00    580.03      0.01      0.00      0.00    574.50
    1520.        0.     1520.        0.        0.    1726.        2.      116.       14.    575.60
     0.95      0.00      0.88      0.09     0.000     0.030     0.035     0.000    557.50    131.68
 0.000016       14.       14.       14.         0         0         0   -103.81    128.11    259.80

*SECNO 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00     22.52    580.02      0.00      0.00    580.03      0.01      0.00      0.00    574.50
    1520.        1.     1529.        0.        6.    1829.        4.      116.       14.    575.60
     0.95      0.12      0.83      0.11     0.035     0.030     0.035     0.000    557.50    131.00
 0.000009        1.         1        1.         0         0         0      0.00    129.00    260.00

*SECNO 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

```
 SECNO     DEPTH     CWSEL     CRTWS     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

 4225.00   22.52     580.02    0.00      0.00      580.03    0.01      0.00      0.00      581.70
   1520.      0.      1520.      0.        0.       1807.      0.       116.       14.       582.70
    0.96    0.00      0.84     0.00     0.000      0.030    0.000     0.000    557.50     251.89
0.000011     10.       10.      10.        0         0         0      0.00     138.17     390.06

*SECNO 4600.000

3265 DIVIDED FLOW

 4600.00   13.03     580.03    0.00      0.00      580.08    0.05      0.01      0.04      581.70
   1520.      1.      1519.      0.        6.       849.      0.       128.       15.       582.70
    1.02    0.16      1.79     0.00     0.035      0.030    0.000     0.000    567.00      85.00
0.000107    375.      375.     375.        0         0         0      0.00     155.81     384.84

*SECNO 4900.000

3265 DIVIDED FLOW

          CONFLUENCE WITH UPPER CHANNEL
 4900.00    7.09     580.09    0.00      0.00      580.23    0.14      0.06      0.09      581.70
   1520.      3.      1517.      0.        8.       509.      0.       133.       16.       582.70
    1.04    0.40      2.98     0.00     0.035      0.030    0.000     0.000    573.00      82.56
0.000571    300.      300.     300.        2         0         0      0.00     159.16     385.17
```

THIS RUN EXECUTED 1 APR 87 9:08:09

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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
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD--520 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 4. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 579.800 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 15.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS    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 5

CCHV=   0.500 CEHV=   1.000
*SECNO 0.000
          CROSS SECTION AT MANISTEE LAKE
     0.00     14.80    579.80      0.00    579.80    579.80      0.00      0.00      0.00    582.00
     520.        0.      520.        0.        0.     1112.        0.        0.        0.    582.00
     0.00     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000006        0.        0.        0.         0         0         0      0.00    142.35    370.00

*SECNO 1000.000
  1000.00     14.81    579.81      0.00      0.00    579.81      0.00      0.01      0.00    582.00
     520.        0.      520.        0.        0.     1112.        0.       26.        3.    582.00
     0.59     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.63
 0.000006     1000.     1000.     1000.         0         0         0      0.00    142.47    370.10

*SECNO 1940.000

3470 ENCROACHMENT STATIONS=        5.0      605.0  TYPE=      1  TARGET=      600.000
  1940.00     14.81    579.81      0.00      0.00    579.81      0.00      0.01      0.00    582.00
     520.        0.      520.        0.        0.     1113.        0.       50.        6.    582.00
     1.15     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.61
 0.000006      940.      940.      940.         0         0         0      0.00    142.58    370.19

*SECNO 2200.000

3470 ENCROACHMENT STATIONS=       70.0      540.0  TYPE=      1  TARGET=      470.000
  2200.00     14.81    579.81      0.00      0.00    579.82      0.00      0.00      0.00    582.00
     520.        0.      520.        0.        0.     1113.        0.       56.        7.    582.00
     1.31     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.61
 0.000006      260.      260.      260.         0         0         0      0.00    142.61    370.22

*SECNO 2400.000

3470 ENCROACHMENT STATIONS=      120.0      490.0  TYPE=      1  TARGET=      370.000
  2400.00     14.81    579.81      0.00      0.00    579.82      0.00      0.00      0.00    582.00
     520.        0.      520.        0.        0.     1114.        0.       61.        8.    582.00
     1.43     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.60
 0.000006      200.      200       200.         0         0         0      0.00    142.64    370.24
```

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 SECNO     DEPTH     CNSEL     CRTWS     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 2600.000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270.000
  2600.00     14.82    579.82     0.00       0.00   579.82     0.00      0.00      0.00    582.00
     520.        0.      520.       0.         0.     1114.       0.       66.        9.    582.00
     1.55      0.00      0.47     0.00      0.000    0.030    0.000     0.000    565.00    227.60
 0.000006      200.      200.     200.          0        0        0      0.00    142.66    370.26

*SECNO 2800.000
          OPENING OF BERMS
  2800.00     14.82    579.82     0.00       0.00   579.82     0.00      0.00      0.00    586.40
     520.        0.      520.       0.         0.     1114.       0.       72.        9.    581.90
     1.66      0.00      0.47     0.00      0.000    0.030    0.000     0.000    565.00    227.86
 0.000006      200.      200.     200.          0        0        0      0.00    142.42    370.28

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      330.0     1400.0  TYPE=      1  TARGET=      570.000
  3000.00     14.82    579.82     0.00       0.00   579.82     0.00      0.00      0.00    582.00
     520.        0.      520.       0.         0.     1114.       0.       77.       10.    582.00
     1.78      0.00      0.47     0.00      0.000    0.030    0.000     0.000    565.00   1227.59
 0.000006      200.      200.     200.          0        0        0      0.00    142.71   1370.30

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     14.82    579.82     0.00       0.00   579.82     0.00      0.00      0.00    582.00
     520.        0.      520.       0.         0.     1115.       0.       89.       11.    582.00
     2.08      0.00      0.47     0.00      0.000    0.030    0.000     0.000    565.00   1227.58
 0.000006      500.      500.     500.          0        0        0      0.00    142.77   1370.35

*SECNO 4000.000

3470 ENCROACHMENT STATIONS=      183.0      410.0  TYPE=      1  TARGET=      227.000
  4000.00     19.83    579.83     0.00       0.00   579.83     0.00      0.00      0.00    581.70
     520.        0.      520.       0.         0.     1754.       0.      106.       13.    582.70
     2.55      0.00      0.30     0.00      0.000    0.030    0.000     0.000    560.00    252.11
 0.000001      500.      500.     500.          0        0        0      0.00    137.38    389.49
```

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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 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00    22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520.       0.      520.       0.        0.     1805.       0.      114.       14.  100000.00
     2.74     0.00      0.29     0.00     0.000     0.030    0.000     0.000    557.50    132.00
 0.000001     199.      199.      199.         0         0        0      0.00    127.00    259.00

*SECNO 4200.000

3370 NORMAL BRIDGE NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00    22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520.       0.      520.       0.        0.     1704.       2.      114.       14.    575.60
     2.74     0.00      0.31     0.03     0.000     0.030    0.035     0.000    557.50    131.69
 0.000002       1.         1       1.         0         0        0   -102.07    128.07    259.76

*SECNO 4214.000

3370 NORMAL BRIDGE NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00    22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520.       0      520.       0.        0.     1704.       2.      115.       14.    575.60
     2.76     0.00      0.31     0.03     0.000     0.030    0.035     0.000    557.50    131.69
 0.000002      14.       14.      14.         0         0        0   -102.07    128.07    259.76

*SECNO 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00    22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520.       0.      520       0.        5.     1805.       4.      115.       14.    575.60
     2.76     0.04      0.29     0.04     0.035     0.030    0.035     0.000    557.50    131.00
 0.000001       1.        1.       1.         0         0        0      0.00    129.00    260.00

*SECNO 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

| SECND | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | DLOSS | 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 |
| 4225.00 | 22.33 | 579.83 | 0.00 | 0.00 | 579.83 | 0.00 | 0.00 | 0.00 | 581.70 |
| 520. | 0. | 520. | 0. | 0. | 1781. | 0. | 115. | 14. | 582.70 |
| 2.77 | 0.00 | 0.29 | 0.00 | 0.000 | 0.030 | 0.000 | 0.000 | 557.50 | 252.11 |
| 0.000001 | 10. | 10. | 10. | 0 | 0 | 0 | 0.00 | 137.39 | 389.50 |

*SECND 4600.000

3265 DIVIDED FLOW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4600.00 | 12.33 | 579.83 | 0.00 | 0.00 | 579.83 | 0.01 | 0.00 | 0.00 | 581.70 |
| 520 | 0. | 520. | 0. | 2. | 824. | 0. | 126. | 15. | 582.70 |
| 2.93 | 0.04 | 0.63 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 567.00 | 91.92 |
| 0.000014 | 375. | 375. | 375. | 0 | 0 | 0 | 0.00 | 141.06 | 383.88 |

*SECND 4900.000

3265 DIVIDED FLOW

CONFLUENCE WITH UPPER CHANNEL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4900.00 | 5.84 | 579.84 | 0.00 | 0.00 | 579.85 | 0.02 | 0.01 | 0.01 | 581.70 |
| 520. | 0. | 520 | 0. | 2. | 477. | 0. | 131. | 16. | 582.70 |
| 3.01 | 0.09 | 1.09 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 573.00 | 91.82 |
| 0.000081 | 300. | 300. | 300. | 0 | 0 | 0 | 0.00 | 139.13 | 383.90 |

THIS RUN EXECUTED 1 APR 87 9:08:11

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

100 YEAR FLOOD--4260 CFS

SUMMARY PRINTOUT TABLE 150

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 579.80 | 0.00 | 580.03 | 3.99 | 3.83 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 579.80 | 0.00 | 579.96 | 2.72 | 3.17 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 579.80 | 0.00 | 579.88 | 1.40 | 2.27 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.80 | 0.00 | 579.83 | 0.51 | 1.37 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.80 | 0.00 | 579.80 | 0.06 | 0.47 | 1111.62 | 2132.94 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.21 | 0.00 | 580.42 | 3.61 | 3.64 | 1171.04 | 2242.59 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.08 | 0.00 | 580.22 | 2.55 | 3.06 | 1151.13 | 2205.35 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 579.94 | 0.00 | 580.02 | 1.35 | 2.23 | 1131.68 | 2169.45 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.85 | 0.00 | 579.88 | 0.50 | 1.36 | 1118.87 | 2146.02 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.81 | 0.06 | 0.47 | 1112.46 | 2134.47 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.56 | 0.00 | 580.75 | 3.24 | 3.47 | 1227.05 | 2366.81 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.32 | 0.00 | 580.46 | 2.39 | 2.96 | 1189.40 | 2277.34 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.07 | 0.00 | 580.14 | 1.31 | 2.19 | 1150.85 | 2204.83 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.90 | 0.00 | 579.93 | 0.50 | 1.35 | 1125.73 | 2158.57 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.81 | 0.06 | 0.47 | 1113.26 | 2135.91 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.65 | 0.00 | 580.83 | 3.15 | 3.44 | 1239.67 | 2399.48 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.39 | 0.00 | 580.52 | 2.35 | 2.94 | 1198.94 | 2295.53 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.10 | 0.00 | 580.18 | 1.30 | 2.18 | 1155.90 | 2214.24 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.91 | 0.00 | 579.94 | 0.49 | 1.35 | 1127.60 | 2161.98 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.48 | 2136.30 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.72 | 0.00 | 580.90 | 3.08 | 3.41 | 1249.67 | 2425.47 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.44 | 0.00 | 580.57 | 2.31 | 2.92 | 1206.37 | 2313.50 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.13 | 0.00 | 580.20 | 1.29 | 2.17 | 1159.82 | 2221.54 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.92 | 0.00 | 579.95 | 0.49 | 1.35 | 1129.04 | 2164.61 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.65 | 2136.61 |

| SECND | KLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EQ | 10K#S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.78 | 0.00 | 580.96 | 3.02 | 3.38 | 1259.96 | 2452.27 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.49 | 0.00 | 580.62 | 2.28 | 2.90 | 1213.87 | 2332.80 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.16 | 0.00 | 580.23 | 1.28 | 2.17 | 1163.75 | 2228.90 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.93 | 0.00 | 579.96 | 0.49 | 1.34 | 1130.48 | 2167.26 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.82 | 2136.92 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.85 | 0.00 | 581.02 | 2.91 | 3.36 | 1268.66 | 2496.40 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.53 | 0.00 | 580.66 | 2.21 | 2.88 | 1220.49 | 2365.85 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.18 | 0.00 | 580.26 | 1.26 | 2.16 | 1167.41 | 2245.14 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.94 | 0.00 | 579.97 | 0.49 | 1.34 | 1131.86 | 2174.54 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.97 | 2139.52 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.91 | 0.00 | 581.08 | 2.89 | 3.33 | 1279.85 | 2504.27 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.58 | 0.00 | 580.71 | 2.21 | 2.87 | 1228.45 | 2370.42 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.21 | 0.00 | 580.28 | 1.26 | 2.15 | 1171.56 | 2243.56 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.95 | 0.00 | 579.98 | 0.49 | 1.34 | 1133.36 | 2172.53 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1114.16 | 2137.53 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 581.06 | 0.00 | 581.22 | 2.75 | 3.27 | 1303.61 | 2566.77 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.69 | 0.00 | 580.82 | 2.12 | 2.82 | 1246.04 | 2416.03 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.27 | 0.00 | 580.34 | 1.24 | 2.13 | 1181.18 | 2261.73 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.98 | 0.00 | 580.00 | 0.49 | 1.34 | 1136.93 | 2179.09 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1114.58 | 2138.29 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 4260.00 | 581.26 | 0.00 | 581.33 | 0.68 | 2.18 | 1955.11 | 5148.95 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 3520.00 | 580.85 | 0.00 | 580.90 | 0.51 | 1.86 | 1896.22 | 4933.42 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 2520.00 | 580.36 | 0.00 | 580.39 | 0.29 | 1.38 | 1828.25 | 4686.68 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 1520.00 | 580.01 | 0.00 | 580.02 | 0.11 | 0.85 | 1778.72 | 4508.98 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.30 | 1753.67 | 4419.81 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 4260.00 | 581.27 | 0.00 | 581.35 | 0.62 | 2.14 | 1990.07 | 5404.53 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 3520.00 | 580.86 | 0.00 | 580.91 | 0.46 | 1.82 | 1937.00 | 5185.12 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 2520.00 | 580.37 | 0.00 | 580.40 | 0.26 | 1.34 | 1875.03 | 4932.44 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 1520.00 | 580.01 | 0.00 | 580.02 | 0.10 | 0.83 | 1829.23 | 4748.16 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.29 | 1804.97 | 4651.46 |
| 4200.000 | 1.00 | 591.42 | 589.50 | 557.50 | 4260.00 | 581.27 | 0.00 | 581.35 | 0.98 | 2.37 | 1877.11 | 4310.24 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 3520.00 | 580.86 | 0.00 | 580.92 | 0.72 | 1.93 | 1827.93 | 4150.81 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 2520.00 | 580.37 | 0.00 | 580.40 | 0.40 | 1.43 | 1769.97 | 3964.51 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 1520.00 | 580.01 | 0.00 | 580.03 | 0.16 | 0.88 | 1727.69 | 3829.73 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.02 | 0.31 | 1705.28 | 3758.69 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 4260.00 | 581.28 | 0.00 | 581.36 | 0.98 | 2.27 | 1877.25 | 4310.68 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 3520.00 | 580.86 | 0.00 | 580.92 | 0.72 | 1.93 | 1828.03 | 4151.12 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 2520.00 | 580.37 | 0.00 | 580.40 | 0.40 | 1.43 | 1770.03 | 3964.69 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 1520.00 | 580.01 | 0.00 | 580.03 | 0.16 | 0.88 | 1727.72 | 3829.79 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.02 | 0.31 | 1705.29 | 3758.70 |

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 4260.00 | 581.29 | 0.00 | 581.36 | 0.55 | 2.14 | 2002.47 | 5719.76 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 3520.00 | 580.87 | 0.00 | 580.92 | 0.41 | 1.82 | 1947.91 | 5464.59 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 2520.00 | 580.38 | 0.00 | 580.40 | 0.24 | 1.34 | 1884.77 | 5175.20 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 1520.00 | 580.02 | 0.00 | 580.03 | 0.09 | 0.83 | 1838.80 | 4968.44 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.29 | 1814.46 | 4860.35 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 4260.00 | 581.29 | 0.00 | 581.36 | 0.66 | 2.14 | 1986.59 | 5248.51 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 3520.00 | 580.87 | 0.00 | 580.92 | 0.49 | 1.93 | 1926.68 | 5027.87 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 2520.00 | 580.38 | 0.00 | 580.40 | 0.28 | 1.36 | 1857.19 | 4775.02 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 1520.00 | 580.02 | 0.00 | 580.03 | 0.11 | 0.84 | 1807.20 | 4595.28 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.29 | 1780.95 | 4501.60 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 4260.00 | 581.34 | 0.00 | 581.59 | 4.76 | 4.02 | 1170.84 | 1952.39 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 3520.00 | 580.91 | 0.00 | 581.11 | 3.95 | 3.59 | 1042.11 | 1770.28 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 2520.00 | 580.40 | 0.00 | 580.52 | 2.53 | 2.80 | 918.18 | 1583.83 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 1520.00 | 580.03 | 0.00 | 580.08 | 1.07 | 1.79 | 854.72 | 1466.46 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 520.00 | 579.83 | 0.00 | 579.83 | 0.14 | 0.63 | 825.94 | 1408.81 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 4260.00 | 581.58 | 0.00 | 582.02 | 14.78 | 5.53 | 897.98 | 1107.97 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 3520.00 | 581.11 | 0.00 | 581.52 | 14.32 | 5.23 | 750.18 | 930.27 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 2520.00 | 580.54 | 0.00 | 580.84 | 11.28 | 4.39 | 599.47 | 750.13 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 1520.00 | 580.09 | 0.00 | 580.23 | 5.71 | 2.98 | 517.04 | 635.96 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 520.00 | 579.84 | 0.00 | 579.85 | 0.81 | 1.09 | 478.37 | 577.09 |

100 YEAR FLOOD--4260 CFS

SUMMARY PRINTOUT TABLE 150

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFXWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 0.000 | 4260.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 3520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 2520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 1520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 1000.000 | 4260.00 | 580.21 | 0.00 | 0.41 | 0.00 | 150.52 | 1000.00 |
| 1000.000 | 3520.00 | 580.08 | -0.13 | 0.28 | 0.00 | 147.83 | 1000.00 |
| 1000.000 | 2520.00 | 579.94 | -0.14 | 0.14 | 0.00 | 145.16 | 1000.00 |
| 1000.000 | 1520.00 | 579.85 | -0.09 | 0.05 | 0.00 | 143.37 | 1000.00 |
| 1000.000 | 520.00 | 579.81 | -0.05 | 0.01 | 0.00 | 142.47 | 1000.00 |
| 1940.000 | 4260.00 | 580.56 | 0.00 | 0.35 | 0.00 | 156.09 | 940.00 |
| 1940.000 | 3520.00 | 580.32 | -0.24 | 0.25 | 0.00 | 152.96 | 940.00 |
| 1940.000 | 2520.00 | 580.07 | -0.25 | 0.13 | 0.00 | 147.80 | 940.00 |
| 1940.000 | 1520.00 | 579.90 | -0.17 | 0.05 | 0.00 | 144.33 | 940.00 |
| 1940.000 | 520.00 | 579.81 | -0.09 | 0.01 | 0.00 | 142.58 | 940.00 |
| 2200.000 | 4260.00 | 580.65 | 0.00 | 0.09 | 0.00 | 156.87 | 260.00 |
| 2200.000 | 3520.00 | 580.39 | -0.26 | 0.06 | 0.00 | 154.21 | 260.00 |
| 2200.000 | 2520.00 | 580.10 | -0.28 | 0.03 | 0.00 | 148.48 | 260.00 |
| 2200.000 | 1520.00 | 579.91 | -0.19 | 0.01 | 0.00 | 144.59 | 260.00 |
| 2200.000 | 520.00 | 579.81 | -0.10 | 0.00 | 0.00 | 142.61 | 260.00 |
| 2400.000 | 4260.00 | 580.72 | 0.00 | 0.07 | 0.00 | 157.49 | 200.00 |
| 2400.000 | 3520.00 | 580.44 | -0.28 | 0.05 | 0.00 | 154.79 | 200.00 |
| 2400.000 | 2520.00 | 580.13 | -0.31 | 0.03 | 0.00 | 149.01 | 200.00 |
| 2400.000 | 1520.00 | 579.92 | -0.21 | 0.01 | 0.00 | 144.79 | 200.00 |
| 2400.000 | 520.00 | 579.81 | -0.11 | 0.00 | 0.00 | 142.64 | 200.00 |
| 2600.000 | 4260.00 | 580.78 | 0.00 | 0.07 | 0.00 | 158.13 | 200.00 |
| 2600.000 | 3520.00 | 580.49 | -0.30 | 0.05 | 0.00 | 155.27 | 200.00 |
| 2600.000 | 2520.00 | 580.16 | -0.33 | 0.03 | 0.00 | 149.54 | 200.00 |
| 2600.000 | 1520.00 | 579.93 | -0.23 | 0.01 | 0.00 | 144.99 | 200.00 |
| 2600.000 | 520.00 | 579.82 | -0.12 | 0.00 | 0.00 | 142.66 | 200.00 |
| 2800.000 | 4260.00 | 580.85 | 0.00 | 0.06 | 0.00 | 156.32 | 200.00 |
| 2800.000 | 3520.00 | 580.53 | -0.31 | 0.05 | 0.00 | 153.88 | 200.00 |
| 2800.000 | 2520.00 | 580.18 | -0.35 | 0.03 | 0.00 | 148.97 | 200.00 |
| 2800.000 | 1520.00 | 579.94 | -0.24 | 0.01 | 0.00 | 144.64 | 200.00 |
| 2800.000 | 520.00 | 579.82 | -0.12 | 0.00 | 0.00 | 142.42 | 200.00 |
| 3000.000 | 4260.00 | 580.91 | 0.00 | 0.06 | 0.00 | 159.35 | 200.00 |
| 3000.000 | 3520.00 | 580.58 | -0.33 | 0.05 | 0.00 | 156.18 | 200.00 |
| 3000.000 | 2520.00 | 580.21 | -0.37 | 0.03 | 0.00 | 150.59 | 200.00 |
| 3000.000 | 1520.00 | 579.95 | -0.26 | 0.01 | 0.00 | 145.39 | 200.00 |
| 3000.000 | 520.00 | 579.82 | -0.13 | 0.00 | 0.00 | 142.71 | 200.00 |

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFWWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 3500.000 | 4260.00 | 581.06 | 0.00 | 0.15 | 0.00 | 160.79 | 500.00 |
| 3500.000 | 3520.00 | 580.69 | -0.36 | 0.11 | 0.00 | 157.27 | 500.00 |
| 3500.000 | 2520.00 | 580.27 | -0.42 | 0.06 | 0.00 | 151.87 | 500.00 |
| 3500.000 | 1520.00 | 579.98 | -0.30 | 0.02 | 0.00 | 145.89 | 500.00 |
| 3500.000 | 520.00 | 579.82 | -0.16 | 0.00 | 0.00 | 142.77 | 500.00 |
| 4000.000 | 4260.00 | 581.26 | 0.00 | 0.20 | 0.00 | 146.68 | 500.00 |
| 4000.000 | 3520.00 | 580.85 | -0.41 | 0.15 | 0.00 | 141.56 | 500.00 |
| 4000.000 | 2520.00 | 580.36 | -0.48 | 0.09 | 0.00 | 139.58 | 500.00 |
| 4000.000 | 1520.00 | 580.01 | -0.35 | 0.03 | 0.00 | 138.13 | 500.00 |
| 4000.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 137.38 | 500.00 |
| 4199.000 | 4260.00 | 581.27 | 0.00 | 0.02 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 3520.00 | 580.86 | -0.42 | 0.01 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 2520.00 | 580.37 | -0.49 | 0.01 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 1520.00 | 580.01 | -0.36 | 0.00 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 127.00 | 199.00 |
| 4200.000 | 4260.00 | 581.27 | 0.00 | 0.00 | 0.00 | 128.41 | 1.00 |
| 4200.000 | 3520.00 | 580.86 | -0.42 | 0.00 | 0.00 | 128.32 | 1.00 |
| 4200.000 | 2520.00 | 580.37 | -0.49 | 0.00 | 0.00 | 128.20 | 1.00 |
| 4200.000 | 1520.00 | 580.01 | -0.36 | 0.00 | 0.00 | 128.11 | 1.00 |
| 4200.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 128.07 | 1.00 |
| 4214.000 | 4260.00 | 581.28 | 0.00 | 0.00 | 0.00 | 128.41 | 14.00 |
| 4214.000 | 3520.00 | 580.86 | -0.42 | 0.00 | 0.00 | 128.32 | 14.00 |
| 4214.000 | 2520.00 | 580.37 | -0.49 | 0.00 | 0.00 | 128.20 | 14.00 |
| 4214.000 | 1520.00 | 580.01 | -0.36 | 0.00 | 0.00 | 128.11 | 14.00 |
| 4214.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 128.07 | 14.00 |
| 4215.000 | 4260.00 | 581.29 | 0.00 | 0.01 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 3520.00 | 580.87 | -0.42 | 0.01 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 2520.00 | 580.38 | -0.49 | 0.01 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 1520.00 | 580.02 | -0.36 | 0.00 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 129.00 | 1.00 |
| 4225.000 | 4260.00 | 581.29 | 0.00 | 0.00 | 0.00 | 143.37 | 10.00 |
| 4225.000 | 3520.00 | 580.87 | -0.42 | 0.00 | 0.00 | 141.66 | 10.00 |
| 4225.000 | 2520.00 | 580.38 | -0.49 | 0.00 | 0.00 | 139.64 | 10.00 |
| 4225.000 | 1520.00 | 580.02 | -0.36 | 0.00 | 0.00 | 138.17 | 10.00 |
| 4225.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 137.39 | 10.00 |
| 4600.000 | 4260.00 | 581.34 | 0.00 | 0.05 | 0.00 | 323.50 | 375.00 |
| 4600.000 | 3520.00 | 580.91 | -0.43 | 0.04 | 0.00 | 271.64 | 375.00 |
| 4600.000 | 2520.00 | 580.40 | -0.51 | 0.02 | 0.00 | 186.67 | 375.00 |
| 4600.000 | 1520.00 | 580.03 | -0.37 | 0.01 | 0.00 | 153.81 | 375.00 |
| 4600.000 | 520.00 | 579.83 | -0.20 | 0.00 | 0.00 | 141.06 | 375.00 |

| SECND | Q | DWSEL | DIFWSP | DIFWSX | DIFRWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 4900.000 | 4260.00 | 581.58 | 0.00 | 0.23 | 0.00 | 336.19 | 300.00 |
| 4900.000 | 3520.00 | 581.11 | -0.46 | 0.20 | 0.00 | 295.40 | 300.00 |
| 4900.000 | 2520.00 | 580.54 | -0.57 | 0.14 | 0.00 | 224.37 | 300.00 |
| 4900.000 | 1520.00 | 580.09 | -0.45 | 0.06 | 0.00 | 159.16 | 300.00 |
| 4900.000 | 520.00 | 579.84 | -0.25 | 0.01 | 0.00 | 139.13 | 300.00 |

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp

3) WATERCOURSE: Manistee River

4) DOCUMENT TYPE: 10, 50, 100, 500 year Flood unencroached

00BREAK00

MANISTEE TOWNSHIP, FIS

MANISTEE RIVER (REVISED)

100-YR FLOOD - UNENCROACHED

INP= MNST.H2

```
EEEEEE   EEEEEE          L        EEEEEE   EEEEEE
E        E               L        E        E
E        E               L        E        E
EEEE     EEEE            L        EEEE     EEEE
E        E               L        E        E
EEEEEE   EEEEEE          LLLLLL   EEEEEE   EEEEEE
```

USACOE DETROIT H800 VOS 5 1.1  PRINTER:  6

EE LEE  1 APR 87  8:51:29

TERMINAL: 105

THIS RUN EXECUTED 1 APR 87 8:51:01

```
*****************************************************
  HEC2 RELEASE DATED NOV 79 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
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C
T1    MANISTEE TOWNSHIP, FIS
T2    MANISTEE RIVER
T3    100 YEAR FLOOD

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0.        2.        0.        0.   0.000000    0.00      0.0       0.     579.800    0.000

J2  NPROF     IFLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

    -1.000    0.000    -1.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000


NC      0.035     0.035     0.030     0.500     1.000     0.000     0.000     0.000     0.000     0.000
GT      1.000  4640.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
          CROSS SECTION AT MANISTEE LAKE
X1      0.000    13.000  1500.000  1860.000     0.000     0.000     0.000     0.000    -4.360     0.000
X3      0.000     0.000     0.000  1348.000     0.000  2013.000     0.000     0.000     0.000     0.000
GR    587.300    50.000   584.300    50.000   583.500   945.000   583.400  1350.000   583.400  1500.000
GR    574.900  1520.000   575.620  1620.000   577.600  1790.000   577.600  1850.000   583.400  1860.000
GR    584.000  2000.000   585.600  2300.000   590.500  2340.000     0.000     0.000     0.000     0.000

          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
X1    900.000     8.000  1550.000  1780.000   800.000  1029.000   900.000     0.000     0.000     0.000
X3      0.000     0.000     0.000  1550.000     0.000  1780.000     0.000     0.000     0.000     0.000
GR    587.300  1200.000   582.000  1200.000   582.000  1550.000   571.570  1580.000   571.570  1760.000
GR    582.000  1780.000   585.600  1830.000   590.500  1880.000     0.000     0.000     0.000     0.000

X1   1010.000     6.000   620.000   800.000   110.000   110.000   110.000     0.000     0.000     0.000
GR    582.000   200.000   582.000   620.000   571.680   630.000   571.680   770.000   582.000   800.000
GR    582.000  1200.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

X1   1040.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

X1   1070.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

X1   1100.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

NC      0.000     0.000     0.000     0.500     1.000     0.000     0.000     0.000     0.000     0.000
```

CROSS SECTION JUST BELOW RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1120.000 | 8.000 | 1042.100 | 1151.900 | 20.000 | 20.000 | 20.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 0.000 | 582.300 | 10.000 | 582.300 | 1042.100 | 571.790 | 1060.000 | 572.290 | 1130.000 |
| GR | 582.300 | 1151.900 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1121.000 | 50.000 | 1042.100 | 1151.900 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |
| BT | -50.000 | 0.000 | 592.000 | 587.300 | 10.000 | 592.000 | 582.300 | 1013.000 | 592.000 | 582.300 |
| BT | 0.000 | 1012.100 | 592.000 | 590.000 | 1014.000 | 592.000 | 590.000 | 1014.100 | 592.000 | 582.300 |
| BT | 0.000 | 1015.000 | 592.000 | 582.300 | 1015.100 | 592.000 | 590.000 | 1026.000 | 592.000 | 590.000 |
| BT | 0.000 | 1026.100 | 592.000 | 583.200 | 1027.000 | 592.000 | 583.200 | 1027.100 | 592.000 | 590.000 |
| BT | 0.000 | 1037.000 | 592.000 | 590.000 | 1037.100 | 592.000 | 582.300 | 1038.000 | 592.000 | 582.300 |
| BT | 0.000 | 1038.100 | 592.000 | 589.100 | 1039.000 | 592.000 | 589.100 | 1039.100 | 592.000 | 582.300 |
| BT | 0.000 | 1040.000 | 592.000 | 582.300 | 1040.100 | 592.000 | 589.100 | 1041.000 | 592.000 | 589.100 |
| BT | 0.000 | 1041.100 | 592.000 | 582.300 | 1042.000 | 592.000 | 582.300 | 1042.100 | 592.000 | 589.100 |
| BT | 0.000 | 1060.000 | 592.000 | 589.100 | 1130.000 | 592.000 | 589.100 | 1151.900 | 592.000 | 589.100 |
| BT | 0.000 | 1152.000 | 592.000 | 582.300 | 1153.000 | 592.000 | 582.300 | 1153.100 | 592.000 | 589.100 |
| BT | 0.000 | 1154.000 | 592.000 | 589.100 | 1154.100 | 592.000 | 582.300 | 1155.000 | 592.000 | 582.300 |
| BT | 0.000 | 1155.100 | 592.000 | 589.100 | 1156.000 | 592.000 | 589.100 | 1156.100 | 592.000 | 582.300 |
| BT | 0.000 | 1157.000 | 592.000 | 582.300 | 1157.100 | 592.000 | 590.000 | 1166.000 | 592.000 | 590.000 |
| BT | 0.000 | 1166.100 | 592.000 | 582.500 | 1167.000 | 592.000 | 582.500 | 1167.100 | 592.000 | 590.000 |
| BT | 0.000 | 1179.000 | 592.000 | 590.000 | 1179.100 | 592.000 | 582.700 | 1180.000 | 592.000 | 582.700 |
| BT | 0.000 | 1180.100 | 592.000 | 590.000 | 1192.000 | 592.000 | 590.000 | 1192.100 | 592.000 | 582.900 |
| BT | 0.000 | 1292.000 | 592.000 | 585.600 | 2292.000 | 592.000 | 590.500 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 0.000 | 582.300 | 10.000 | 582.300 | 1013.000 | 582.300 | 1013.100 | 582.300 | 1014.000 |
| GR | 582.300 | 1014.100 | 582.300 | 1015.000 | 582.300 | 1015.100 | 582.300 | 1026.000 | 582.300 | 1026.100 |
| GR | 582.300 | 1027.000 | 582.300 | 1027.100 | 582.300 | 1037.000 | 582.300 | 1037.100 | 582.300 | 1038.000 |
| GR | 582.300 | 1038.100 | 582.300 | 1039.000 | 582.300 | 1039.100 | 582.300 | 1040.000 | 582.300 | 1040.100 |
| GR | 582.300 | 1041.000 | 582.300 | 1041.100 | 582.300 | 1042.000 | 582.300 | 1042.100 | 571.790 | 1060.000 |
| GR | 572.290 | 1130.000 | 582.300 | 1151.900 | 582.300 | 1152.000 | 582.300 | 1153.000 | 582.300 | 1153.100 |
| GR | 582.300 | 1154.000 | 582.300 | 1154.100 | 582.300 | 1155.000 | 582.300 | 1155.100 | 582.300 | 1156.000 |
| GR | 582.300 | 1156.100 | 582.300 | 1157.000 | 582.300 | 1157.100 | 582.500 | 1166.000 | 582.500 | 1166.100 |
| GR | 582.500 | 1167.000 | 582.500 | 1167.100 | 582.700 | 1179.000 | 582.700 | 1179.100 | 582.700 | 1180.000 |
| GR | 582.700 | 1130.100 | 582.700 | 1192.000 | 582.900 | 1192.100 | 585.600 | 1292.000 | 590.500 | 2292.000 |

CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1146.000 | 0.000 | 0.000 | 0.000 | 25.000 | 25.000 | 25.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1147.000 | 8.000 | 1042.100 | 1151.900 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 0.000 | 582.300 | 10.000 | 582.300 | 1042.100 | 571.790 | 1060.000 | 572.290 | 1130.000 |
| GR | 582.300 | 1151.900 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1177.000 | 8.000 | 1035.000 | 1155.000 | 30.000 | 30.000 | 30.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 990.000 | 0.000 | 1155.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 0.000 | 581.300 | 10.000 | 581.300 | 1035.000 | 572.000 | 1060.000 | 572.740 | 1130.000 |
| GR | 581.300 | 1155.000 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
UPSTREAM OF THE RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1364.000 | 8.000 | 1027.000 | 1150.000 | 137.000 | 187.000 | 187.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 625.000 | 0.000 | 1175.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 0.000 | 582.000 | 10.000 | 582.000 | 1027.000 | 572.300 | 1060.000 | 572.800 | 1130.000 |
| GR | 582.300 | 1150.000 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.000 | 0.100 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 1526.000 | 8.000 | 1620.000 | 1740.000 | 113.000 | 162.000 | 162.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1200.000 | 582.000 | 1200.000 | 582.000 | 1620.000 | 572.170 | 1640.000 | 572.770 | 1720.000 |
| GR | 592.000 | 1740.000 | 585.600 | 1830.000 | 590.500 | 1880.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 1851.000 | 8.000 | 1600.000 | 1750.000 | 225.000 | 325.000 | 325.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1200.000 | 582.000 | 1200.000 | 582.000 | 1600.000 | 572.500 | 1620.000 | 573.000 | 1730.000 |
| GR | 582.000 | 1750.000 | 585.600 | 1830.000 | 590.500 | 1880.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| QT | 1.000 | 8520.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.080 | 0.080 | 0.030 | 0.100 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 2500.000 | 8.000 | 1550.000 | 1780.000 | 450.000 | 649.000 | 649.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1200.000 | 582.000 | 1200.000 | 582.000 | 1550.000 | 573.140 | 1580.000 | 574.140 | 1760.000 |
| GR | 582.000 | 1780.000 | 585.600 | 1830.000 | 590.500 | 1880.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3515.000 | 12.000 | 1500.000 | 1360.000 | 1015.000 | 1015.000 | 1015.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1365.000 | 0.000 | 1898.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1100.000 | 582.100 | 1100.000 | 582.000 | 1200.000 | 582.000 | 1350.000 | 582.000 | 1500.000 |
| GR | 574.350 | 1520.000 | 575.350 | 1620.000 | 577.050 | 1790.000 | 577.050 | 1850.000 | 582.100 | 1860.000 |
| GR | 585.600 | 1910.000 | 590.300 | 1960.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.000 | 0.500 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3870.000 | 77.000 | 1500.000 | 1955.000 | 355.000 | 355.000 | 355.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| GR | 584.300 | 50.000 | 583.900 | 200.000 | 583.600 | 950.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 579.600 | 1505.000 | 578.800 | 1510.000 | 576.900 | 1515.000 | 577.200 | 1520.000 | 577.000 | 1525.000 |
| GR | 576.300 | 1530.000 | 578.000 | 1535.000 | 576.600 | 1540.000 | 575.200 | 1545.000 | 576.200 | 1550.000 |
| GR | 574.500 | 1554.000 | 577.400 | 1560.000 | 575.500 | 1565.000 | 574.900 | 1570.000 | 578.700 | 1575.000 |
| GR | 578.900 | 1580.000 | 578.900 | 1585.000 | 578.800 | 1590.000 | 578.600 | 1595.000 | 577.900 | 1600.000 |
| GR | 577.600 | 1605.000 | 576.100 | 1610.000 | 576.300 | 1614.000 | 576.500 | 1620.000 | 577.200 | 1625.000 |
| GR | 579.100 | 1630.000 | 579.300 | 1635.000 | 579.300 | 1640.000 | 579.500 | 1645.000 | 579.100 | 1650.000 |
| GR | 579.300 | 1655.000 | 579.200 | 1660.000 | 579.400 | 1665.000 | 579.900 | 1670.000 | 578.100 | 1674.000 |
| GR | 578.700 | 1680.000 | 579.700 | 1685.000 | 579.800 | 1690.000 | 580.000 | 1695.000 | 580.000 | 1700.000 |
| GR | 579.900 | 1705.000 | 580.100 | 1710.000 | 579.600 | 1715.000 | 579.700 | 1720.000 | 579.900 | 1725.000 |
| GR | 579.900 | 1730.000 | 578.500 | 1734.000 | 579.200 | 1740.000 | 579.600 | 1745.000 | 579.900 | 1750.000 |
| GR | 580.400 | 1755.000 | 580.400 | 1760.000 | 580.500 | 1765.000 | 580.400 | 1770.000 | 580.600 | 1775.000 |
| GR | 580.500 | 1780.000 | 580.400 | 1785.000 | 579.400 | 1790.000 | 578.700 | 1794.000 | 579.500 | 1800.000 |
| GR | 579.300 | 1805.000 | 580.300 | 1810.000 | 580.400 | 1815.000 | 580.500 | 1820.000 | 579.400 | 1825.000 |
| GR | 578.700 | 1830.000 | 577.900 | 1835.000 | 577.800 | 1840.000 | 579.300 | 1845.000 | 579.100 | 1850.000 |
| GR | 583.400 | 1855.000 | 584.700 | 2005.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3871.000 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| X4 | 12.000 | 583.400 | 1500.100 | 590.400 | 1555.000 | 590.400 | 1559.000 | 590.500 | 1615.000 | 590.500 |
| X4 | 1619.000 | 590.600 | 1675.000 | 590.600 | 1679.000 | 590.700 | 1735.000 | 590.700 | 1739.000 | 590.800 |
| X4 | 1795.000 | 590.800 | 1799.000 | 583.400 | 1854.900 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -19.000 | 50.000 | 588.100 | 0.000 | 200.000 | 588.000 | 0.000 | 950.000 | 590.000 | 0.000 |
| BT | 0.000 | 1350.000 | 593.200 | 0.000 | 1500.000 | 595.500 | 583.400 | 1500.100 | 595.500 | 590.400 |
| BT | 0.000 | 1555.000 | 595.900 | 590.400 | 1559.000 | 595.900 | 590.400 | 1615.000 | 595.900 | 590.500 |
| BT | 0.000 | 1619.000 | 595.900 | 590.500 | 1675.000 | 595.900 | 590.600 | 1679.000 | 595.900 | 590.600 |
| BT | 0.000 | 1735.000 | 595.900 | 590.700 | 1739.000 | 595.900 | 590.700 | 1795.000 | 595.900 | 590.800 |
| BT | 0.000 | 1799.000 | 595.900 | 590.800 | 1854.900 | 595.900 | 590.800 | 1855.000 | 595.900 | 583.400 |
| BT | 0.000 | 2005.000 | 595.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

UPSTREAM FACE OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3900.000 | 0.000 | 0.000 | 0.000 | 29.000 | 29.000 | 29.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |

CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3901.000 | 77.000 | 1500.000 | 1855.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| GR | 584.300 | 50.000 | 583.900 | 200.000 | 583.600 | 950.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 579.600 | 1505.000 | 578.800 | 1510.000 | 576.900 | 1515.000 | 577.200 | 1520.000 | 577.000 | 1525.000 |
| GR | 576.300 | 1530.000 | 578.000 | 1535.000 | 576.600 | 1540.000 | 575.200 | 1545.000 | 576.200 | 1550.000 |
| GR | 574.500 | 1554.000 | 577.400 | 1560.000 | 575.500 | 1565.000 | 574.900 | 1570.000 | 578.700 | 1575.000 |
| GR | 578.900 | 1580.000 | 578.900 | 1585.000 | 578.600 | 1590.000 | 578.600 | 1595.000 | 577.900 | 1600.000 |
| GR | 577.600 | 1605.000 | 576.100 | 1610.000 | 576.300 | 1614.000 | 576.500 | 1620.000 | 577.200 | 1625.000 |
| GR | 579.100 | 1630.000 | 579.300 | 1635.000 | 579.300 | 1640.000 | 579.500 | 1645.000 | 579.100 | 1650.000 |
| GR | 579.300 | 1655.000 | 579.200 | 1660.000 | 579.400 | 1665.000 | 579.900 | 1670.000 | 578.100 | 1674.000 |
| GR | 578.700 | 1680.000 | 579.700 | 1685.000 | 579.800 | 1690.000 | 580.000 | 1695.000 | 580.000 | 1700.000 |
| GR | 579.900 | 1705.000 | 580.100 | 1710.000 | 579.600 | 1715.000 | 579.700 | 1720.000 | 579.900 | 1725.000 |
| GR | 579.900 | 1730.000 | 578.500 | 1734.000 | 579.200 | 1740.000 | 579.600 | 1745.000 | 579.900 | 1750.000 |
| GR | 580.400 | 1755.000 | 580.400 | 1760.000 | 580.500 | 1765.000 | 580.400 | 1770.000 | 580.600 | 1775.000 |
| GR | 580.500 | 1780.000 | 580.400 | 1785.000 | 579.400 | 1790.000 | 578.700 | 1794.000 | 579.500 | 1800.000 |
| GR | 579.800 | 1805.000 | 580.300 | 1810.000 | 580.400 | 1815.000 | 580.500 | 1820.000 | 579.400 | 1825.000 |
| GR | 578.700 | 1830.000 | 577.900 | 1835.000 | 577.800 | 1840.000 | 579.300 | 1845.000 | 579.100 | 1850.000 |
| GR | 583.400 | 1855.000 | 584.100 | 2005.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
UPSTREAM OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4321.000 | 13.000 | 1500.000 | 1860.000 | 420.000 | 420.000 | 420.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 946.000 | 0.000 | 2141.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 50.000 | 584.300 | 50.000 | 583.500 | 945.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 574.900 | 1520.000 | 575.620 | 1620.000 | 577.600 | 1790.000 | 577.600 | 1850.000 | 583.400 | 1860.000 |
| GR | 584.000 | 2000.000 | 585.600 | 2300.000 | 590.500 | 2940.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| EJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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  SECNO     DEPTH     CASEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         GLOB      GCH       GROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
  TIME      VLOB      VCH       VRGB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*PROF 1

DCHV=   0.500 CEHV=   1.000
*SECND 0.000

3470 ENCROACHMENT STATIONS=    1348.0    2013.0  TYPE=     1  TARGET=     665.000
          CROSS SECTION AT MANISTEE LAKE
     0.00      9.26    579.80      0.00    579.80    579.84      0.04      0.00      0.00    579.04
    4640.       37.     4599.       15.      116.     2704.       66.        0.        0.    579.04
     0.00      0.32      1.70      0.22     0.035     0.030     0.035     0.000    570.54   1348.00
 0.000081        0.        0.        0.         0         0         0      0.00    665.00   2013.00

*SECND 900.000

3470 ENCROACHMENT STATIONS=    1550.0    1780.0  TYPE=     1  TARGET=     230.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
   900.00      8.34    579.91      0.00      0.00    580.03      0.12      0.11      0.08    582.00
    4640.        0.     4640.        0.        0.     1368.        0.       47.        9.  100000.00
     0.09      0.00      2.73      0.00     0.000     0.030     0.000     0.000    571.57   1556.01
 0.000216      800.      900.     1029.         2         0         0      0.00    219.99   1776.00

*SECND 1010.000
  1010.00      8.26    579.94      0.00      0.00    580.14      0.20      0.03      0.08    582.00
    4640.        0.     4640.        0.        0.     1288.        0.       51.       10.    582.00
     0.10      0.00      3.60      0.00     0.000     0.030     0.000     0.000    571.68    622.00
 0.000375      110.      110.      110.         1         0         0      0.00    172.00    794.00

*SECND 1040.000
  1040.00      8.25    579.96      0.00      0.00    580.24      0.28      0.01      0.08    582.03
    4640.        0.     4640.        0.        0.     1093.        0.       52.       10.    582.03
     0.10      0.00      4.25      0.00     0.000     0.030     0.000     0.000    571.71    558.71
 0.000629       30.       20.       30.         0         0         0      0.00    146.15    704.86

*SECND 1070.000
  1070.00      8.23    579.97      0.00      0.00    580.36      0.39      0.02      0.11    582.06
    4640.        0.     4640.        0.        0.      927.        0.       52.       10.    582.06
     0.10      0.00      5.00      0.00     0.000     0.030     0.000     0.000    571.74    504.91
 0.000746       30.       30.       30.         0         0         0      0.00    124.20    629.11
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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 1100.000
 1100.00     8.23    580.00      0.00      0.00    580.54      0.54      0.03      0.15    582.09
   4640.       0.     4640.       0.        0.      788.        0.       53.       10.     582.09
    0.10     0.00      5.89      0.00     0.000     0.030     0.000     0.000    571.77    459.18
0.001055      30.       30.       30.         0         0         0      0.00    105.55    564.73

CCHV=   0.500 CEHV=   1.000
*SECNO 1120.000

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
 ELENCL=    592.00  ELENCR=    592.00
          CROSS SECTION JUST BELOW RAILROAD BRIDGE
 1120.00     8.24    580.03      0.00      0.00    580.75      0.72      0.03      0.18    582.30
   4640.       0.     4640.       0.        0.      682.        0.       53.       10.     582.30
    0.10     0.00      6.81      0.00     0.000     0.030     0.000     0.000    571.79   1045.98
0.001557      20.       20.       20.         0         0         0      0.00    100.92   1146.91

*SECNO 1121.000

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
 ELENCL=    592.00  ELENCR=    592.00
          CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
 1121.00     8.24    580.03      0.00      0.00    580.75      0.72      0.00      0.00    582.30
   4640.       0.     4640.       0.        0.      682.        0.       53.       10.     582.30
    0.10     0.00      6.80      0.00     0.000     0.030     0.000     0.000    571.79   1045.97
0.001551       1.        1.        1.         0         0         0      0.00    100.96   1146.93

*SECNO 1146.000

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
 ELENCL=    592.00  ELENCR=    592.00
          CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
 1146.00     8.29    580.03      0.00      0.00    580.79      0.71      0.04      0.01    582.30
   4640.       0.     4640.       0.        0.      687.        0         54.       10.     582.30
    0.11     0.00      6.75      0.00     0.000     0.030     0.000     0.000    571.79   1045.89
0.001519      25.       25.       25.         1         0         0      0.00    101.15   1147.03
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 SECNO     DEPTH     CNSEL     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       WTN       ELMIN       SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 1147.000

3470 ENCROACHMENT STATIONS=     1013.0     1192.1  TYPE=      1  TARGET=      179.100
 ELENCL=     592.00  ELENCR=     592.00
          CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
  1147.00      8.30    580.09      0.00      0.00    580.79      0.71      0.00      0.00    582.30
   4640.         0.     4640.        0.        0.      688.        0.       54.       10.     582.30
     0.11      0.00      6.74      0.00     0.000     0.030     0.000     0.000    571.79   1045.87
 0.001512        1.        1.        1.         0         0         0      0.00    101.18   1147.06

*SECNO 1177.000

3470 ENCROACHMENT STATIONS=      790.0     1155.0  TYPE=      1  TARGET=      165.000
  1177.00      8.23    580.23      0.00      0.00    580.87      0.64      0.04      0.03    581.30
   4640.         0.     4640.        0.        0.      724.        0.       54.       10.  100000.00
     0.11      0.00      6.41      0.00     0.000     0.030     0.000     0.000    572.00   1037.86
 0.001471       30.       30.       30.         2         0         0      0.00    114.03   1151.89

*SECNO 1364.000

3470 ENCROACHMENT STATIONS=      625.0     1175.0  TYPE=      1  TARGET=      550.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
  1364.00      8.24    580.54      0.00      0.00    581.15      0.61      0.27      0.01    582.00
   4640.         0.     4640.        0.        0.      738.        0.       57.       11.     582.30
     0.11      0.00      6.29      0.00     0.000     0.030     0.000     0.000    572.30   1031.97
 0.001389      137.      187.      187.         2         0         0      0.00    114.32   1146.29

CCHV=    0.100 CEHV=    0.300
*SECNO 1526.000
  1526.00      8.68    580.85      0.00      0.00    581.35      0.50      0.19      0.01    582.00
   4640.         0.     4640.        0.        0.      818.        0.       60.       11.     582.00
     0.12      0.00      5.67      0.00     0.000     0.030     0.000     0.000    572.17   1622.33
 0.001002      113.      162.      162.         2         0         0      0.00    115.19   1737.52

*SECNO 1851.000
  1851.00      8.83    581.33      0.00      0.00    581.60      0.28      0.23      0.02    582.00
   4640.         0.     4640.        0.        0.     1102.        0.       67.       12.     582.00
     0.14      0.00      4.21      0.00     0.000     0.030     0.000     0.000    572.50   1601.42
 0.000509      225.      325.      325.         2         0         0      0.00    147.09   1748.50
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  SECND     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

CCHV=   0.100 CEHV=   0.300
*SECND 2500.000
 2500.00     8.52    581.66      0.00      0.00    582.08      0.42      0.44      0.04    582.00
   8520.       0.     8520.        0.        0.     1639.        0.       88.       15.    582.00
    0.18     0.00      5.20      0.00     0.000     0.030     0.000     0.000    573.14   1551.14
0.000805     450.      649.      649.         2         0         0      0.00    228.01   1779.15

*SECND 3515.000

3470 ENCROACHMENT STATIONS=    1365.0    1998.0  TYPE=     1  TARGET=     533.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          HIGHWAY 55 BRIDGE
 3515.00     8.16    582.51      0.00      0.00    582.73      0.21      0.62      0.02    582.00
   8520.       18.     8502.        0.       69.     2284.        1.       134.       23.    582.10
    0.25     0.36      3.72      0.14     0.080     0.030     0.080     0.000    574.35   1365.00
0.000486    1015.     1015.     1015.         2         0         0      0.00    500.92   1865.92

CCHV=   0.500 CEHV=   1.000
*SECND 3870.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
 3870.00     8.34    582.84      0.00      0.00    583.38      0.54      0.32      0.33    583.40
   8520.       0.     8520.        0.        0.     1439.        0.      150.       27.    583.40
    0.27     0.00      5.92      0.00     0.000     0.030     0.000     0.000    574.50   1500.74
0.002271     355.      355.      355.         2         0         0      0.00    353.60   1854.35

*SECND 3871.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      595.50 ELREA=      595.90

          DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE
 3871.00     8.34    582.84      0.00      0.00    583.51      0.67      0.00      0.13    583.40
   8520.       0.     3520.        0.        0.     1297.        0.      150.       27.    583.40
    0.27     0.00      6.57      0.00     0.000     0.030     0.000     0.000    574.50   1500.82
0.003455       1.        1.        1.         0         0         0      0.00    327.33   1854.26
```

```
 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 3900.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          UPSTREAM FACE OF HIGHWAY 55 BRIDGE
  3900.00     8.52    583.02      0.00      0.00    583.63      0.61      0.09      0.03    583.40
    8520.       0.     8520.        0.        0.     1356.         0       151.       27.    583.40
     0.27     0.00      6.29      0.00     0.000     0.030     0.000     0.000    574.50   1500.59
 0.002999      29.       29.       29.         2         0         0      0.00    327.91   1854.47

*SECNO 2901.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE
  3901.00     8.78    583.28      0.00      0.00    583.72      0.44      0.00      0.09    583.40
    8520.       0.     8520.        0.        0.     1597.         0.       151.       27.    583.40
     0.27     0.00      5.34      0.00     0.000     0.030     0.000     0.000    574.50   1500.15
 0.001614       1.        1.        1.         2         0         0      0.00    354.71   1854.86

*SECNO 4321.000

3470 ENCROACHMENT STATIONS=      946.0     2141.0  TYPE=      1  TARGET=     1195.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF HIGHWAY 55 BRIDGE
  4321.00     9.05    583.95      0.00      0.00    584.11      0.16      0.25      0.14    583.40
    8520.       59.     8457.        5.      283.     2628.       35.       173.       34.    583.40
     0.31     0.21      2.22      0.14     0.080     0.030     0.080     0.000    574.90    946.00
 0.000302      420.      420.      420.         2         0         0      0.00   1041.86   1987.86
```

THIS RUN EXECUTED 1 APR 87 8:51:06

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

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 150

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.00 | 570.54 | 4640.00 | 579.80 | 0.00 | 579.84 | 0.81 | 1.70 | 2885.45 | 5163.00 |
| 900.000 | 900.00 | 0.00 | 0.00 | 571.57 | 4640.00 | 579.91 | 0.00 | 580.03 | 2.16 | 2.78 | 1668.34 | 3157.12 |
| 1010.000 | 110.00 | 0.00 | 0.00 | 571.68 | 4640.00 | 579.94 | 0.00 | 580.14 | 3.75 | 3.60 | 1287.55 | 2396.57 |
| 1040.000 | 30.00 | 0.00 | 0.50 | 571.71 | 4640.00 | 579.96 | 0.00 | 580.24 | 5.28 | 4.25 | 1092.63 | 2019.11 |
| 1070.000 | 30.00 | 0.00 | 0.00 | 571.74 | 4640.00 | 579.97 | 0.00 | 580.36 | 7.46 | 5.00 | 927.24 | 1699.00 |
| 1100.000 | 30.00 | 0.00 | 0.00 | 571.77 | 4640.00 | 580.00 | 0.00 | 580.54 | 10.55 | 5.89 | 787.54 | 1428.69 |
| 1120.000 | 20.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.57 | 6.81 | 681.54 | 1175.92 |
| 1121.000 | 1.00 | 592.00 | 590.30 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.51 | 6.80 | 682.42 | 1178.16 |
| 1146.000 | 25.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.08 | 0.00 | 580.79 | 15.19 | 6.75 | 687.30 | 1190.63 |
| 1147.000 | 1.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.09 | 0.00 | 580.79 | 15.12 | 6.74 | 688.30 | 1193.19 |
| 1177.000 | 30.00 | 0.00 | 0.00 | 572.00 | 4640.00 | 580.23 | 0.00 | 580.87 | 14.71 | 6.41 | 723.76 | 1209.80 |
| 1364.000 | 187.00 | 0.00 | 0.00 | 572.30 | 4640.00 | 580.54 | 0.00 | 581.15 | 13.89 | 6.29 | 737.59 | 1245.14 |
| 1526.000 | 162.00 | 0.00 | 0.00 | 572.17 | 4640.00 | 580.85 | 0.00 | 581.35 | 10.02 | 5.67 | 818.28 | 1465.90 |
| 1851.000 | 325.00 | 0.00 | 0.00 | 572.50 | 4640.00 | 581.33 | 0.00 | 581.60 | 5.09 | 4.21 | 1102.45 | 2056.53 |
| 2500.000 | 649.00 | 0.00 | 0.00 | 573.14 | 8520.00 | 581.66 | 0.00 | 582.08 | 8.05 | 5.20 | 1639.49 | 3002.24 |
| *3515.000 | 1015.00 | 0.00 | 0.00 | 574.35 | 8520.00 | 582.51 | 0.00 | 582.73 | 4.86 | 3.72 | 2354.48 | 3866.61 |
| 3870.000 | 355.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.38 | 22.71 | 5.92 | 1439.03 | 1787.67 |

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3871.000 | 1.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.51 | 34.55 | 6.57 | 1296.72 | 1449.42 |
| 3900.000 | 29.00 | 589.00 | 590.80 | 574.50 | 8520.00 | 583.02 | 0.00 | 583.63 | 29.99 | 6.28 | 1356.45 | 1555.90 |
| 3901.000 | 1.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 583.28 | 0.00 | 583.72 | 16.14 | 5.34 | 1596.86 | 2120.73 |
| 4321.000 | 420.00 | 0.00 | 0.00 | 574.90 | 8520.00 | 583.95 | 0.00 | 584.11 | 3.02 | 3.22 | 2946.01 | 4904.24 |

1 YEAR FLOOD

SUMMARY PRINTOUT TABLE 150

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 0.000 | 4640.00 | 579.80 | 0.00 | 0.00 | 0.00 | 665.00 | 0.00 |
| 900.000 | 4640.00 | 579.91 | 0.00 | 0.11 | 0.00 | 219.99 | 900.00 |
| 1010.000 | 4640.00 | 579.94 | 0.00 | 0.03 | 0.00 | 172.00 | 110.00 |
| 1040.000 | 4640.00 | 579.96 | 0.00 | 0.01 | 0.00 | 146.15 | 30.00 |
| 1070.000 | 4640.00 | 579.97 | 0.00 | 0.02 | 0.00 | 124.20 | 30.00 |
| 1100.000 | 4640.00 | 580.00 | 0.00 | 0.03 | 0.00 | 105.55 | 30.00 |
| 1120.000 | 4640.00 | 580.03 | 0.00 | 0.03 | 0.00 | 100.92 | 20.00 |
| 1121.000 | 4640.00 | 580.03 | 0.00 | 0.00 | 0.00 | 100.96 | 1.00 |
| 1146.000 | 4640.00 | 580.08 | 0.00 | 0.05 | 0.00 | 101.15 | 25.00 |
| 1147.000 | 4640.00 | 580.09 | 0.00 | 0.00 | 0.00 | 101.18 | 1.00 |
| 1177.000 | 4640.00 | 580.23 | 0.00 | 0.15 | 0.00 | 114.03 | 30.00 |
| 1364.000 | 4640.00 | 580.54 | 0.00 | 0.30 | 0.00 | 114.32 | 187.00 |
| 1526.000 | 4640.00 | 580.85 | 0.00 | 0.32 | 0.00 | 115.19 | 162.00 |
| 1851.000 | 4640.00 | 581.33 | 0.00 | 0.47 | 0.00 | 147.09 | 325.00 |
| 2500.000 | 8520.00 | 581.66 | 0.00 | 0.34 | 0.00 | 228.01 | 649.00 |
| 3515.000 | 8520.00 | 582.51 | 0.00 | 0.85 | 0.00 | 500.92 | 1015.00 |
| 3870.000 | 8520.00 | 582.84 | 0.00 | 0.32 | 0.00 | 353.60 | 355.00 |
| 3871.000 | 8520.00 | 582.84 | 0.00 | 0.00 | 0.00 | 327.33 | 1.00 |
| 3900.000 | 8520.00 | 583.02 | 0.00 | 0.18 | 0.00 | 327.91 | 29.00 |
| 3901.000 | 8520.00 | 583.28 | 0.00 | 0.26 | 0.00 | 354.71 | 1.00 |
| 4321.000 | 8520.00 | 583.95 | 0.00 | 0.67 | 0.00 | 1041.86 | 420.00 |

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee

3) WATERCOURSE: Manistee River

4) DOCUMENT TYPE: 10, 50, 100, 500 Year floodway

00BREAK00

TOWNSHIP OF MANISTEE, FIS

MANISTEE RIVER (REVISED)

100-YR FLOOD - ENCROACHED RUN

INP = MNSTEN2

```
EEEEEE   EEEEEE          L        EEEEEE   EEEEEE
E        E                L        E        E
E        E                L        E        E
EEEE     EEEE             L        EEEE     EEEE
E        E                L        E        E
EEEEEE   EEEEEE           LLLLLL   EEEEEE   EEEEEE
```

USACOE DETROIT H800 VOS 5.1.1 PRINTER: 6

EE LEE 1 APR 87 8:59:59

TERMINAL: 105

THIS RUN EXECUTED 1 APR 87 8:52:24

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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
*****************************************************

C
T1     MANISTEE TOWNSHIP, F/S
T2     MANISTEE RIVER
T3     100 YEAR FLOOD

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
      0.       2.        0         0     0.000000    0.00      0.0       0.      579.800    0.000
J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    1.000     0.000    -1.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    110.000   150.000   200.000   0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC     0.035     0.035     0.030     0.500     1.000     0.000     0.000     0.000     0.000     0.000
GT     2.000  4640.000  4640.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
ET     0.000     4.100     1.400  1348.000  2013.000     0.000     0.000     0.000     0.000     0.000
          CROSS SECTION AT MANISTEE LAKE
X1     0.000    13.000  1500.000  1860.000     0.000     0.000     0.000     0.000    -4.360     0.000
GR   587.300    50.000   584.300    50.000   583.500   945.000   583.400  1350.000   583.400  1500.000
GR   574.900  1520.000   575.620  1620.000   577.600  1790.000   577.600  1850.000   583.400  1860.000
GR   584.000  2000.000   585.600  2300.000   590.500  2340.000     0.000     0.000     0.000     0.000

ET     0.000     4.100     0.000  1550.000  1360.000     0.000     0.000     0.000     0.000     0.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
X1   900.000     8.000  1550.000  1780.000   800.000  1029.000   900.000     0.000     0.000     0.000
GR   587.300  1200.000   582.000  1200.000   582.000  1550.000   571.570  1580.000   571.570  1760.000
GR   582.000  1780.000   585.600  1830.000   590.500  1880.000     0.000     0.000     0.000     0.000

X1  1010.000     6.000   620.000   800.000   110.000   110.000   110.000     0.000     0.000     0.000
GR   582.000   200.000   582.000   620.000   571.680   630.000   571.680   770.000   582.000   800.000
GR   582.000  1200.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

X1  1040.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

X1  1070.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000
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X1    1100.000      0.000      0.000      0.000     30.000     30.000     30.000      0.350      0.030      0.000

NC       0.000      0.000      0.000      0.500      1.000      0.000      0.000      0.000      0.000      0.000
ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION JUST BELOW RAILROAD BRIDGE
X1    1120.000      8.000   1042.100   1151.900     20.000     20.000     20.000      0.000      0.000      0.000
GR     587.300      0.000    582.300     10.000    582.300   1042.100    571.790   1060.000    572.290   1130.000
GR     582.300   1151.900    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000

ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
X1    1121.000     50.000   1042.100   1151.900      1.000      1.000      1.000      0.000      0.000      0.000
BT     -50.000      0.000    592.000    587.300     10.000    592.000    582.300   1013.000    592.000    582.300
BT       0.000   1013.100    592.000    590.000   1014.000    592.000    590.000   1014.100    592.000    582.300
BT       0.000   1015.000    592.000    582.300   1015.100    592.000    590.000   1026.000    592.000    590.000
BT       0.000   1026.100    592.000    583.200   1027.000    592.000    583.200   1027.100    592.000    590.000
BT       0.000   1037.000    592.000    590.000   1037.100    592.000    582.300   1038.000    592.000    582.300
BT       0.000   1038.100    592.000    589.100   1039.000    592.000    589.100   1039.100    592.000    582.300
BT       0.000   1040.000    592.000    582.300   1040.100    592.000    589.100   1041.000    592.000    589.100
BT       0.000   1041.100    592.000    582.300   1042.000    592.000    582.300   1042.100    592.000    589.100
BT       0.000   1060.000    592.000    589.100   1130.000    592.000    589.100   1151.900    592.000    589.100
BT       0.000   1152.000    592.000    582.300   1153.000    592.000    582.300   1153.100    592.000    589.100
BT       0.000   1154.000    592.000    589.100   1154.100    592.000    582.300   1155.000    592.000    582.300
BT       0.000   1155.100    592.000    589.100   1156.000    592.000    589.100   1156.100    592.000    582.300
BT       0.000   1157.000    592.000    582.300   1157.100    592.000    590.000   1166.000    592.000    590.000
BT       0.000   1166.100    592.000    582.500   1167.000    592.000    582.500   1167.100    592.000    590.000
BT       0.000   1179.000    592.000    590.000   1179.100    592.000    582.700   1180.000    592.000    582.700
BT       0.000   1180.100    592.000    590.000   1192.000    592.000    590.000   1192.100    592.000    582.900
BT       0.000   1292.000    592.000    585.600   2292.000    592.000    590.500      0.000      0.000      0.000
GR     587.300      0.000    582.300     10.000    582.300   1013.000    582.300   1013.100    582.300   1014.000
GR     582.300   1014.100    582.300   1015.000    582.300   1015.100    582.300   1026.000    582.300   1026.100
GR     582.300   1027.000    582.300   1027.100    582.300   1037.000    582.300   1037.100    582.300   1038.000
GR     582.300   1038.100    582.300   1039.000    582.300   1039.100    582.300   1040.000    582.300   1040.100
GR     582.300   1041.000    582.300   1041.100    582.300   1042.000    582.300   1042.100    571.790   1060.000
GR     572.290   1130.000    582.300   1151.900    582.300   1152.000    582.300   1153.000    582.300   1153.100
GR     582.300   1154.000    582.300   1154.100    582.300   1155.000    582.300   1155.100    582.300   1156.000
GR     582.300   1156.100    582.300   1157.000    582.300   1157.100    582.500   1166.000    582.500   1166.100
GR     582.500   1167.000    582.500   1167.100    582.700   1179.000    582.700   1179.100    582.700   1180.000
GR     582.700   1180.100    582.900   1192.000    582.900   1192.100    585.600   1292.000    590.500   2292.000

ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
X1    1146.000      0.000      0.000      0.000     25.000     25.000     25.000      0.000      0.000      0.000
X2       0.000      0.000      0.000      0.000      0.000      0.000      1.000      0.000      0.000      0.000

ET       0.000      4.100      0.000   1013.000   1192.100      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
X1    1147.000      8.000   1042.100   1151.900      1.000      1.000      1.000      0.000      0.000      0.000
GR     587.300      0.000    582.300     10.000    582.300   1042.100    571.790   1060.000    572.290   1130.000
GR     582.300   1151.900    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000
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ET      0.000      4.100      0.000    990.000   1155.000      0.000      0.000      0.000      0.000      0.000
X1   1177.000      8.000   1035.000   1155.000     30.000     30.000     30.000      0.000      0.000      0.000
GR    587.300      0.000    581.300     10.000    581.300   1035.000    572.000   1060.000    572.740   1130.000
GR    581.300   1155.000    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      0.000    625.000   1175.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
X1   1364.000      8.000   1027.000   1150.000    137.000    187.000    187.000      0.000      0.000      0.000
GR    587.300      0.000    582.000     10.000    582.000   1027.000    572.300   1060.000    572.800   1130.000
GR    582.300   1150.000    585.600   1292.000    590.500   2292.000      0.000      0.000      0.000      0.000

NC      0.000      0.000      0.000      0.100      0.300      0.000      0.000      0.000      0.000      0.000
ET      0.000      0.000      1.400   1375.000   1740.000      0.000      0.000      0.000      0.000      0.000
X1   1526.000      8.000   1620.000   1740.000    113.000    162.000    162.000      0.000      0.000      0.000
GR    587.300   1200.000    582.000   1200.000    582.000   1620.000    572.170   1640.000    572.770   1720.000
GR    582.000   1740.000    585.600   1830.000    590.500   1880.000      0.000      0.000      0.000      0.000

ET      0.000      0.000      1.400   1385.000   1750.000      0.000      0.000      0.000      0.000      0.000
X1   1851.000      8.000   1600.000   1750.000    225.000    325.000    325.000      0.000      0.000      0.000
GR    587.300   1200.000    582.000   1200.000    582.000   1600.000    572.500   1620.000    573.000   1730.000
GR    582.000   1750.000    585.600   1830.000    590.500   1880.000      0.000      0.000      0.000      0.000

OT      2.000   8520.000   8520.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
NC      0.080      0.080      0.030      0.100      0.300      0.000      0.000      0.000      0.000      0.000
ET      0.000      0.000      1.400   1410.000   1780.000      0.000      0.000      0.000      0.000      0.000
X1   2500.000      8.000   1550.000   1780.000    450.000    649.000    649.000      0.000      0.000      0.000
GR    587.300   1200.000    582.000   1200.000    582.000   1550.000    573.140   1580.000    574.140   1760.000
GR    582.000   1780.000    585.600   1830.000    590.500   1880.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      1.400   1365.000   1898.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          HIGHWAY 55 BRIDGE
X1   3515.000     12.000   1500.000   1860.000   1015.000   1015.000   1015.000      0.000      0.000      0.000
GR    587.300   1100.000    582.100   1100.000    582.000   1200.000    582.000   1350.000    582.000   1500.000
GR    574.350   1520.000    575.350   1620.000    577.050   1790.000    577.050   1850.000    582.100   1860.000
GR    585.600   1910.000    590.500   1960.000      0.000      0.000      0.000      0.000      0.000      0.000

NC      0.000      0.000      0.000      0.500      1.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
X1   3870.000     77.000   1500.000   1855.000    355.000    355.000    355.000      0.000      0.000      0.000
X3     10.000      0.000      0.000      0.000      0.000      0.000      0.000    595.500    595.900      0.000
GR    584.300     50.000    583.900    200.000    583.600    950.000    583.400   1350.000    583.400   1500.000
GR    579.600   1505.000    578.800   1510.000    576.900   1515.000    577.200   1520.000    577.000   1525.000
GR    576.300   1530.000    578.000   1535.000    576.600   1540.000    575.200   1545.000    576.200   1550.000
GR    574.500   1554.000    577.400   1560.000    575.500   1565.000    574.900   1570.000    578.700   1575.000
GR    578.900   1580.000    578.900   1585.000    578.800   1590.000    578.600   1595.000    577.900   1600.000
GR    577.600   1605.000    576.100   1610.000    576.300   1614.000    576.500   1620.000    577.200   1625.000
GR    579.100   1630.000    579.300   1635.000    579.300   1640.000    579.500   1645.000    579.100   1650.000
GR    579.300   1655.000    579.200   1660.000    579.400   1665.000    579.900   1670.000    578.100   1674.000
GR    578.700   1680.000    579.700   1685.000    579.800   1690.000    580.000   1695.000    580.000   1700.000
GR    579.900   1705.000    580.100   1710.000    579.600   1715.000    579.700   1720.000    579.900   1725.000
GR    579.900   1730.000    578.300   1734.000    579.200   1740.000    579.600   1745.000    579.900   1750.000
```

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GR | 580.400 | 1755.000 | 580.400 | 1760.000 | 580.500 | 1765.000 | 580.400 | 1770.000 | 580.600 | 1775.000 |
| GR | 580.500 | 1780.000 | 580.400 | 1785.000 | 579.400 | 1790.000 | 578.700 | 1794.000 | 579.500 | 1800.000 |
| GR | 579.800 | 1805.000 | 580.200 | 1810.000 | 580.400 | 1815.000 | 580.500 | 1820.000 | 579.400 | 1825.000 |
| GR | 578.700 | 1830.000 | 577.900 | 1835.000 | 577.800 | 1840.000 | 579.300 | 1845.000 | 579.100 | 1850.000 |
| GR | 583.400 | 1855.000 | 584.700 | 2005.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3871.000 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| X4 | 12.000 | 583.400 | 1500.100 | 590.400 | 1555.000 | 590.400 | 1559.000 | 590.500 | 1615.000 | 590.500 |
| X4 | 1619.000 | 590.600 | 1675.000 | 590.600 | 1679.000 | 590.700 | 1735.000 | 590.700 | 1739.000 | 590.800 |
| X4 | 1795.000 | 590.800 | 1799.000 | 583.400 | 1854.900 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -19.000 | 50.000 | 588.100 | 0.000 | 200.000 | 588.000 | 0.000 | 950.000 | 590.000 | 0.000 |
| BT | 0.000 | 1350.000 | 593.200 | 0.000 | 1500.000 | 595.500 | 583.400 | 1500.100 | 595.500 | 590.400 |
| BT | 0.000 | 1555.000 | 595.900 | 590.400 | 1559.000 | 595.900 | 590.400 | 1615.000 | 595.900 | 590.500 |
| BT | 0.000 | 1619.000 | 595.900 | 590.500 | 1675.000 | 595.900 | 590.600 | 1679.000 | 595.900 | 590.600 |
| BT | 0.000 | 1735.000 | 595.900 | 590.700 | 1739.000 | 595.900 | 590.700 | 1795.000 | 595.900 | 590.800 |
| BT | 0.000 | 1799.000 | 595.900 | 590.800 | 1854.900 | 595.900 | 590.800 | 1855.000 | 595.900 | 583.400 |
| BT | 0.000 | 2005.000 | 595.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

UPSTREAM FACE OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3900.000 | 0.000 | 0.000 | 0.000 | 29.000 | 29.000 | 29.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |

CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3901.000 | 77.000 | 1500.000 | 1855.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X2 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| GR | 584.300 | 50.000 | 583.900 | 200.000 | 583.600 | 950.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 579.600 | 1505.000 | 578.800 | 1510.000 | 576.900 | 1515.000 | 577.200 | 1520.000 | 577.000 | 1525.000 |
| GR | 576.300 | 1530.000 | 578.000 | 1535.000 | 576.600 | 1540.000 | 575.200 | 1545.000 | 576.200 | 1550.000 |
| GR | 574.500 | 1554.000 | 577.400 | 1560.000 | 575.500 | 1565.000 | 574.900 | 1570.000 | 578.700 | 1575.000 |
| GR | 578.900 | 1580.000 | 578.900 | 1585.000 | 578.800 | 1590.000 | 578.600 | 1595.000 | 577.900 | 1600.000 |
| GR | 577.600 | 1605.000 | 576.100 | 1610.000 | 576.300 | 1614.000 | 576.500 | 1620.000 | 577.200 | 1625.000 |
| GR | 579.100 | 1630.000 | 579.300 | 1635.000 | 579.300 | 1640.000 | 579.500 | 1645.000 | 579.100 | 1650.000 |
| GR | 579.300 | 1655.000 | 579.200 | 1660.000 | 579.400 | 1665.000 | 579.900 | 1670.000 | 578.100 | 1674.000 |
| GR | 578.700 | 1680.000 | 579.700 | 1685.000 | 579.800 | 1690.000 | 580.000 | 1695.000 | 580.000 | 1700.000 |
| GR | 579.900 | 1705.000 | 580.100 | 1710.000 | 579.600 | 1715.000 | 579.700 | 1720.000 | 579.900 | 1725.000 |
| GR | 579.900 | 1730.000 | 578.500 | 1734.000 | 579.200 | 1740.000 | 579.600 | 1745.000 | 579.900 | 1750.000 |
| GR | 580.400 | 1755.000 | 580.400 | 1760.000 | 580.500 | 1765.000 | 580.400 | 1770.000 | 580.600 | 1775.000 |
| GR | 580.500 | 1780.000 | 580.400 | 1785.000 | 579.400 | 1790.000 | 578.700 | 1794.000 | 579.500 | 1800.000 |
| GR | 579.800 | 1805.000 | 580.300 | 1810.000 | 580.400 | 1815.000 | 580.500 | 1820.000 | 579.400 | 1825.000 |
| GR | 578.700 | 1830.000 | 577.900 | 1835.000 | 577.800 | 1840.000 | 579.300 | 1845.000 | 579.100 | 1850.000 |
| GR | 583.400 | 1855.000 | 584.100 | 2005.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ET | 0.000 | 4.100 | 1.400 | 946.000 | 2141.000 | 1200.000 | 1860.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
UPSTREAM OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4321.000 | 13.000 | 1500.000 | 1860.000 | 420.000 | 420.000 | 420.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 50.000 | 584.300 | 50.000 | 583.500 | 945.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 574.900 | 1520.000 | 575.620 | 1620.000 | 577.600 | 1790.000 | 577.600 | 1850.000 | 583.400 | 1860.000 |
| GR | 584.000 | 2000.000 | 585.600 | 2300.000 | 590.500 | 2340.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| EJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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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=   0.500 CEHV=   1.000
*SECNO 0.000

3470 ENCROACHMENT STATIONS=    1348.0    2013.0  TYPE=     1  TARGET=     665.000
          CROSS SECTION AT MANISTEE LAKE
     0.00      9.26    579.80      0.00      0.00    579.84      0.04      0.00      0.00    579.04
    4640.       37.     4589       15.      116.     2704.       66.        0.        0.    579.04
     0.00      0.32      1.70      0.22     0.035     0.030     0.035     0.000    570.54   1348.00
 0.000081        0.        0.        0.         0         0         0      0.00    665.00   2013.00

*SECNO 900.000

3470 ENCROACHMENT STATIONS=    1550.0    1860.0  TYPE=     1  TARGET=     310.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
   900.00      8.34    579.91      0.00      0.00    580.03      0.12      0.11      0.08    582.00
    4640.        0.     4640.        0.        0.     1668.        0.       47.        9.    582.00
     0.09      0.00      2.78      0.00     0.000     0.030     0.000     0.000    571.57   1556.01
 0.000216      800.      900.     1029.         2         0         0      0.00    219.99   1776.00

*SECNO 1010.000
  1010.00      8.26    579.94      0.00      0.00    580.14      0.20      0.03      0.08    582.00
    4640.        0.     4640        0.         0     1288.        0.       51.       10.    582.00
     0.10      0.00      3.60      0.00     0.000     0.030     0.000     0.000    571.68    622.00
 0.000375      110.      110.      110.         1         0         0      0.00    172.00    794.00

*SECNO 1040.000
  1040.00      8.25    579.96      0.00      0.00    580.24      0.28      0.01      0.08    582.03
    4640.        0.     4640.        0.        0.     1093.        0.       52.       10.    582.03
     0.10      0.00      4.25      0.00     0.000     0.030     0.000     0.000    571.71    558.71
 0.000528       30.       30.       30.         0         0         0      0.00    146.15    704.86

*SECNO 1070.000
  1070.00      8.23    579.97      0.00      0.00    580.36      0.39      0.02      0.11    582.06
    4640.        0.     4640.        0.        0.      927.        0.       52.       10.    582.06
     0.10      0.00      5.00      0.00     0.000     0.030     0.000     0.000    571.74    504.91
 0.000746       30.       30.       30.         0         0         0      0.00    124.20    629.11
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EC        HV        HL        DLOSS   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 1100.000
 1100.00     8.23    580.00      0.00      0.00    560.54      0.54      0.03      0.15    582.09
  4640.        0.     4640.        0.        0.      788.        0.       53.       10.    582.09
    0.10     0.00      5.89      0.00     0.000     0.030     0.000     0.000    571.77    459.18
0.001055      30.       30.       30.         0         0         0      0.00    105.55    564.73

CCHV=   0.500 CEHV=   1.000
*SECNO 1120.000

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
          CROSS SECTION JUST BELOW RAILROAD BRIDGE
 1120.00     8.24    580.03      0.00      0.00    580.75      0.72      0.03      0.18    582.30
  4640.        0.     4640.        0.        0.      682.         0       53.       10.    582.30
    0.10     0.00      6.81      0.00     0.000     0.030     0.000     0.000    571.79   1045.98
0.001557      20.       20.       20.         0         0         0      0.00    100.92   1146.91

*SECNO 1121.000

3370 NORMAL BRIDGE.NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
          CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
 1121.00     8.24    590.03      0.00      0.00    580.75      0.72      0.00      0.00    582.30
  4640.        0.     4640.        0.        0.      682.        0.       53.       10.    582.30
    0.10     0.00      6.80      0.00     0.000     0.030     0.000     0.000    571.79   1045.97
0.001551       1.         1        1.         0         0         0      0.00    100.96   1146.93

*SECNO 1146.000

3370 NORMAL BRIDGE.NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
          CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
 1146.00     8.29    580.02      0.00      0.00    580.79      0.71      0.04      0.01    582.30
  4640.        0.     4640.        0.        0.      687.        0.       54.       10.    582.30
    0.11     0.00      6.75      0.00     0.000     0.030     0.000     0.000    571.79   1045.89
0.001519      25.       25.       25.         1         0         0      0.00    101.15   1147.03
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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       WTN       ELMIN       SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 1147.000

3470 ENCROACHMENT STATIONS=     1013.0     1192.1  TYPE=      1  TARGET=      179.100
          CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
  1147.00     8.30    580.09     0.00      0.00    580.79     0.71      0.00      0.00    582.30
   4640.        0.     4640.       0.        0.      688.       0.       54.       10.     582.30
     0.11     0.00      6.74     0.00     0.000     0.030    0.000     0.000    571.79   1045.87
 0.001512       1.         1       1.         0         0        0      0.00    101.18   1147.06

*SECNO 1177.000

3470 ENCROACHMENT STATIONS=      990.0     1155.0  TYPE=      1  TARGET=      165.000
  1177.00     8.23    580.23     0.00      0.00    580.87     0.64      0.04      0.03    581.30
   4640.        0.     4640.       0.        0.      724.       0         54.       10.  100000.00
     0.11     0.00      6.41     0.00     0.000     0.030    0.000     0.000    572.00   1037.86
 0.001471      30.        30      30.         2         0        0      0.00    114.03   1151.89

*SECNO 1364.000

3470 ENCROACHMENT STATIONS=      625.0     1175.0  TYPE=      1  TARGET=      550.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
  1364.00     8.24    580.54     0.00      0.00    581.15     0.61      0.27      0.01    582.00
   4640.        0.     4640       0.        0.      738.       0.       57.       11.     582.30
     0.11     0.00      6.29     0.00     0.000     0.030    0.000     0.000    572.30   1031.97
 0.001389     137.      187.     187.         2         0        0      0.00    114.32   1146.29

CCHV=    0.100 CEHV=    0.300
*SECNO 1526.000
  1526.00     8.68    580.85     0.00      0.00    581.35     0.50      0.19      0.01    582.00
   4640.        0.     4640       0.        0.      818.       0.       60.       11.     582.00
     0.12     0.00      5.67     0.00     0.000     0.030    0.000     0.000    572.17   1622.33
 0.001002     113.      162.     162.         2         0        0      0.00    115.19   1737.52

*SECNO 1851.000
  1851.00     8.33    581.33     0.00      0.00    581.60     0.28      0.23      0.02    582.00
   4640.        0.     4640.       0.        0.     1102.       0.       67.       12.     582.00
     0.14     0.00      4.21     0.00     0.000     0.030    0.000     0.000    572.50   1601.42
 0.000509     225.      325.     325.         2         0        0      0.00    147.09   1748.50
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

CCHV=   0.100 CEHV=   0.300
*SECNO 2500.000
 2500.00     8.52    581.66      0.00      0.00    582.08      0.42      0.44      0.04    582.00
   8520.       0.     8520.        0.        0.     1639.         0       88.        15    582.00
    0.18     0.00      5.20      0.00     0.000     0.030     0.000     0.000    573.14   1551.14
0.000805     450.      649.      649.         2         0         0      0.00    228.01   1779.15

*SECNO 3515.000

3470 ENCROACHMENT STATIONS=     1365.0     1898.0  TYPE=     1  TARGET=     533.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          HIGHWAY 55 BRIDGE
 3515.00     8.16    582.51      0.00      0.00    582.73      0.21      0.62      0.02    582.00
   8520.       18.     8502.        0.       69.     2284.        1.       134.       23.    582.10
    0.25     0.26      3.72      0.14     0.080     0.030     0.080     0.000    574.35   1365.00
0.000486    1015.     1015.     1015.         2         0         0      0.00    500.92   1865.92

CCHV=   0.500 CEHV=   1.000
*SECNO 3870.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
 3870.00     8.34    582.84      0.00      0.00    583.38      0.54      0.32      0.33    583.40
   8520.       0.     8520.        0.        0.     1439.        0.       150.       27.    583.40
    0.27     0.00      5.92      0.00     0.000     0.030     0.000     0.000    574.50   1500.74
0.002271     355.      355       355.         2         0         0      0.00    353.60   1854.35

*SECNO 3871.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  538.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE
 3871.00     8.34    582.84      0.00      0.00    583.51      0.67      0.00      0.13    583.40
   8520.       0.     8520.        0.        0.     1297.        0.       150.       27.    583.40
    0.27     0.00      6.57      0.00     0.000     0.030     0.000     0.000    574.50   1500.62
0.003455       1.        1.        1.         0         0         0      0.00    327.33   1854.26
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 SECNO     DEPTH     CWSEL     CRIWS     WSELX     ED        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

*SECNO 3900.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE.ELLEA=      595.50 ELREA=      595.90

          UPSTREAM FACE OF HIGHWAY 55 BRIDGE
  3900.00     8.52    583.02      0.00      0.00    583.63      0.61      0.09      0.03    583.40
    8520.       0.      8520.       0.        0.     1356.       0.       151.       27.     583.40
     0.27     0.00      6.28      0.00     0.000     0.030     0.000     0.000    574.50   1500.59
 0.002999      29.       29.       29.         2         0         0      0.00    327.91   1854.47

*SECNO 3901.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE
  3901.00     8.78    583.28      0.00      0.00    583.72      0.44      0.00      0.09    583.40
    8520.       0.      8520.       0.        0.     1597.       0.       151.       27.     583.40
     0.27     0.00      5.34      0.00     0.000     0.030     0.000     0.000    574.50   1500.15
 0.001614       1.        1.        1.         2         0         0      0.00    354.71   1854.86

*SECNO 4321.000

3470 ENCROACHMENT STATIONS=      946.0     2141.0  TYPE=      1  TARGET=     1195.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF HIGHWAY 55 BRIDGE
  4321.00     9.05    583.95      0.00      0.00    584.11      0.16      0.25      0.14    583.40
    8520.       59.     8457.       5.       283.     2628.       35.      173.       34.     583.40
     0.31     0.21      3.22      0.14     0.080     0.030     0.080     0.000    574.90    946.00
 0.000302      420.      420.      420.         2         0         0      0.00   1041.86   1987.86
```

THIS RUN EXECUTED 1 APR 87 8:52:29

```
*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER
T3 100 YEAR FLOOD ENCROACHED RUN

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0. | 3. | 0. | 0 | 0.000000 | 0.00 | 0.0 | 0. | 579.900 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 15.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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

+PROF 2

CCHV=   0.500 CEHV=   1.000
+SECNO 0.000
 2800 NAT Q1=   5163.00  WSEL=    579.80  ENC Q1=   5219.59  WSEL=    579.90  RATIO= -0.0110
 NAT Q1=   5485.  RATIOS LOB,CH,ROB=  0.0442  0.9515  0.0042  WSEL=    579.90

3470 ENCROACHMENT STATIONS=    1500.0    1860.0  TYPE=     4  TARGET=       0.048
          CROSS SECTION AT MANISTEE LAKE
     0.00      9.36    579.90      0.00    579.80    579.94      0.04      0.00      0.00    579.04
    4640.        0.     4640.        0.        0.     2740.        0.        0.        0.    579.04
     0.00      0.00      1.69      0.00     0.000     0.030     0.000     0.000    570.54   1500.00
 0.000080        0.        0.        0.         0         0         0      0.00    360.00   1860.00


*SECNO 900.000
 2800 NAT Q1=   3157.13  WSEL=    579.91  ENC Q1=   3221.89  WSEL=    580.01  RATIO= -0.0205
 NAT Q1=   3222.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.01

3470 ENCROACHMENT STATIONS=    1550.0    1780.0  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
   900.00      8.44    580.01      0.00    579.91    580.13      0.12      0.11      0.07    582.00
    4640.        0.     4640.        0.        0.     1690.        0        46.        6.    582.00
     0.09      0.00      2.75      0.00     0.000     0.030     0.000     0.000    571.57   1555.73
 0.000208       800.      900.     1029.         2         0         0      0.00    220.46   1776.18


*SECNO 1010.000
 2800 NAT Q1=   2396.57  WSEL=    579.94  ENC Q1=   2449.67  WSEL=    580.04  RATIO= -0.0222
 NAT Q1=   2450.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.04

3470 ENCROACHMENT STATIONS=     620.0     800.0  TYPE=     4  TARGET=       0.000
  1010.00      8.36    580.04      0.00    579.94    580.23      0.20      0.03      0.08    582.00
    4640.        0.     4640.        0.        0.     1306.        0.        50.        6.    582.00
     0.10      0.00      3.55      0.00     0.000     0.030     0.000     0.000    571.68    621.90
 0.000359       110.      110.      110.         0         0         0      0.00    172.40    794.30


*SECNO 1040.000
 2800 NAT Q1=   2019.11  WSEL=    579.96  ENC Q1=   2062.63  WSEL=    580.06  RATIO= -0.0216
 NAT Q1=   2063.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.06
```

```
 SECNO     DEPTH     CWSEL     CRIWS     WSELK     ZG        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


3470 ENCROACHMENT STATIONS=      557.0      710.0  TYPE=      4  TARGET=        0.000
  1040.00      3.34    580.05      0.00    579.96    580.32      0.27      0.01      0.08    582.03
    4640.        0.     4640.        0.         0     1107.        0.       50.        7.    582.03
     0.10      0.00      4.19      0.00     0.000     0.030     0.000     0.000    571.71    558.63
 0.000507       30.       30.       30.         0         0         0      0.00    146.48    705.11


*SECNO 1070.000
 2900 NAT Q1=    1699.00  WSEL=     579.97  ENC Q1=    1735.80  WSEL=     580.07  RATIO= -0.0217
 NAT Q1=    1736.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.07

3470 ENCROACHMENT STATIONS=      503.4      633.5  TYPE=      4  TARGET=        0.000
  1070.00      8.33    580.07      0.00    579.97    580.45      0.38      0.02      0.11    582.06
    4640.        0.     4640.        0.         0      940.        0.       51.        7.    582.06
     0.10      0.00      4.94      0.00     0.000     0.030     0.000     0.000    571.74    504.84
 0.000716       30.       30.       30.         0         0         0      0.00    124.48    629.32


*SECNO 1100.000
 2900 NAT Q1=    1428.69  WSEL=     580.00  ENC Q1=    1460.16  WSEL=     580.10  RATIO= -0.0220
 NAT Q1=    1460.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.10

3470 ENCROACHMENT STATIONS=      457.9      568.5  TYPE=      4  TARGET=        0.000
  1100.00      8.32    580.09      0.00    580.00    580.62      0.52      0.03      0.15    582.09
    4640.        0.     4640.        0.         0      798.        0.       52.        7.    582.09
     0.10      0.00      5.81      0.00     0.000     0.030     0.000     0.000    571.77    459.12
 0.001012       30.       30.       30.         0         0         0      0.00    105.79    564.91


CCHV=    0.500 CEHV=    1.000
*SECNO 1120.000
 2800 NAT Q1=    1175.92  WSEL=     580.03  ENC Q1=    1203.72  WSEL=     580.13  RATIO= -0.0236
 NAT Q1=    1204.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.13

3470 ENCROACHMENT STATIONS=     1042.1     1151.9  TYPE=      4  TARGET=        0.000
          CROSS SECTION JUST BELOW RAILROAD BRIDGE
  1120.00      8.33    580.12      0.00    580.03    580.82      0.70      0.02      0.17    582.30
    4640.        0.     4640.        0.         0      692.        0.       52.        7.    582.30
     0.11      0.00      6.71      0.00     0.000     0.030     0.000     0.000    571.79   1045.81
 0.001490       20.       20.       20.         0         0         0      0.00    101.32   1147.13
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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 1121.000
 2800 NAT Q1=   1178.16  WSEL=    580.03  ENC Q1=   1204.84  WSEL=    580.13  RATIO= -0.0227
 NAT Q1=   1205.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.13

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50


3470 ENCROACHMENT STATIONS=    1042.1    1151.9  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
  1121.00     8.33   580.12     0.00   580.03   580.82     0.70     0.00     0.00   582.30
    4640.       0.    4640.       0.       0.     692.        0       52.       7.   582.30
     0.11     0.00     6.71     0.00    0.000    0.030    0.000    0.000   571.79  1045.81
 0.001490       1.       1.       1.        0        0        0     0.00   101.32  1147.13


*SECNO 1146.000
 2800 NAT Q1=   1190.63  WSEL=    580.08  ENC Q1=   1218.84  WSEL=    580.18  RATIO= -0.0237
 NAT Q1=   1219.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.18

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50


3470 ENCROACHMENT STATIONS=    1042.1    1151.9  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
  1146.00     8.38   580.17     0.00   580.08   580.86     0.69     0.04     0.00   582.30
    4640.       0.    4640.       0.       0.     696.        0       52.       7.   582.30
     0.11     0.00     6.67     0.00    0.000    0.030    0.000    0.000   571.79  1045.74
 0.001462      25.      25.      25.        1        0        0     0.00   101.49  1147.23


*SECNO 1147.000
 2800 NAT Q1=   1193.19  WSEL=    580.09  ENC Q1=   1220.04  WSEL=    580.19  RATIO= -0.0225
 NAT Q1=   1220.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.19

3470 ENCROACHMENT STATIONS=    1042.1    1151.9  TYPE=     4  TARGET=       0.000
          CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
  1147.00     8.38   580.17     0.00   580.09   580.86     0.69     0.00     0.00   582.30
    4640.       0.    4640       0.       0.     697.        0       52.       7.   582.30
     0.11     0.00     6.66     0.00    0.000    0.030    0.000    0.000   571.79  1045.72
 0.001457       1.       1        1.        0        0        0     0.00   101.52  1147.24
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS   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 1177.000
 2800 NAT Q1=   1209.80  WSEL=    580.33  ENC Q1=   1237.49  WSEL=    580.33  RATIO= -0.0229
 NAT Q1=   1237.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.33

3470 ENCROACHMENT STATIONS=    1035.0    1155.0  TYPE=     4  TARGET=       0.000
  1177.00     8.32   580.32     0.00   580.23   580.94     0.62     0.04     0.03   581.30
    4640.       0.     4640       0.       0.     733.       0.      53.       7.   581.30
     0.11     0.00     6.33     0.00    0.000    0.030    0.000    0.000   572.00  1037.64
 0.001417      30.      30.      30.        2        0        0     0.00   114.49  1152.13

*SECNO 1364.000
 2800 NAT Q1=   1245.14  WSEL=    580.54  ENC Q1=   1273.28  WSEL=    580.64  RATIO= -0.0226
 NAT Q1=   1273.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.64

3470 ENCROACHMENT STATIONS=    1027.0    1150.0  TYPE=     4  TARGET=       0.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
  1364.00     8.31   580.61     0.00   580.54   581.21     0.60     0.26     0.01   582.00
    4640.       0.     4640.      0.       0.     745.       0.      56.       7.   582.30
     0.12     0.00     6.22     0.00    0.000    0.030    0.000    0.000   572.30  1031.74
 0.001347     137.     187      187.        2        0        0     0.00   114.69  1146.43

CCHV=   0.100 CEHV=   0.300
*SECNO 1525.000
 2800 NAT Q1=   1465.90  WSEL=    580.95  ENC Q1=   1496.56  WSEL=    580.95  RATIO= -0.0209
 NAT Q1=   1497.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.95

3470 ENCROACHMENT STATIONS=    1620.0    1740.0  TYPE=     4  TARGET=       0.000
  1526.00     8.74   580.91     0.00   580.85   581.40     0.49     0.18     0.01   582.00
    4640.       0.     4640.      0.       0.     825.       0.      59.       8.   582.00
     0.12     0.00     5.62     0.00    0.000    0.030    0.000    0.000   572.17  1622.21
 0.000978     113.     162.     162.        2        0        0     0.00   115.43  1737.64

*SECNO 1851.000
 2800 NAT Q1=   2056.53  WSEL=    581.33  ENC Q1=   2098.09  WSEL=    581.43  RATIO= -0.0202
 NAT Q1=   2098.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    581.43

3470 ENCROACHMENT STATIONS=    1600.0    1750.0  TYPE=     4  TARGET=       0.000
  1851.00     8.87   581.37     0.00   581.33   581.65     0.27     0.22     0.02   582.00
    4640.       0.     4640       0.       0.    1110.       0.      66.       9.   582.00
     0.15     0.00     4.16     0.00    0.000    0.030    0.000    0.000   572.50  1601.32
 0.000499     225.     325      325.        2        0        0     0.00   147.29  1748.61
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```
  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST


CCHV=   0.100 CEHV=   0.300
*SECNO 2500.000
 2800 NAT Q1=   3002.24  WSEL=    581.66  ENC Q1=   3066.69  WSEL=    581.76  RATIO= -0.0215
 NAT Q1=   3067.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    581.76

3470 ENCROACHMENT STATIONS=    1550.0    1780.0  TYPE=     4  TARGET=       0.000
  2500.00      8.57    581.71      0.00    581.66    582.12      0.41      0.43      0.04    582.00
    8520.        0.     8520.        0.        0.    1649.        0.       87.       12.    582.00
     0.18      0.00      5.17      0.00     0.000     0.030     0.000     0.000    573.14   1551.00
 0.000791      450.      649.      649.         2         0         0      0.00    228.25   1779.25


*SECNO 3515.000
 2800 NAT Q1=   3866.61  WSEL=    582.51  ENC Q1=   3960.37  WSEL=    582.61  RATIO= -0.0242
 NAT Q1=   3992.  RATIOS LOB,CH,ROB=  0.0080  0.9920  0.0000  WSEL=    582.61

3470 ENCROACHMENT STATIONS=    1500.0    1860.0  TYPE=     4  TARGET=       0.008
           CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
           HIGHWAY 55 BRIDGE
  3515.00      8.19    582.54      0.00    582.51    582.76      0.21      0.62      0.02    582.00
    8520.        0.     8520.        0.        0.    2294.        0.      133.       19.    582.10
     0.26      0.00      3.71      0.00     0.000     0.030     0.000     0.000    574.35   1500.00
 0.000482     1015.     1015.     1015.         2         0         0      0.00    360.00   1860.00


CCHV=   0.500 CEHV=   1.000
*SECNO 3870.000
 2800 NAT Q1=   1787.67  WSEL=    582.84  ENC Q1=   1860.45  WSEL=    582.94  RATIO= -0.0407
 NAT Q1=   1860.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    582.94

3470 ENCROACHMENT STATIONS=    1500.0    1855.0  TYPE=     4  TARGET=       0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

           CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
  3870.00      8.36    582.86      0.00    582.84    583.40      0.54      0.32      0.32    583.40
    8520.        0.     8520.        0.        0.    1448.        0.      148.       21.    583.40
     0.27      0.00      5.88      0.00     0.000     0.030     0.000     0.000    574.50   1500.71
 0.002225      355.      355.      355.         2         0         0      0.00    353.67   1854.37


*SECNO 3871.000
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```
 SECND     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        O_LOSS   BANK ELEV
 @         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

2800 NAT Q1=   1449.42  WSEL=    582.84  ENC Q1=   1508.30  WSEL=    582.94  RATIO= -0.0406
NAT Q1=   1508.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    582.94

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3470 ENCROACHMENT STATIONS=    1500.0    1855.0  TYPE=     4  TARGET=       0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE
  3871.00     8.36   582.86      0.00   582.84   583.53      0.66      0.00      0.12   583.40
    8520.       0.     8520        0.       0.    1305.        0.      148.       21.   583.40
     0.27     0.00     6.53      0.00    0.000    0.030    0.000     0.000   574.50  1500.79
 0.003383       1.       1.        1.        0        0        0      0.00   327.41  1854.29

*SECND 3900.000
2800 NAT Q1=   1555.90  WSEL=    583.02  ENC Q1=   1614.78  WSEL=    583.12  RATIO= -0.0378
NAT Q1=   1615.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    583.12

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3470 ENCROACHMENT STATIONS=    1500.0    1855.0  TYPE=     4  TARGET=       0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          UPSTREAM FACE OF HIGHWAY 55 BRIDGE
  3900.00     8.54   583.04      0.00   583.02   583.64      0.61      0.09      0.03   583.40
    8520.       0.     8520.       0.       0.    1362.        0.      149.       22.   583.40
     0.27     0.00     6.25      0.00    0.000    0.030    0.000     0.000   574.50  1500.57
 0.002958      27.      29.       29.        2        0        0      0.00   327.97  1854.49

*SECND 3901.000
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 SECND     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

2800 NAT Q1=    2120.73  WSEL=     583.28  ENC Q1=    2194.66  WSEL=     583.38  RATIO= -0.0349
NAT Q1=    2195.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     583.38

3470 ENCROACHMENT STATIONS=     1300.0     1855.0  TYPE=     4  TARGET=        0.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=       595.50 ELREA=       595.90

          CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE
  3901.00      8.79    583.29      0.00    583.28    583.73      0.44      0.00      0.08    583.40
    8520         0.      8520        0.        0.     1602.        0.       149.       22.    583.40
     0.27      0.00      5.32      0.00     0.000     0.030     0.000     0.000    574.50   1500.14
 0.001597        1.        1.        1.         2         0         0      0.00    354.74   1854.88


*SECND 4321.000
 2800 NAT Q1=    4904.24  WSEL=     583.95  ENC Q1=    4979.61  WSEL=     584.05  RATIO= -0.0154
 NAT Q1=    5043.   RATIOS LOB,CH,ROB=  0.0116  0.9875  0.0009  WSEL=     584.05

3470 ENCROACHMENT STATIONS=     1500.0     1860.0  TYPE=     4  TARGET=        0.013
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF HIGHWAY 55 BRIDGE
  4321.00      9.06    583.96      0.00    583.95    584.12      0.16      0.25      0.14    583.40
    8520.        0.      8520.       0.         0     2630.        0.       169.       25.    583.40
     0.31      0.00      3.24      0.00     0.000     0.030     0.000     0.000    574.90   1500.00
 0.000307      420.      420.      420.         2         0         0      0.00    360.00   1860.00
```

THIS RUN EXECUTED 1 APR 87 8:52:33

```
*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
```

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

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 110

| SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENCR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 579.80 | 0.00 | 579.84 | 665.00 | 36.61 | 4583.59 | 14.80 | 665.00 | 1348.00 | 1500.00 | 1860.00 | 2013.00 |
| 0.000 | 579.90 | 0.10 | 579.94 | 360.00 | 0.00 | 4640.00 | 0.00 | 0.05 | 1500.00 | 1500.00 | 1860.00 | 1860.00 |
| 900.000 | 579.91 | 0.00 | 580.03 | 219.99 | 0.00 | 4640.00 | 0.00 | 310.00 | 1550.00 | 1550.00 | 1780.00 | 1860.00 |
| 900.000 | 580.01 | 0.10 | 580.13 | 220.46 | 0.00 | 4640.00 | 0.00 | 0.00 | 1550.00 | 1550.00 | 1780.00 | 1780.00 |
| 1010.000 | 579.94 | 0.00 | 580.14 | 172.00 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 620.00 | 800.00 | 0.00 |
| 1010.000 | 580.04 | 0.10 | 580.23 | 172.40 | 0.00 | 4640.00 | 0.00 | 0.00 | 620.00 | 620.00 | 800.00 | 800.00 |
| 1040.000 | 579.96 | 0.00 | 580.24 | 146.15 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 557.00 | 710.00 | 0.00 |
| 1040.000 | 580.05 | 0.10 | 580.32 | 146.48 | 0.00 | 4640.00 | 0.00 | 0.00 | 557.00 | 557.00 | 710.00 | 710.00 |
| 1070.000 | 579.97 | 0.00 | 580.36 | 124.20 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 503.45 | 633.50 | 0.00 |
| 1070.000 | 580.07 | 0.09 | 580.45 | 124.48 | 0.00 | 4640.00 | 0.00 | 0.00 | 503.45 | 503.45 | 633.50 | 633.50 |
| 1100.000 | 580.00 | 0.00 | 580.54 | 105.55 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 457.93 | 568.47 | 0.00 |
| 1100.000 | 580.09 | 0.09 | 580.62 | 105.79 | 0.00 | 4640.00 | 0.00 | 0.00 | 457.93 | 457.93 | 568.47 | 568.48 |
| 1120.000 | 580.03 | 0.00 | 580.75 | 100.92 | 0.00 | 4640.00 | 0.00 | 179.10 | 1013.00 | 1042.10 | 1151.90 | 1192.10 |
| 1120.000 | 580.12 | 0.09 | 580.82 | 101.32 | 0.00 | 4640.00 | 0.00 | 0.00 | 1042.10 | 1042.10 | 1151.90 | 1151.90 |
| 1121.000 | 580.03 | 0.00 | 580.75 | 100.96 | 0.00 | 4640.00 | 0.00 | 179.10 | 1013.00 | 1042.10 | 1151.90 | 1192.10 |
| 1121.000 | 580.12 | 0.09 | 580.82 | 101.32 | 0.00 | 4640.00 | 0.00 | 0.00 | 1042.10 | 1042.10 | 1151.90 | 1151.90 |
| 1146.000 | 580.08 | 0.00 | 580.79 | 101.15 | 0.00 | 4640.00 | 0.00 | 179.10 | 1013.00 | 1042.10 | 1151.90 | 1192.10 |
| 1146.000 | 580.17 | 0.09 | 580.86 | 101.49 | 0.00 | 4640.00 | 0.00 | 0.00 | 1042.10 | 1042.10 | 1151.90 | 1151.90 |
| 1147.000 | 580.09 | 0.00 | 580.79 | 101.18 | 0.00 | 4640.00 | 0.00 | 179.10 | 1013.00 | 1042.10 | 1151.90 | 1192.10 |
| 1147.000 | 580.17 | 0.09 | 580.86 | 101.52 | 0.00 | 4640.00 | 0.00 | 0.00 | 1042.10 | 1042.10 | 1151.90 | 1151.90 |
| 1177.000 | 580.23 | 0.00 | 580.87 | 114.03 | 0.00 | 4640.00 | 0.00 | 165.00 | 990.00 | 1035.00 | 1155.00 | 1155.00 |
| 1177.000 | 580.32 | 0.08 | 580.94 | 114.49 | 0.00 | 4640.00 | 0.00 | 0.00 | 1035.00 | 1035.00 | 1155.00 | 1155.00 |

| SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENCR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1364.000 | 580.54 | 0.00 | 581.15 | 114.32 | 0.00 | 4640.00 | 0.00 | 550.00 | 625.00 | 1027.00 | 1150.00 | 1175.00 |
| 1364.000 | 580.61 | 0.07 | 581.21 | 114.69 | 0.00 | 4640.00 | 0.00 | 0.00 | 1027.00 | 1027.00 | 1150.00 | 1150.00 |
| 1526.000 | 580.85 | 0.00 | 581.25 | 115.19 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 1620.00 | 1740.00 | 0.00 |
| 1526.000 | 580.91 | 0.06 | 581.40 | 115.43 | 0.00 | 4640.00 | 0.00 | 0.00 | 1620.00 | 1620.00 | 1740.00 | 1740.00 |
| 1851.000 | 581.33 | 0.00 | 581.60 | 147.09 | 0.00 | 4640.00 | 0.00 | 0.00 | 0.00 | 1600.00 | 1750.00 | 0.00 |
| 1851.000 | 581.37 | 0.05 | 581.65 | 147.29 | 0.00 | 4640.00 | 0.00 | 0.00 | 1600.00 | 1600.00 | 1750.00 | 1750.00 |
| 2500.000 | 581.66 | 0.00 | 582.08 | 223.01 | 0.00 | 8520.00 | 0.00 | 0.00 | 0.00 | 1550.00 | 1780.00 | 0.00 |
| 2500.000 | 581.71 | 0.04 | 582.12 | 228.25 | 0.00 | 8520.00 | 0.00 | 0.00 | 1550.00 | 1550.00 | 1780.00 | 1780.00 |
| 3515.000 | 582.51 | 0.00 | 582.73 | 500.92 | 18.19 | 8501.64 | 0.18 | 533.00 | 1365.00 | 1500.00 | 1860.00 | 1898.00 |
| 3515.000 | 582.54 | 0.03 | 582.76 | 360.00 | 0.00 | 8520.00 | 0.00 | 0.01 | 1500.00 | 1500.00 | 1860.00 | 1860.00 |
| 3870.000 | 582.84 | 0.00 | 583.38 | 353.60 | 0.00 | 8520.00 | 0.00 | 0.00 | 0.00 | 1500.00 | 1855.00 | 0.00 |
| 3870.000 | 582.86 | 0.03 | 583.40 | 353.67 | 0.00 | 8520.00 | 0.00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855.00 |
| 3871.000 | 582.84 | 0.00 | 583.51 | 327.33 | 0.00 | 8520.00 | 0.00 | 0.00 | 0.00 | 1500.00 | 1855.00 | 0.00 |
| 3871.000 | 582.86 | 0.03 | 583.53 | 327.41 | 0.00 | 8520.00 | 0.00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855.00 |
| 3900.000 | 583.02 | 0.00 | 583.63 | 327.91 | 0.00 | 8520.00 | 0.00 | 0.00 | 0.00 | 1500.00 | 1855.00 | 0.00 |
| 3900.000 | 583.04 | 0.02 | 583.64 | 327.97 | 0.00 | 8520.00 | 0.00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855.00 |
| 3901.000 | 583.28 | 0.00 | 583.72 | 354.71 | 0.00 | 8520.00 | 0.00 | 0.00 | 0.00 | 1500.00 | 1855.00 | 0.00 |
| 3901.000 | 583.29 | 0.01 | 583.73 | 354.74 | 0.00 | 8520.00 | 0.00 | 0.00 | 1500.00 | 1500.00 | 1855.00 | 1855.00 |
| 4321.000 | 583.95 | 0.00 | 584.11 | 1041.86 | 58.53 | 8456.70 | 4.77 | 1195.00 | 946.00 | 1500.00 | 1860.00 | 2141.00 |
| 4321.000 | 583.96 | 0.01 | 584.12 | 360.00 | 0.00 | 8520.00 | 0.00 | 0.01 | 1500.00 | 1500.00 | 1860.00 | 1860.00 |

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 150

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.00 | 570.54 | 4640.00 | 579.80 | 0.00 | 579.84 | 0.81 | 1.70 | 2885.45 | 5163.00 |
| 0.000 | 0.00 | 0.00 | 0.00 | 570.54 | 4640.00 | 579.90 | 0.00 | 579.94 | 0.80 | 1.69 | 2739.90 | 5203.17 |
| 900.000 | 900.00 | 0.00 | 0.00 | 571.57 | 4640.00 | 579.91 | 0.00 | 580.03 | 2.16 | 2.78 | 1668.35 | 3157.13 |
| 900.000 | 900.00 | 0.00 | 0.00 | 571.57 | 4640.00 | 580.01 | 0.00 | 580.13 | 2.08 | 2.75 | 1689.77 | 3220.13 |
| 1010.000 | 110.00 | 0.00 | 0.00 | 571.68 | 4640.00 | 579.94 | 0.00 | 580.14 | 3.75 | 3.60 | 1287.85 | 2396.57 |
| 1010.000 | 110.00 | 0.00 | 0.00 | 571.68 | 4640.00 | 580.04 | 0.00 | 580.23 | 3.59 | 3.55 | 1305.91 | 2448.54 |
| 1040.000 | 30.00 | 0.00 | 0.00 | 571.71 | 4640.00 | 579.96 | 0.00 | 580.24 | 5.28 | 4.25 | 1092.63 | 2019.11 |
| 1040.000 | 30.00 | 0.00 | 0.00 | 571.71 | 4640.00 | 580.05 | 0.00 | 580.32 | 5.07 | 4.19 | 1107.29 | 2060.86 |
| 1070.000 | 30.00 | 0.00 | 0.00 | 571.74 | 4640.00 | 579.97 | 0.00 | 580.36 | 7.46 | 5.00 | 927.23 | 1699.00 |
| 1070.000 | 30.00 | 0.00 | 0.00 | 571.74 | 4640.00 | 580.07 | 0.00 | 580.45 | 7.16 | 4.94 | 939.71 | 1734.10 |
| 1100.000 | 30.00 | 0.00 | 0.00 | 571.77 | 4640.00 | 580.00 | 0.00 | 580.54 | 10.55 | 5.89 | 787.54 | 1426.69 |
| 1100.000 | 30.00 | 0.00 | 0.00 | 571.77 | 4640.00 | 580.09 | 0.00 | 580.62 | 10.12 | 5.81 | 798.27 | 1458.46 |
| 1120.000 | 20.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.57 | 6.81 | 681.54 | 1175.92 |
| 1120.000 | 20.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.12 | 0.00 | 580.82 | 14.90 | 6.71 | 691.72 | 1201.97 |
| 1121.000 | 1.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.51 | 6.80 | 682.42 | 1178.16 |
| 1121.000 | 1.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.12 | 0.00 | 580.82 | 14.90 | 6.71 | 691.81 | 1202.19 |
| 1146.000 | 25.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.08 | 0.00 | 580.79 | 15.19 | 6.75 | 687.30 | 1190.63 |
| 1146.000 | 25.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.17 | 0.00 | 580.86 | 14.62 | 6.67 | 696.14 | 1213.33 |
| 1147.000 | 1.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.09 | 0.00 | 580.79 | 15.12 | 6.74 | 688.30 | 1193.19 |
| 1147.000 | 1.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.17 | 0.00 | 580.86 | 14.57 | 6.66 | 697.04 | 1215.65 |
| 1177.000 | 30.00 | 0.00 | 0.00 | 572.00 | 4640.00 | 580.23 | 0.00 | 580.87 | 14.71 | 6.41 | 723.76 | 1209.80 |
| 1177.000 | 30.00 | 0.00 | 0.00 | 572.00 | 4640.00 | 580.32 | 0.00 | 580.94 | 14.17 | 6.33 | 733.16 | 1232.65 |
| 1364.000 | 187.00 | 0.00 | 0.00 | 572.30 | 4640.00 | 580.54 | 0.00 | 581.15 | 13.89 | 6.29 | 737.59 | 1245.14 |
| 1364.000 | 187.00 | 0.00 | 0.00 | 572.30 | 4640.00 | 580.61 | 0.00 | 581.21 | 13.47 | 6.22 | 745.40 | 1264.31 |
| 1526.000 | 162.00 | 0.00 | 0.00 | 572.17 | 4640.00 | 580.85 | 0.00 | 581.35 | 10.02 | 5.67 | 818.28 | 1465.90 |
| 1526.000 | 162.00 | 0.00 | 0.00 | 572.17 | 4640.00 | 580.91 | 0.00 | 581.40 | 9.78 | 5.62 | 824.96 | 1483.67 |
| 1851.000 | 325.00 | 0.00 | 0.00 | 572.50 | 4640.00 | 581.33 | 0.00 | 581.60 | 5.09 | 4.21 | 1102.45 | 2056.53 |
| 1851.000 | 325.00 | 0.00 | 0.00 | 572.50 | 4640.00 | 581.37 | 0.00 | 581.65 | 4.99 | 4.18 | 1109.56 | 2076.58 |
| 2500.000 | 649.00 | 0.00 | 0.00 | 573.14 | 8520.00 | 581.66 | 0.00 | 582.08 | 8.05 | 5.20 | 1639.49 | 3002.24 |
| 2500.000 | 649.00 | 0.00 | 0.00 | 573.14 | 8520.00 | 581.71 | 0.00 | 582.12 | 7.91 | 5.17 | 1648.85 | 3028.61 |
| 3515.000 | 1015.00 | 0.00 | 0.00 | 574.35 | 8520.00 | 582.51 | 0.00 | 582.73 | 4.86 | 3.72 | 2354.48 | 3866.61 |
| 3515.000 | 1015.00 | 0.00 | 0.00 | 574.35 | 8520.00 | 582.54 | 0.00 | 582.76 | 4.82 | 3.71 | 2294.32 | 3880.77 |

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3870.000 | 355.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.38 | 22.71 | 5.92 | 1439.03 | 1787.67 |
| 3870.000 | 355.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 582.86 | 0.00 | 583.40 | 22.25 | 5.88 | 1448.02 | 1806.05 |
| 3871.000 | 1.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.51 | 34.55 | 6.57 | 1296.72 | 1449.42 |
| 3871.000 | 1.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 582.86 | 0.00 | 583.53 | 33.83 | 6.53 | 1305.48 | 1464.89 |
| 3900.000 | 29.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 583.02 | 0.00 | 583.63 | 29.99 | 6.28 | 1356.45 | 1555.50 |
| 3900.000 | 29.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 583.04 | 0.00 | 583.64 | 29.58 | 6.25 | 1362.34 | 1566.02 |
| 3901.000 | 1.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 583.28 | 0.00 | 583.72 | 16.14 | 5.34 | 1596.86 | 2120.73 |
| 3901.000 | 1.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 583.29 | 0.00 | 583.73 | 15.97 | 5.32 | 1601.94 | 2131.80 |
| 4321.000 | 420.00 | 0.00 | 0.00 | 574.90 | 8520.00 | 583.95 | 0.00 | 584.11 | 3.02 | 3.22 | 2946.01 | 4904.24 |
| 4321.000 | 420.00 | 0.00 | 0.00 | 574.90 | 8520.00 | 583.96 | 0.00 | 584.12 | 3.07 | 3.24 | 2630.23 | 4866.11 |

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 150

| SECND | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 0.000 | 4640.00 | 579.80 | 0.00 | 0.00 | 0.00 | 665.00 | 0.00 |
| 0.000 | 4640.00 | 579.90 | 0.10 | 0.00 | 0.10 | 360.00 | 0.00 |
| 900.000 | 4640.00 | 579.91 | 0.00 | 0.11 | 0.00 | 219.99 | 900.00 |
| 900.000 | 4640.00 | 580.01 | 0.10 | 0.11 | 0.10 | 220.46 | 900.00 |
| 1010.000 | 4640.00 | 579.94 | 0.00 | 0.03 | 0.00 | 172.00 | 110.00 |
| 1010.000 | 4640.00 | 580.04 | 0.10 | 0.03 | 0.10 | 172.40 | 110.00 |
| 1040.000 | 4640.00 | 579.96 | 0.00 | 0.01 | 0.00 | 146.15 | 30.00 |
| 1040.000 | 4640.00 | 580.05 | 0.10 | 0.01 | 0.10 | 146.48 | 30.00 |
| 1070.000 | 4640.00 | 579.97 | 0.00 | 0.02 | 0.00 | 124.20 | 30.00 |
| 1070.000 | 4640.00 | 580.07 | 0.09 | 0.02 | 0.09 | 124.48 | 30.00 |
| 1100.000 | 4640.00 | 580.00 | 0.00 | 0.03 | 0.00 | 105.55 | 30.00 |
| 1100.000 | 4640.00 | 580.09 | 0.09 | 0.03 | 0.09 | 105.79 | 30.00 |
| 1120.000 | 4640.00 | 580.03 | 0.00 | 0.03 | 0.00 | 100.92 | 20.00 |
| 1120.000 | 4640.00 | 580.12 | 0.09 | 0.02 | 0.09 | 101.32 | 20.00 |
| 1121.000 | 4640.00 | 580.03 | 0.00 | 0.00 | 0.00 | 100.96 | 1.00 |
| 1121.000 | 4640.00 | 580.12 | 0.09 | 0.00 | 0.09 | 101.32 | 1.00 |
| 1146.000 | 4640.00 | 580.08 | 0.00 | 0.05 | 0.00 | 101.15 | 25.00 |
| 1146.000 | 4640.00 | 580.17 | 0.09 | 0.05 | 0.09 | 101.49 | 25.00 |
| 1147.000 | 4640.00 | 580.09 | 0.00 | 0.00 | 0.00 | 101.18 | 1.00 |
| 1147.000 | 4640.00 | 580.17 | 0.09 | 0.00 | 0.09 | 101.52 | 1.00 |
| 1177.000 | 4640.00 | 580.23 | 0.00 | 0.15 | 0.00 | 114.03 | 30.00 |
| 1177.000 | 4640.00 | 580.32 | 0.08 | 0.14 | 0.08 | 114.49 | 30.00 |
| 1364.000 | 4640.00 | 580.54 | 0.00 | 0.30 | 0.00 | 114.32 | 187.00 |
| 1364.000 | 4640.00 | 580.61 | 0.07 | 0.29 | 0.07 | 114.69 | 187.00 |
| 1526.000 | 4640.00 | 580.85 | 0.00 | 0.32 | 0.00 | 115.19 | 162.00 |
| 1526.000 | 4640.00 | 580.91 | 0.06 | 0.31 | 0.06 | 115.43 | 162.00 |
| 1851.000 | 4640.00 | 581.33 | 0.00 | 0.47 | 0.00 | 147.09 | 325.00 |
| 1851.000 | 4640.00 | 581.37 | 0.05 | 0.46 | 0.05 | 147.29 | 325.00 |
| 2500.000 | 8520.00 | 581.66 | 0.00 | 0.34 | 0.00 | 228.01 | 649.00 |
| 2500.000 | 8520.00 | 581.71 | 0.04 | 0.33 | 0.04 | 228.25 | 649.00 |
| 3515.000 | 8520.00 | 582.51 | 0.00 | 0.85 | 0.00 | 500.92 | 1015.00 |
| 3515.000 | 8520.00 | 582.54 | 0.03 | 0.84 | 0.03 | 360.00 | 1015.00 |

| SECND | Q | CWSEL | DIFWSP | DIFWSX | DIFRWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 3870.000 | 8520.00 | 582.84 | 0.00 | 0.32 | 0.00 | 353.60 | 355.00 |
| 3870.000 | 8520.00 | 582.86 | 0.03 | 0.32 | 0.03 | 353.67 | 355.00 |
| 3871.000 | 8520.00 | 582.84 | 0.00 | 0.00 | 0.00 | 327.33 | 1.00 |
| 3871.000 | 8520.00 | 582.86 | 0.03 | 0.00 | 0.03 | 327.41 | 1.00 |
| 3900.000 | 8520.00 | 583.02 | 0.00 | 0.18 | 0.00 | 327.91 | 29.00 |
| 3900.000 | 8520.00 | 583.04 | 0.02 | 0.17 | 0.02 | 327.97 | 29.00 |
| 3901.000 | 8520.00 | 583.28 | 0.00 | 0.26 | 0.00 | 354.71 | 1.00 |
| 3901.000 | 8520.00 | 583.29 | 0.01 | 0.25 | 0.01 | 354.74 | 1.00 |
| 4321.000 | 8520.00 | 583.95 | 0.00 | 0.67 | 0.00 | 1041.86 | 420.00 |
| 4321.000 | 8520.00 | 583.96 | 0.01 | 0.66 | 0.01 | 360.00 | 420.00 |

SUMMARY OF ERRORS AND SPECIAL NOTES

FLOODWAY DATA, 0 YEAR FLOOD
PROFILE NO. 2

| STATION | FLOODWAY WIDTH | FLOODWAY SECTION AREA | FLOODWAY MEAN VELOCITY | WATER SURFACE ELEVATION WITH FLOODWAY | WITHOUT FLOODWAY | DIFFERENCE |
|---|---|---|---|---|---|---|
| 0.000 | 360. | 2740. | 1.7 | 579.9 | 579.8 | 0.1 |
| 900.000 | 220. | 1690. | 2.7 | 580.0 | 579.9 | 0.1 |
| 1010.000 | 172. | 1306. | 3.6 | 580.0 | 579.9 | 0.1 |
| 1040.000 | 146. | 1107. | 4.2 | 580.1 | 580.0 | 0.1 |
| 1070.000 | 124. | 940. | 4.9 | 580.1 | 580.0 | 0.1 |
| 1100.000 | 106. | 798 | 5.3 | 580.1 | 580.0 | 0.1 |
| 1120.000 | 101. | 692. | 6.7 | 580.1 | 580.0 | 0.1 |
| 1121.000 | 101. | 692. | 6.7 | 580.1 | 580.0 | 0.1 |
| 1146.000 | 101. | 696. | 6.7 | 580.2 | 580.1 | 0.1 |
| 1147.000 | 102. | 697. | 6.7 | 580.2 | 580.1 | 0.1 |
| 1177.000 | 114. | 733. | 6.3 | 580.3 | 580.2 | 0.1 |
| 1364.000 | 115. | 745. | 6.2 | 580.6 | 580.5 | 0.1 |
| 1526.000 | 115. | 825. | 5.6 | 581.0 | 580.9 | 0.1 |
| 1851.000 | 147. | 1110. | 4.2 | 581.3 | 581.3 | 0.0 |
| 2500.000 | 228. | 1649 | 5.2 | 581.7 | 581.7 | 0.0 |
| 3515.000 | 360. | 2294. | 3.7 | 582.5 | 582.5 | 0.0 |
| 3870.000 | 354. | 1448. | 5.9 | 582.8 | 582.8 | 0.0 |
| 3871.000 | 354. | 1305. | 6.5 | 582.8 | 582.8 | 0.0 |
| 3900.000 | 354. | 1362. | 6.3 | 583.0 | 583.0 | 0.0 |
| 3901.000 | 355. | 1602. | 5.3 | 583.3 | 583.3 | 0.0 |
| 4321.000 | 360. | 2630. | 3.2 | 583.9 | 583.9 | 0.0 |

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp

3) WATERCOURSE: Manistee River

4) DOCUMENT TYPE: 10, 50, 500 & 100 year flood

00BREAK00

MANISTEE TOWNSHIP, FIS

MANISTEE RIVER, - CHANNEL 2 (SECONDARY CHANNEL)

100 YR FLOOD - VARIABLE FLOWS

INP= MNST.CH2

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EEEEEE   EEEEEE          L        EEEEEE   EEEEEE
E        E               L        E        E
E        E               L        E        E
EEEE     EEEE            L        EEEE     EEEE
E        E               L        E        E
EEEEEE   EEEEEE          LLLLLL   EEEEEE   EEEEEE

USACOE DETROIT H800 VOS 5.1 1     PRINTER:  6

EE LEE                      1 APR 87   9:08:54

TERMINAL: 105
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RUN MADE ON SECONDARY CHANNEL WHICH EXISTS IN LEFT OVERBANK AREA OF MANISTEE RIVER MAIN CHANNEL - Results of this run were compared to MULTIPLE FLOW RUN MADE FOR MAIN CHANNEL TO DETERMINE FLOW SPLIT.

THIS RUN EXECUTED 1 APR 87 9 08.02

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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
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T1      MANISTEE TOWNSHIP, FIS
T2      MANISTEE RIVER-CHANNEL 2
T3      100 YEAR FLOOD--4260 CFS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0        2        0        0    0.000000   0.00     0.0      0      579.800   0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

NC      0.035    0.035    0.030    0.500    1.000    0.000    0.000    0.000    0.000    0.000
QT      5.000 4260.000 3520.000 2520.000 1520.000  520.000    0.000    0.000    0.000    0.000
          CROSS SECTION AT MANISTEE LAKE
X1      0.000   15.000  220.000  390.000    0.000    0.000    0.000    0.000    0.000    0.000
GR    582.000    0.000  582.000  100.000  582.000  220.000  579.700  228.000  577.500  238.000
GR    575.000  250.000  570.000  260.000  565.000  290.000  570.000  320.000  577.800  360.000
GR    579.800  370.000  580.400  380.000  582.000  390.000  582.000  450.000  582.000  610.000

X1   1000.000    0.000    0.000    0.000 1000.000 1000.000 1000.000    0.000    0.000    0.000

X1   1940.000    0.000    0.000    0.000  940.000  940.000  940.000    0.000    0.000    0.000
X3      0.000    0.000    0.000    5.000    0.000  605.000    0.000    0.000    0.000    0.000

X1   2200.000    0.000    0.000    0.000  260.000  260.000  260.000    0.000    0.000    0.000
X3      0.000    0.000    0.000   70.000    0.000  540.000    0.000    0.000    0.000    0.000

X1   2400.000    0.000    0.000    0.000  200.000  200.000  200.000    0.000    0.000    0.000
X2      0.000    0.000    0.000  120.000    0.000  490.000    0.000    0.000    0.000    0.000

X1   2600.000    0.000    0.000    0.000  200.000  200.000  200.000    0.000    0.000    0.000
X3      0.000    0.000    0.000  170.000    0.000  440.000    0.000    0.000    0.000    0.000

          OPENING OF BERMS
X1   2800.000   30.000  220.000  390.000  200.000  200.000  200.000    0.000    0.000    0.000
GR    583.700    0.000  584.000   25.000  584.300   50.000  584.400   75.000  585.000  100.000
GR    585.800  125.000  586.600  150.000  587.700  175.000  589.300  200.000  585.900  205.000
GR    587.800  210.000  586.400  220.000  579.700  228.000  577.500  238.000  575.000  250.000
GR    570.000  260.000  565.000  290.000  570.000  320.000  577.800  360.000  579.800  370.000
GR    580.400  380.000  581.900  390.000  589.200  400.000  588.600  425.000  587.200  450.000
GR    585.900  475.000  585.000  500.000  584.200  525.000  584.200  550.000  584.000  575.000
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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3000.000 | 15.000 | 1220.000 | 1390.000 | 200.000 | 200.000 | 200.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 830.000 | 0.000 | 1400.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 582.000 | 1000.000 | 582.000 | 1220.000 | 579.700 | 1228.000 | 577.500 | 1238.000 | 575.000 | 1250.000 |
| GR | 570.000 | 1260.000 | 565.000 | 1290.000 | 570.000 | 1320.000 | 577.800 | 1360.000 | 579.800 | 1370.000 |
| GR | 580.400 | 1380.000 | 582.000 | 1390.000 | 585.000 | 1400.000 | 582.000 | 1420.000 | 582.000 | 1500.000 |
| X1 | 3500.000 | 0.000 | 0.000 | 0.000 | 500.000 | 500.000 | 500.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1113.000 | 0.000 | 1400.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 4000.000 | 29.000 | 250.000 | 398.000 | 500.000 | 500.000 | 500.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 183.000 | 0.000 | 410.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 572.300 | 260.000 | 561.300 | 270.000 | 561.300 | 280.000 | 567.500 | 290.000 |
| GR | 567.700 | 300.000 | 565.700 | 310.000 | 560.000 | 320.000 | 560.000 | 330.000 | 560.400 | 340.000 |
| GR | 563.300 | 350.000 | 569.500 | 360.000 | 575.200 | 370.000 | 575.600 | 377.000 | 582.700 | 398.000 |
| GR | 585.000 | 410.000 | 582.000 | 430.000 | 582.000 | 450.000 | 582.000 | 500.000 | 0.000 | 0.000 |
| X1 | 4199.000 | 29.000 | 132.000 | 259.000 | 199.000 | 199.000 | 199.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 132.000 | 0.000 | 259.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 591.420 | 0.000 | 591.470 | 25.000 | 591.550 | 50.000 | 591.640 | 75.000 | 591.840 | 122.000 |
| GR | 574.500 | 131.000 | 574.500 | 132.000 | 572.800 | 142.000 | 561.800 | 152.000 | 561.300 | 162.000 |
| GR | 567.500 | 172.000 | 567.700 | 182.000 | 565.700 | 192.000 | 565.700 | 192.500 | 557.500 | 197.500 |
| GR | 557.500 | 202.000 | 559.300 | 212.000 | 560.400 | 222.000 | 563.300 | 232.000 | 569.500 | 242.000 |
| GR | 575.200 | 252.000 | 575.600 | 259.000 | 575.700 | 262.000 | 592.260 | 272.000 | 592.290 | 282.000 |
| GR | 592.290 | 317.000 | 592.280 | 342.000 | 592.240 | 367.000 | 592.310 | 392.000 | 0.000 | 0.000 |

DOWNSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4200.000 | 29.000 | 132.000 | 259.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| BT | -13.000 | 0.000 | 591.420 | 0.000 | 50.000 | 591.550 | 0.000 | 132.000 | 591.840 | 0.000 |
| BT | 0.000 | 132.000 | 591.840 | 574.500 | 132.000 | 591.840 | 588.500 | 192.500 | 592.000 | 588.500 |
| BT | 0.000 | 192.500 | 592.000 | 565.700 | 197.500 | 592.000 | 557.500 | 197.500 | 592.000 | 588.500 |
| BT | 0.000 | 262.000 | 592.230 | 588.500 | 262.000 | 592.230 | 575.700 | 262.000 | 592.230 | 0.000 |
| BT | 0.000 | 392.000 | 592.310 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 591.420 | 0.000 | 591.470 | 25.000 | 591.550 | 50.000 | 591.640 | 75.000 | 591.840 | 122.000 |
| GR | 591.840 | 131.000 | 574.500 | 132.000 | 572.800 | 142.000 | 561.800 | 152.000 | 561.300 | 162.000 |
| GR | 567.500 | 172.000 | 567.700 | 182.000 | 565.700 | 192.000 | 565.700 | 192.500 | 557.500 | 197.500 |
| GR | 557.500 | 202.000 | 559.900 | 212.000 | 560.400 | 222.000 | 563.300 | 232.000 | 569.500 | 242.000 |
| GR | 575.200 | 252.000 | 575.600 | 259.000 | 592.230 | 262.000 | 592.260 | 272.000 | 592.290 | 282.000 |
| GR | 592.290 | 317.000 | 592.280 | 342.000 | 592.240 | 367.000 | 592.310 | 392.000 | 0.000 | 0.000 |

UPSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4214.000 | 0.000 | 0.000 | 0.000 | 14.000 | 14.000 | 14.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X1 | 4215.000 | 29.000 | 132.000 | 259.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 131.000 | 0.000 | 260.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 591.420 | 0.000 | 591.470 | 25.000 | 591.550 | 50.000 | 591.640 | 75.000 | 591.840 | 122.000 |
| GR | 574.500 | 131.000 | 574.500 | 132.000 | 572.800 | 142.000 | 561.800 | 152.000 | 561.300 | 162.000 |
| GR | 567.500 | 172.000 | 567.700 | 182.000 | 565.700 | 192.000 | 565.700 | 192.500 | 557.500 | 197.500 |
| GR | 557.500 | 202.000 | 559.900 | 212.000 | 560.400 | 222.000 | 563.300 | 232.000 | 569.500 | 242.000 |
| GR | 575.200 | 252.000 | 575.600 | 259.000 | 575.700 | 262.000 | 592.260 | 272.000 | 592.290 | 282.000 |
| GR | 592.290 | 317.000 | 592.280 | 342.000 | 592.240 | 367.000 | 592.310 | 392.000 | 0.000 | 0.000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4225.000 | 36.000 | 250.000 | 398.000 | 10.000 | 10.000 | 10.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 250.000 | 0.000 | 399.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 572.800 | 260.000 | 561.800 | 270.000 | 561.300 | 280.000 | 567.500 | 290.000 |
| GR | 567.700 | 300.000 | 565.700 | 310.000 | 557.500 | 320.000 | 559.800 | 330.000 | 560.400 | 340.000 |
| GR | 563.300 | 350.000 | 569.300 | 360.000 | 575.200 | 370.000 | 575.600 | 377.000 | 582.700 | 398.000 |
| GR | 585.400 | 410.000 | 586.800 | 435.000 | 586.500 | 460.000 | 586.000 | 485.000 | 586.400 | 510.000 |
| GR | 585.900 | 535.000 | 590.400 | 560.000 | 589.000 | 585.000 | 586.300 | 610.000 | 585.000 | 635.000 |
| GR | 583.400 | 660.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 4600.000 | 22.000 | 250.000 | 399.000 | 375.000 | 375.000 | 375.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 577.000 | 270.000 | 573.000 | 290.000 | 570.000 | 310.000 | 567.000 | 320.000 |
| GR | 569.000 | 330.000 | 572.000 | 350.000 | 577.000 | 370.000 | 582.700 | 398.000 | 583.000 | 410.000 |
| GR | 583.000 | 435.000 | 583.000 | 600.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | CONFLUENCE WITH UPPER CHANNEL | | | | | | | | | |
| X1 | 4900.000 | 22.000 | 250.000 | 398.000 | 300.000 | 300.000 | 300.000 | 0.000 | 0.000 | 0.000 |
| GR | 580.900 | 0.000 | 581.400 | 25.000 | 580.700 | 50.000 | 580.300 | 75.000 | 579.600 | 100.000 |
| GR | 580.400 | 125.000 | 580.500 | 150.000 | 580.800 | 175.000 | 581.800 | 200.000 | 582.300 | 225.000 |
| GR | 581.700 | 250.000 | 578.000 | 270.000 | 575.000 | 290.000 | 574.500 | 310.000 | 573.000 | 320.000 |
| GR | 574.500 | 330.000 | 576.000 | 350.000 | 577.000 | 370.000 | 582.700 | 398.000 | 583.000 | 410.000 |
| GR | 583.000 | 435.000 | 583.000 | 600.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| EJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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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     TRIAL     IDC       ICONT     CORAR     TOPWID      ENDST

*PROF 1

CCHV=   0.500 CEHV=   1.000
*SECNO 0.000
          CROSS SECTION AT MANISTEE LAKE
     0.00     14.80    579.80      0.00    579.80    580.03      0.23      0.00      0.00    582.00
    4260.        0.      4260        0.         0     1112.        0.         0        0.    582.00
     0.00     0.00      3.83      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000399        0.        0.        0.         0         0         0      0.00    142.35    370.00

*SECNO 1000.000
  1000.00    15.21    580.21      0.00      0.00    580.42      0.21      0.38      0.01    582.00
    4260.        0.      4260        0.        0.     1171        0.       26.        3.    582.00
     0.08     0.00      3.64      0.00     0.000     0.030     0.000     0.000    565.00    226.24
 0.000361    1000.      1000     1000.         1         0         0      0.00    150.52    376.76

*SECNO 1940.000

3470 ENCROACHMENT STATIONS=        5.0     605.0  TYPE=      1  TARGET=      600.000
  1940.00    15.56    580.56      0.00      0.00    580.75      0.19      0.32      0.01    582.00
    4260.        0.      4260.       0.         0     1227.        0.       52.        7.    582.00
     0.15     0.00      3.47      0.00     0.000     0.030     0.000     0.000    565.00    224.97
 0.000324     940.       940.      940         0         0         0      0.00    156.09    381.06

*SECNO 2200.000

3470 ENCROACHMENT STATIONS=       70.0     540.0  TYPE=      1  TARGET=      470.000
  2200.00    15.65    580.65      0.00      0.00    580.83      0.18      0.08      0.00    582.00
    4260.        0.      4260        0.         0     1240.        0.       59.        8.    582.00
     0.17     0.00      3.44      0.00     0.000     0.030     0.000     0.000    565.00    224.69
 0.000315     260.       260.      260.         0         0         0      0.00    156.87    381.57

*SECNO 2400.000

3470 ENCROACHMENT STATIONS=      120.0     490.0  TYPE=      1  TARGET=      370.000
  2400.00    15.72    580.72      0.00      0.00    580.90      0.18      0.06      0.00    582.00
    4260.        0.      4260.       0.         0     1250.        0.       65.        8.    582.00
     0.19     0.00      3.41      0.00     0.000     0.030     0.000     0.000    565.00    224.47
 0.000308     200.       200       200         0         0         0      0.00    157.49    381.96
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SECNO     DEPTH     CHEEL     CRTWS     WSELK     EG        HV        HL        DLOSS    BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
TIME      VLOB      VCH       VROB      XTL       XNCH      XNR       WTN       ELMIN       SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 2600.000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270 000
  2600 00     15 78    590.73     0 00      0 00    580.96     0 18      0.06      0.00    582.00
    1260        0.      4260       0         0      1260       0.        71.        9.     582.00
     0 21     0.00      3.38     0 00     0.000     0 030    0.000     0.000    565.00    224.25
 0 000302     200.       200     200.         0         0        0      0.00    158.13    382.37

*SECNO 2800.000
          OPENING OF BERMS
  2800 00     15.85    580.85     0.00      0.00    581.02     0.18      0.06      0.00    586 40
    4260.        0.      4260       0.        0.     1269.       0.       77.       10.     581.90
     0 22     0.00      3 36     0.00     0 000     0.030    0.000     0.000    565.00    226.63
 0 000291     200.       200     200.         0         0        0      0.00    156.32    382 96

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      830.0     1400.0  TYPE=      1  TARGET=      570.000
  3000 00     15.91    580 91     0.00      0 00    581.08     0.17      0.06      0.00    582.00
    4260.        0.      4260       0.        0.     1280.       0.       83.       10.     582.00
     0.24     0 00      3.33     0 00     0.000     0 030    0.000     0.000    565.00   1223.81
 0 000289     200.       200     200.         0         0        0      0.00    159.35   1383.15

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     16.06    591.06     0.00      0.00    581.22     0 17      0.14      0.00    582.00
    4260.        0.      4260       0.         0     1304.       0        97.       12.     582.00
     0.28     0 00      3 27     0.00     0.000     0.030    0.000     0 000    565.00   1223.29
 0.000275      500       500     500.         0         0        0      0.00    160.79   1384.08

*SECNO 4000 000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=      183.0      410 0  TYPE=      1  TARGET=      227.000
  4000 00     21 26    531 26     0 00      0.00    581.33     0.07      0.06      0.05    581.70
    4260        0.      4260       0.        0.     1955.       0.      116.       14.     582.70
     0.34     0.06      2.18     0.00     0.035     0.030    0.000     0.000    560 00    183.00
 0.000068      500       500     500.         2         0        0      0.00    146.68    393.73
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00     23.77    581.27     0.00      0.00    581.35     0.07      0.01      0.00    574.50
    4260.        0.     4260        0         0.     1990.       0.      125.        15  100000.00
     0.37     0.00      2.14      0.00     0.000     0.030    0.000     0.000    557.50    132.00
 0.000062      199.      199.      199.         1         0        0      0.00    127.00    259.00

*SECNO 4200.000

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00     23.77    581.27     0.00      0.00    581.35     0.08      0.00      0.01    574.50
    4260.        0.     4259.       1.         0.     1874.       3       125.        15     575.60
     0.37     0.00      2.27      0.27     0.000     0.030    0.035     0.000    557.50    131.61
 0.000098        1.         1        1.         0         0        0   -116.09    128.41    260.02

*SECNO 4214.000

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00     23.78    581.28     0.00      0.00    581.36     0.08      0.00      0.00    574.50
    4260.        0.     4259        1         0.     1874.       3       126.       15.     575.60
     0.37     0.00      2.27      0.27     0.000     0.030    0.035     0.000    557.50    131.61
 0.000098       14.       14.       14.         0         0        0   -116.10    128.41    260.02

*SECNO 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00     23.79    581.29     0.00      0.00    581.36     0.07      0.00      0.00    574.50
    4260.        2.     4256.       2.         7.     1990.       6.      126       15.     575.60
     0.37     0.29      2.14      0.28     0.035     0.030    0.035     0.000    557.50    131.00
 0.000055        1         1        1         1         0        0      0.00    129.00    260.00

*SECNO 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
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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 |
| 4225.00 | 23.79 | 531.29 | 0.00 | 0.00 | 581.36 | 0.07 | 0.00 | 0.00 | 581.70 |
| 4260. | 0 | 4260 | 0 | 0 | 1987. | 0. | 126. | 15. | 582.70 |
| 0.37 | 0.00 | 2.14 | 0.00 | 0.000 | 0.030 | 0.000 | 0.000 | 557.50 | 250.46 |
| 0.000066 | 10. | 10. | 10 | 0 | 0 | 0 | 0.00 | 143.37 | 393.83 |

*SECNO 4600.000

3265 DIVIDED FLOW

3280 CROSS SECTION 4600.00 EXTENDED 0.44 FEET

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4600.00 | 14.34 | 581.34 | 0.00 | 0.00 | 581.59 | 0.24 | 0.05 | 0.17 | 581.70 |
| 4260. | 134. | 4126. | 0. | 145. | 1026. | 0. | 140. | 17. | 582.70 |
| 0.40 | 0.92 | 4.02 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 567.00 | 0.00 |
| 0.000476 | 375. | 375 | 375. | 2 | 0 | 0 | 0.00 | 323.50 | 391.33 |

*SECNO 4900.000

3265 DIVIDED FLOW

3280 CROSS SECTION 4900.00 EXTENDED 0.68 FEET

CONFLUENCE WITH UPPER CHANNEL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4900.00 | 8.36 | 581.58 | 0.00 | 0.00 | 582.02 | 0.44 | 0.23 | 0.20 | 581.70 |
| 4260. | 340. | 2920 | 0 | 169. | 709. | 0 | 147. | 19 | 582.70 |
| 0.42 | 1.80 | 5.53 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 573.00 | 0.00 |
| 0.001478 | 300. | 300 | 300. | 2 | 0 | 0 | 0.00 | 336.19 | 392.48 |

THIS RUN EXECUTED 1 APR 87 9.08 05

```
*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD---3520 CFS

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
| | 0 | 3. | 0. | 0. | 0.000000 | 0.00 | 0 0 | 0 | 579.800 | 0.000 |
| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
| | 2.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
 Q         WLOB      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

*PRO= 2

CCHV=   0 500 CEHV=   .. 000
*SECNO 0 000
          CROSS SECTION AT MANISTEE LAKE
    0 00     14. 80    579 80      0. 00    579. 80    579. 96      0 16      0. 00      0. 00    582. 00
   3520.        0.     3520.        0.        0.      1112.        0.        0.         0.      582. 00
    0 00      0. 00     0. 17      0. 00     0. 000    0. 030    0. 000    0. 000    565. 00    227. 65
 0 000272       0.        0.        0.         0         0         0      0. 00    142. 35    370. 00

*SECNO 1000. 000
  1000 00     15 08    580 03      0. 00      0 00    580 22      0. 15      0. 26      0. 01    582. 00
   3520.        0.     3520        0.        0.      1151.        0.       26.         3.      582 00
    0. 09      0. 00     3. 06      0. 00     0. 000    0. 030    0. 000    0. 000    555. 00    226. 70
 0 000255     1000.     1000.     1000.         0         0         0      0. 00    147. 83    374. 54

*SECNO 1940. 000

3470 ENCROACHMENT STATIONS=        5. 0      605. 0  TYPE=      1  TARGET=      600. 000
  1940. 00     15. 32    580. 32      0. 00      0. 00    580. 46      0 14      0. 23      0. 00    582 00
   3520.        0.     3520.        0.        0.      1189.        0.       51.         7.      582. 00
    0. 18      0. 00     2. 96      0. 00     0 000    0 030    0. 000    0. 000    565. 00    225 82
 0 000239      940.      940.      940.         0         0         0      0. 00    152. 96    378 78

*SECNO 2200 000

3470 ENCROACHMENT STATIONS=       70. 0      540. 0  TYPE=      1  TARGET=      470 000
  2200 00     15. 39    580. 39      0. 00      0. 00    580. 52      0. 13      0. 06      0. 00    582 00
   3520.        0       3520.        0.        0.      1199.        0        58.         7.      582. 00
    0. 20      0. 00     2. 94      0. 00     0. 000    0. 030    0 000    0. 000    565 00    225. 60
 0 000235      260.      260.      260.         0         0         0      0. 00    154. 21    379. 81

*SECNO 2400. 000

3470 ENCROACHMENT STATIONS=      120. 0      490. 0  TYPE=      1  TARGET=      370. 000
  2400 00     15. 44    580 44      0. 00      0 00    580. 57      0 13      0. 05      0. 00    582. 00
   3520.        0.     3520        0.        0.      1206.        0.       64.         8.      582. 00
    0 22      0. 00     2 92       0. 00     0. 000    0. 030    0. 000    0. 000    565. 00    225. 44
 0 000231      200.      200       200.         0         0         0      0. 00    154 79    380. 23
```

```
  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       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 2600 000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270.000
  2600 00     15 49    580 49     0 00      0.00    580.62     0 13      0.05      0.00    582.00
    3520         0      3520        0         0     1214        0.       69.        9.     582.00
     0 24      0.00      2.90     0 00     0 000    0 030    0 000     0.000    565.00    225.27
 0 000228      200.       200     200.         0        0        0      0.00    155.27    380.53

*SECNO 2800.000
          OPENING OF BERMS
  2800 00     15.53    580 53     0.00      0.00    580.66     0.13      0.04      0 00    586.40
    3520         0      3520       0.        0.     1220.        0       75.       10.     581.90
     0 26      0.00      2.88     0.00     0.000    0 030    0.000     0 000    565.00    227.01
 0 000221      200.       200.    200.         0        0        0      0.00    153.88    380.89

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      830.0     1400.0  TYPE=      1  TARGET=      570.000
  3000 00     15.58    580 58     0.00      0.00    580.71     0.13      0.04      0 00    582.00
    3520.        0      3520.      0.        0.     1228.        0.       81.       10.     582.00
     0.28      0 00      2 87     0.00     0.000    0.030    0.000     0.000    565.00   1224.94
 0.000221      200.       200     200.         0        0        0      0.00    156.18   1381.12

 SECNO 3500 000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     15 69    580 69     0.00      0.00    580.82     0.12      0.11      0.00    582.00
    3520         0.      3520       0.        0.     1246.        0.       95        12     582.00
     0 33      0.00      2 82     0.00     0.000    0 030    0.000     0.000    565.00   1224.55
 0 000212      500.       500     500          0        0        0      0.00    157 27   1381.82

*SECNO 4000.000

3470 ENCROACHMENT STATIONS=      183.0      410.0  TYPE=      1  TARGET=      227.000
  4000 00     20.85    580.85     0.00      0 00    580.90     0.05      0.05      0.04    581.70
    3520.        0.      3520.      0.        0.     1896.        0.      113.       14.     582 70
     0 40      0.00      1 86     0.00     0.000    0.030    0.000     0.000    560.00    250.96
 0 000051      500.       500.    500.         2        0        0      0.00    141.56    392.52
```

```
 SECND     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

*SECND 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00     23.36    580.86      0.00      0.00    580.91      0.05      0.01      0.00    574.50
   3520.        0.      3520        0.         0      1937.        0       122.        14  100000.00
    0.43      0.00      1.82      0.00     0.000     0.030     0.000     0.000    557.50    132.00
 0.000046      199       199      199.         1         0         0      0.00    127.00    259.00

*SECND 4200.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00     23.36    590.86      0.00      0.00    580.92      0.06      0.00      0.01    574.50
   3520.        0       3519        1.         0.     1825.        2       122.       14.     575.60
    0.44      0.00      1.93      0.22     0.000     0.030     0.035     0.000    557.50    131.63
 0.000072       1.        1.        1.         0         0         0   -111.90    128.32    259.95

*SECND 4214.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00     23.36    580.86      0.00      0.00    580.92      0.06      0.00      0.00    574.50
   3520        0.      3519.        1.         0.     1326.        2.       122       15.     575.60
    0.44      0.00      1.93      0.22     0.000     0.030     0.035     0.000    557.50    131.63
 0.000072      14.        .4       14.         0         0         0   -111.91    128.32    259.95

*SECND 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00     23.37    580.87      0.00      0.00    580.92      0.05      0.00      0.00    574.50
   3520.        2.      3517        1.         6.     1936.        5.       122.       15.     575.60
    0.44      0.25      1.82      0.24     0.035     0.030     0.035     0.000    557.50    131.00
 0.000041       1.        1.        1.         0         0         0      0.00    129.00    260.00

*SECND 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

```
 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
 Q         GLOB      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

 4225 00    23.37    590.87     0.00      0.00    580.92     0.05      0.00      0 00    581.70
   3520.       0.     3520.       0.         0     1927.       0.      123.       15.    582 70
   0 44     0.00      1.83     0.00     0.000     0 030    0.000    0 000    557.50    250.93
 0 000049     10.        10      10.         0         0        0     0.00    141.66    392.59

SECND 4600.000

3265 DIVIDED FLOW

3290 CROSS SECTION   4600 00 EXTENDED      0 01 FEET

 4600 00    13.91    590.91     0.00      0.00    581.11     0 20      0.04      0.15    581.70
   3520.       51     3469       0.        76      966.       0      136.       16.    582.70
   0.47     0.67      3 59     0.00     0 035     0 030    0.000    0 000    567.00      0.00
 0.000395    375.      375.     375.         2         0        0     0.00    271 64    389.21

SECND 4900.000

3265 DIVIDED FLOW

3290 CROSS SECTION   4900.00 EXTENDED      0 21 FEET

          CONFLUENCE WITH UPPER CHANNEL
 4900.00     8.11    581.11     0.00      0 00    581 52     0 41      0.20      0.21    581.70
   3520.      152.     3368       0.       106.      644.       0.      142        18.    582.70
   0.48     1.43      5 23     0.00     0.035     0.030    0.000    0.000    573.00      0.00
 0 001432    300.      300      300.         2         0        0     0.00    295.40    390.21
```

THIS RUN EXECUTED 1 APR 87 9 08:06

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*****************************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,07,05,06
 MODIFICATION -  50,51,52 53,54 55,56
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD--2520 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0. | 4. | 0. | 0. | 0.000000 | 0.00 | 0.0 | 0. | 579.800 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
  SECNO     DEPTH     CHSEL     CRIWS     WSELK     EQ        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 3

CONV=   0.500 CENV=   1.000
*SECND 0.000
          CROSS SECTION AT MANISTEE LAKE
     0.00     14.80    579.80      0.00    579.80    579.88      0.08      0.00      0.00    582.00
    2520.        0.     2520.        0.        0.    1112.        0.        0.        0.    582.00
     0.00     0.00      2.27      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000140        0.        0.        0.         0         0         0      0.00    142.35    370.00

*SECND 1000.000
  1000.00     14.94    579.94      0.00      0.00    580.02      0.08      0.14      0.00    582.00
     2520        0.     2520.        0.         0    1132.        0.       26.        3.    582.00
     0.12     0.00      2.23      0.00     0.000     0.030     0.000     0.000    565.00    227.17
 0.000135     1000.     1000      1000.         0         0         0      0.00    145.16    372.33

*SECND 1940.000

3470 ENCROACHMENT STATIONS=        5.0      605.0  TYPE=      1  TARGET=      600.000
  1940.00     15.07    580.07      0.00      0.00    580.14      0.07      0.12      0.00    582.00
     2520        0.     2520.        0.        0.    1151.        0.       50.        6.    582.00
     0.24     0.00      2.19      0.00     0.000     0.030     0.000     0.000    565.00    226.71
 0.000131      940       940       940         0         0         0      0.00    147.80    374.31

*SECND 2200.000

3470 ENCROACHMENT STATIONS=       70.0      540.0  TYPE=      1  TARGET=      470.000
  2200.00     15.10    580.10      0.00      0.00    580.18      0.07      0.03      0.00    582.00
     2520        0     2520.        0.        0.    1156.        0        57         7    582.00
     0.28     0.00      2.18      0.00     0.000     0.030     0.000     0.000    565.00    226.59
 0.000130      260.       260       260.         0         0         0      0.00    148.48    375.08

*SECND 2400.000

3470 ENCROACHMENT STATIONS=      120.0      490.0  TYPE=      1  TARGET=      370.000
  2400.00     15.13    580.13      0.00      0.00    580.20      0.07      0.03      0.00    582.00
     2520.        0.     2520.        0.        0.    1160.        0.       63        8.    582.00
     0.30     0.00      2.17      0.00     0.000     0.030     0.000     0.000    565.00    226.50
 0.000129      200.       200       200         0         0         0      0.00    149.01    375.51
```

```
 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 2600 000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      370.000
  2600.00     15 16    580.16     0 00      0 00    580 23     0.07      0.03      0.00    582.00
    2520        0      2520       0.         0      1164        0         68        9.     582 00
     0.33     0.00      2.17     0.00     0 000     0 030    0.000     0.000    565.00    226.41
 0 000128     200.       200      200.         0         0        0      0.00    149.54    375.95

*SECNO 2800 000
          OPENING OF BERMS
  2800 00     15.18    580 18     0.00      0.00    580.26     0.07      0.03      0.00    586.40
    2520        0      2520.       0.         0     1167.        0        73.        9.     581.90
     0.35     0.00      2.16     0.00     0.000     0 030    0.000     0.000    565.00    227.42
 0.000126     200.       200      200         0         0        0      0.00    148.97    376.39

*SECNO 3000 000

3470 ENCROACHMENT STATIONS=      830.0     1400.0  TYPE=      1  TARGET=      570.000
  3000.00     15.21    580 21     0.00      0.00    580.28     0 07      0.03      0.00    582.00
    2520.        0.      2520.       0.         0     1172.        0.        79.       10.     582 00
     0.38     0.00      2 15     0.00     0.000     0.030    0.000     0.000    565.00   1226.23
 0.000126     200.       200      200.         0         0        0      0.00    150.59   1376.82

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400 0  TYPE=      1  TARGET=      287.000
  3500 00     15.27    580.27     0.00      0.00    580.34     0.07      0.06      0.00    582.00
    2520.        0      2520       0.         0.     1181..       0.        92.       12.     582.00
     0 45     0.00      2.13     0.00     0.000     0.030    0.000     0.000    565.00   1226 01
 0.000124     500.       500      500.         0         0        0      0.00    151.87   1377.88

*SECNO 4000.000

3470 ENCROACHMENT STATIONS=      183.0      410 0  TYPE=      1  TARGET=      227.000
  4000 00     20.36    580.36     0.00      0 00    580.39     0.03      0.03      0.02    581.70
    2520.        0.      2520       0.         0     1828.        0.       109.       13.     582.70
     0.55     0 00      1 38     0.00     0.000     0 030    0 000     0.000    560.00    251.50
 0.000029     500.       500      500.         2         0        0      0.00    139.58    391.09
```

```
  SECND     DEPTH     CHSEL     CRTWS     WSELK     EQ        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     CDRAR     TOPWID      ENDST

*SECND 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199 00     22.87    590.37     0.00      0.00    580.40     0.03      0.01      0.00    574.50
   2520.        0.      2520       0.        0.      1875.      0         118.      14.   100000.00
    0.59      0 00      1.34      0.00    0 000     0.030    0.000     0.000    557.50    132.00
 0 000026     199.       199      199.        0         0        0      0.00    127.00    259.00

*SECND 4200.000

0370 NORMAL BRIDGE, NRD= 13 MIN ELTRD=  591 42 MAX ELLC=  588 50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200 00     22.87    580 37     0 00      0 00    580.40     0 03      0.00      0.00    574.50
   2520.        0.      2520.      0.        0       1768.      2.        118       14.     575.60
    0 59      0.00      1 43      0.15    0.000     0.030    0.035    0.000    557.50    131.66
 0 000040       1.        1        1.        0         0        0   -107.15    128.20    259.86

*SECND 4214.000

0370 NORMAL BRIDGE, NRD= 13 MIN ELTRD=  591 42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214 00     22.87    580.37     0.00      0.00    380.40     0.03      0.00      0.00    574.50
   2520        0.      2520       0.        0.      1768.      2.        118.      14.     575.60
    0 59      0.00      1 43      0.15    0.000     0 030    0.035    0.000    557.50    131.66
 0 000040      14.        14       14        0         0        0   -107.15    128 20    259.86

.SECND 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00     22.88    580.38     0 00      0.00    580.40     0.03      0.00      0.00    574 50
   2520.        1       2518       1.        6.      1874.      5         119.      14.     575 60
    0.59      0 19      1 34      0 18    0.035     0 030    0.035    0.000    557 50    131.00
 0.000024       1.        1        1         0         0        0      0.00    129 00    260.00

'SECND 4225 000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

| SECNO | DEPTH | CWSEL | CRIWS | WSELK | IQ | 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 |
| 4225.00 | 22.38 | 580.23 | 0.00 | 0.00 | 580.40 | 0.03 | 0.00 | 0.00 | 581.70 |
| 2520. | 0. | 2520 | 0. | 0. | 1857. | 0 | 119. | 14 | 582.70 |
| 0.59 | 0.00 | 1.36 | 0.00 | 0.000 | 0.030 | 0.000 | 0.000 | 557.50 | 251.49 |
| 0.000026 | 10. | .0 | 10 | 0 | 0 | 0 | 0.00 | 139.64 | 391.13 |

SECNO 4600.000

3265 DIVIDED FLOW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4600.00 | 13.40 | 580.40 | 0.00 | 0.00 | 580.52 | 0.12 | 0.02 | 0.09 | 581.70 |
| 2520. | 8 | 2512. | 0. | 21 | 897. | 0. | 131. | 16. | 582.70 |
| 0.63 | 0.38 | 2.80 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 567.00 | 69.21 |
| 0.000253 | 375. | 375 | 375. | 1 | 0 | 0 | 0.00 | 186.67 | 386.67 |

SECNO 4900.000

3265 DIVIDED FLOW

CONFLUENCE WITH UPPER CHANNEL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4900.00 | 7.54 | 580.54 | 0.00 | 0.00 | 580.84 | 0.30 | 0.14 | 0.17 | 581.70 |
| 3520. | 29. | 2491. | 0. | 32. | 567. | 0. | 136. | 17. | 582.70 |
| 0.65 | 0.89 | 4.39 | 0.00 | 0.035 | 0.030 | 0.000 | 0.000 | 573.00 | 60.03 |
| 0.001128 | 300. | 300 | 300. | 2 | 0 | 0 | 0.00 | 224.37 | 387.39 |

THIS RUN EXECUTED 1 APR 87 9:08:08

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*****************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  30,51,52,53,54,55,56
*****************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD--1520 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0. | 5. | 0 | 0. | 0.000000 | 0.00 | 0.0 | 0. | 579.800 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 4.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
 SECND     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      XML       XNCH      XNR       WTN       ELMIN       SSTA
 SLOPE     XLOBL     XLCH      XLCBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*PROF 4

CCHV=   0.500 CEHV=   1.000
*SECND 0.000
          CROSS SECTION AT MANISTEE LAKE
    0.00     14.80    579.80     0.00    579.80    579.83     0.03     0.00     0.00    582.00
   1520.        0.     1520.       0.         0      1112        0        0.        0    582.00
    0.00     0.00      1.37     0.00     0.000     0.030    0.000    0.000    565.00    227.65
0.000051        0.        0.       0.         0         0        0     0.00    142.35    370.00

*SECND 1000.000
 1000.00     14.85    579.85     0.00     0.00    579.88     0.03     0.05     0.00    582.00
   1520         0     1520.       0.        0.      1119       0.      26.       3.    582.00
    0.20     0.00      1.36     0.00     0.000     0.030    0.000    0.000    565.00    227.48
0.000050    1000.     1000     1000.         0         0        0     0.00    143.37    370.85

*SECND 1940.000

3470 ENCROACHMENT STATIONS=        5.0      605.0  TYPE=      1  TARGET=      600.000
 1940.00     14.90    579.90     0.00     0.00    579.93     0.03     0.05     0.00    582.00
   1520.        0.     1520.       0.        0.     1126.       0.      50.       6    582.00
    0.40     0.00      1.35     0.00     0.000     0.030    0.000    0.000    565.00    227.31
0.000050     940.      940.     940.         0         0        0     0.00    144.33    371.64

*SECND 2200.000

3470 ENCROACHMENT STATIONS=       70.0      540.0  TYPE=      1  TARGET=      470.000
 2200.00     14.91    579.91     0.00     0.00    579.94     0.03     0.01     0.00    582.00
   1520.        0.     1520       0         0     1128.       0.      57.       7.    582.00
    0.45     0.00      1.35     0.00     0.000     0.030    0.000    0.000    565.00    227.26
0.000049     260.      260.     260.         0         0        0     0.00    144.59    371.86

*SECND 2400.000

3470 ENCROACHMENT STATIONS=      120.0      490.0  TYPE=      1  TARGET=      370.000
 2400.00     14.92    579.92     0.00     0.00    579.95     0.03     0.01     0.00    582.00
   1520.        0.     1520       0.        0.     1129.       0.      62.       8.    582.00
    0.49     0.00      1.35     0.00     0.000     0.030    0.000    0.000    565.00    227.23
0.000049     200.      200      200.         0         0        0     0.00    144.79    372.02
```

```
 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      ENOST

*SECND 2600.000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270.000
  2600.00     14.93    579.93     0.00      0.00    579.96     0.03      0.01      0.00    582.00
   1520.        0       1520       0.        0.      1130.      0.        67.       9.      582.00
    0.53      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00    227.20
 0.000049     200       200      200         0         0        0      0.00     144.99    372.19

*SECND 2800.000
          OPENING OF BERMS
  2800.00     14.94    579.94     0.00      0.00    579.97     0.03      0.01      0.00    586.40
   1520.        0.      1520.      0.        0      1132       0        72.       9.      581.90
    0.58      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00    227.71
 0.000049     200       200      200         0         0        0      0.00     144.64    372.35

*SECND 3000.000

3470 ENCROACHMENT STATIONS=      530.0     1400.0  TYPE=      1  TARGET=      570.000
  3000.00     14.95    579.95     0.00      0.00    579.98     0.03      0.01      0.00    582.00
   1520.        0.      1520       0.        0      1133.      0.        77.       10.     582.00
    0.62      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00   1227.13
 0.000049     200       200      200.        0         0        0      0.00     145.39   1372.52

*SECND 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     14.98    579.98     0.00      0.00    580.00     0.03      0.02      0.00    582.00
   1520.        0       1520       0.        0.      1137.      0.        90        12.     582.00
    0.72      0.00      1.34     0.00     0.000     0.030    0.000     0.000    565.00   1227.04
 0.000049     500       500      500         0         0        0      0.00     145.89   1372.93

*SECND 4000.000

3470 ENCROACHMENT STATIONS=      183.0      410.0  TYPE=      1  TARGET=      227.000
  4000.00     20.01    580.01     0.00      0.00    580.02     0.01      0.01      0.01    581.70
   1520.        0       1520       0.        0      1779.      0        107        13.     582.70
    0.88      0.00      0.85     0.00     0.000     0.030    0.000     0.000    560.00    251.90
 0.000011     500.      500      500.        1         0        0      0.00     138.13    390.03
```

```
 SECNO     DEPTH     CUSEL     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       WTN       ELMIN       SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    TDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00     22.51    580.01      0.00      0.00    580.02      0.01      0.00      0.00    574.50
    1520.        0.      1520        0         0     1329.        0       115.       14.  100000.00
     0.95      0.00      0.83      0.00     0.000     0.030     0.000     0.000    557.50    132.00
 0.000010      199.       199       199         0         0         0      0.00    127.00    259.00

*SECNO 4200.000

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00     22.51    580.01      0.00      0.00    580.03      0.01      0.00      0.00    574.50
    1520        0.      1520.       0.         0     1726.        2       115.       14.     575.60
     0.95      0.00      0.83      0.09     0.000     0.030     0.035     0.000    557.50    131.68
 0.000016        1.         1        1.         0         0         0   -103.80    128.11    259.80

*SECNO 4214.000

3270 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00     22.51    580.01      0.00      0.00    580.03      0.01      0.00      0.00    574.50
    1520.        0       1520       0.         0     1726.        2       116        14.     575.60
     0.95      0.00      0.88      0.09     0.000     0.030     0.035     0.000    557.50    131.68
 0.000016       14.        14.       14.         0         0         0   -103.81    128.11    259.80

*SECNO 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00     22.52    580.02      0.00      0.00    580.03      0.01      0.00      0.00    574.50
    1520        1       1519       0.         6.     1829.        4.       116.       14.     575.60
     0.95      0.12      0.83      0.11     0.035     0.030     0.035     0.000    557.50    131.00
 0.000009        1.         1        1.         0         0         0      0.00    129.00    260.00

*SECNO 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

| SECNO | DEPTH | CNGEL | CRTWS | WSELR | 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 |
| 4225 00 | 22.52 | 580.02 | 0.00 | 0.00 | 580.03 | 0.01 | 0.00 | 0.00 | 581.70 |
| 1520. | 0. | 1520. | 0. | 0 | 1807. | 0 | 116 | 14. | 582 70 |
| 0.96 | 0.00 | 0 84 | 0 00 | 0.000 | 0 030 | 0.000 | 0.000 | 557.50 | 251.89 |
| 0 000011 | 10 | 10 | 10. | 0 | 0 | 0 | 0.00 | 138.17 | 390.06 |

-SECND 4600.000

3265 DIVIDED FLOW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4600 00 | 13 03 | 580 03 | 0.00 | 0 00 | 580.08 | 0.05 | 0.01 | 0 04 | 581 70 |
| 1520 | 1 | 1519. | 0. | 6. | 849. | 0 | 128. | 15. | 582.70 |
| 1 02 | 0 16 | 1.79 | 0 00 | 0.035 | 0.030 | 0 000 | 0.000 | 567.00 | 85.00 |
| 0.000107 | 375. | 375 | 375. | 0 | 0 | 0 | 0.00 | 155.81 | 384 84 |

-SECND 4900.000

3245 DIVIDED FLOW

CONFLUENCE WITH UPPER CHANNEL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4900 00 | 7 09 | 580 07 | 0.00 | 0.00 | 580.23 | 0.14 | 0.06 | 0 09 | 581 70 |
| 1520 | 3 | 1517. | 0. | 8. | 509. | 0 | 133. | 16. | 582.70 |
| 1.04 | 0.40 | 2 98 | 0 00 | 0.035 | 0 030 | 0.000 | 0 000 | 573.00 | 82.56 |
| 0.000571 | 300. | 300. | 300. | 2 | 0 | 0 | 0 00 | 159.16 | 385.17 |

THIS RUN EXECUTED 1 APR 87 9.08:09

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**********************************************************
  HEC2 RELEASE DATED NOV 75 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**********************************************************
```

T1 MANISTEE TOWNSHIP, FIS
T2 MANISTEE RIVER-CHANNEL 2
T3 100 YEAR FLOOD--520 CFS

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 4. | 0 | 0. | 0.000000 | 0.00 | 0.0 | 0. | 579.800 | 0.000 |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 15.000 | 0.000 | -1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
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      WNL       WNCH      XNR       WTN       ELMIN       SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*PROF 5

CCHV=   0.500 CEHV=   1.000
*SECNO 0.000
          CROSS SECTION AT MANISTEE LAKE
     0.00     14.80    579.80     0.00    579.80    579.80      0.00      0.00      0.00    582.00
     520         0       520        0.         0     1112.         0         0.        0.    582.00
     0.00     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.65
 0.000006        0         0.        0.         0         0         0      0.00    142.35    370.00

*SECNO 1000.000
  1000.00    14.81    579.81      0.00      0.00    579.81      0.00      0.01      0.00    582.00
     520         0.       520        0.         0.     1112.         0        26.        3.    582.00
     0.59     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.63
 0.000006    1000.     1000.     1000.         0         0         0      0.00    142.47    370.10

*SECNO 1940.000

3470 ENCROACHMENT STATIONS=        5.0       605.0  TYPE=      1  TARGET=      600.000
  1940.00    14.81    579.81      0.00      0.00    579.81      0.00      0.01      0.00    582.00
     520.        0.       520.       0.         0     1113.         0        50        6.    582.00
     1.15     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.61
 0.000006     940.      940.      940.         0         0         0      0.00    142.58    370.19

*SECNO 2200.000

3470 ENCROACHMENT STATIONS=       70.0       540.0  TYPE=      1  TARGET=      470.000
  2200.00    14.81    579.81      0.00      0.00    579.82      0.00      0.00      0.00    582.00
     520.        0       520.       0.         0     1113         0.        56.        7     582.00
     1.31     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.61
 0.000006     260.      260.      260.         0         0         0      0.00    142.61    370.22

*SECNO 2400.000

3470 ENCROACHMENT STATIONS=      120.0       450.0  TYPE=      1  TARGET=      370.000
  2400.00    14.81    579.81      0.00      0.00    579.82      0.00      0.00      0.00    582.00
     520.        0.       520.       0.         0     1114.         0        61.        8.    582.00
     1.43     0.00      0.47      0.00     0.000     0.030     0.000     0.000    565.00    227.60
 0.000006     200       200       200.         0         0         0      0.00    142.64    370.24
```

```
 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
 Q         ALOB      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 2600.000

3470 ENCROACHMENT STATIONS=      170.0      440.0  TYPE=      1  TARGET=      270.000
  2600.00     14.82    579.82     0.00      0.00    579.82     0.00      0.00      0.00    582.00
     520        0        520       0.        0.     1114.       0        66.        9.     582.00
    1.55      0.00      0.47     0.00     0.000     0.030    0.000     0.000    565.00    227.60
 0.000006     200.      200      200.        0         0        0      0.00    142.66    370.26

*SECNO 2800.000
          OPENING OF BERMS
  2800.00     14.82    579.82     0.00      0.00    579.82     0.00      0.00      0.00    586.40
     520.       0.       520.      0.        0.     1114.       0.       72.        9.     581.90
    1.66      0.00      0.47     0.00     0.000     0.030    0.000     0.000    565.00    227.86
 0.000006     200.      200      200.        0         0        0      0.00    142.42    370.28

*SECNO 3000.000

3470 ENCROACHMENT STATIONS=      330.0     1400.0  TYPE=      1  TARGET=      570.000
  3000.00     14.82    579.82     0.00      0.00    579.82     0.00      0.00      0.00    582.00
     520.       0        520.      0.        0.     1114.       0        77.       10.     582.00
    1.78      0.00      0.47     0.00     0.000     0.030    0.000     0.000    565.00   1227.59
 0.000006     200.      200.     200        0         0        0      0.00    142.71   1370.30

*SECNO 3500.000

3470 ENCROACHMENT STATIONS=     1113.0     1400.0  TYPE=      1  TARGET=      287.000
  3500.00     14.82    579.82     0.00      0.00    579.82     0.00      0.00      0.00    582.00
     520.       0.       530       0.        0.     1115.       0.       89.       11      592.00
    2.08      0.00      0.47     0.00     0.000     0.030    0.000     0.000    565.00   1227.58
 0.000006     500.      500      500        0         0        0      0.00    142.77   1370.35

*SECNO 4000.000

3470 ENCROACHMENT STATIONS=      183.0      410.0  TYPE=      1  TARGET=      227.000
  4000.00     19.83    579.83     0.00      0.00    579.83     0.00      0.00      0.00    581.70
     520.       0        520       0.        0.     1754.       0.      106.       13.     582.70
    2.55      0.00      0.30     0.00     0.000     0.030    0.000     0.000    560.00    252.11
 0.000001     500.      500      500.        0         0        0      0.00    137.38    389.49
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```
 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        KV        HL        OLOSS   BANK ELEV
 Q         QLOB      QCH       QRIOB     ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       VTN       ELMIN      SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID     ENDST

*SECNO 4199.000

3470 ENCROACHMENT STATIONS=      132.0      259.0  TYPE=      1  TARGET=      127.000
  4199.00     22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520.        0.      520.       0.        0.      1805       0.       114.        14  100000.00
    2.74      0.00      0.29     0.00     0.000     0.030    0.000     0.000    557.50    132.00
 0.000001       199       199     199.         0         0        0      0.00    127.00    259.00

*SECNO 4200.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          DOWNSTREAM FACE OF RAILROAD BRIDGE
  4200.00     22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520        0.       520       0.         0      1704       2.       114.       14.     575.60
    2.74      0.00      0.31     0.03     0.000     0.030    0.035     0.000    557.50    131.69
 0.000002        1.        1        1.         0         0        0   -102.07    128.07    259.76

*SECNO 4214.000

3370 NORMAL BRIDGE.NRD= 13 MIN ELTRD=  591.42 MAX ELLC=  588.50

          UPSTREAM FACE OF RAILROAD BRIDGE
  4214.00     22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520        0       520       0.         0      1704       2       115.       14.     575.60
    2.76      0.00      0.31     0.03     0.000     0.030    0.035     0.000    557.50    131.69
 0.000002       14        14       14         0         0        0   -102.07    128.07    259.76

*SECNO 4215.000

3470 ENCROACHMENT STATIONS=      131.0      260.0  TYPE=      1  TARGET=      129.000
  4215.00     22.33    579.83     0.00      0.00    579.83     0.00      0.00      0.00    574.50
     520.        0.       520       0.         5      1805       4       115       14.     575.60
    2.76      0.04      0.29     0.04     0.035     0.030    0.035     0.000    557.50    131.00
 0.000001        1         1        1.         0         0        0      0.00    129.00    260.00

*SECNO 4225.000

3470 ENCROACHMENT STATIONS=      250.0      399.0  TYPE=      1  TARGET=      149.000
```

| SECND | DEPTH | CWSEL | CRIWS | WSELK | AO | HV | HL | DLOSS | BANK ELEV |
|---|---|---|---|---|---|---|---|---|---|
| Q | QLOB | QCH | QROB | XNL | XCH | AROB | VOL | TWA | LEFT/RIGHT |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | E_MIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |
| 4225 00 | 22 36 | 579 83 | 0.00 | 0.00 | 579.83 | 0 00 | 0.00 | 0.00 | 581.70 |
| 520 | 0. | 520. | 0. | 0 | 1781. | 0 | 115. | 14. | 582.70 |
| 2.77 | 0 00 | 0 29 | 0 00 | 0.000 | 0.030 | 0.000 | 0.000 | 557 50 | 252 11 |
| 0.000001 | 10 | 10. | 10 | 0 | 0 | 0 | 0.00 | 137.39 | 389.50 |

SECND 4600 000

3265 DIVIDED FLOW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4600 00 | 12.33 | 579 83 | 0.00 | 0 00 | 579.83 | 0 01 | 0.00 | 0 00 | 581 70 |
| 520 | 0 | 520 | 0. | 2 | 824. | 0 | 126 | 15 | 582.70 |
| 2.93 | 0.04 | 0 63 | 0 00 | 0 035 | 0.030 | 0.000 | 0.000 | 567.00 | 91.92 |
| 0.000014 | 375 | 375 | 375. | 0 | 0 | 0 | 0.00 | 141.06 | 383.88 |

*SECND 4900 000

3265 DIVIDED FLOW

CONFLUENCE WITH UPPER CHANNEL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4900 00 | 5 84 | 579.84 | 0.00 | 0 00 | 579.85 | 0 02 | 0 01 | 0.01 | 581.70 |
| 520. | 0. | 520 | 0. | 2. | 477. | 0 | 131. | 16. | 582 70 |
| 3.01 | 0 09 | 1 09 | 0.00 | 0.035 | 0.030 | 0.000 | 0 000 | 573.00 | 91.82 |
| 0 0000B1 | 300 | 300 | 300. | 0 | 0 | 0 | 0.00 | 139.13 | 383.90 |

THIS RUN EXECUTED 1 APR 87 9:08:11

```
*****************************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
*****************************************************************
```

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

100 YEAR FLOOD--4260 CFS

SUMMARY PRINTOUT TABLE 130

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 579.80 | 0.00 | 580.03 | 3.99 | 3.83 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 579.80 | 0.00 | 579.96 | 2.72 | 3.17 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 579.80 | 0.00 | 579.88 | 1.40 | 2.27 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.80 | 0.00 | 579.83 | 0.51 | 1.37 | 1111.62 | 2132.94 |
| 0.000 | 0.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.80 | 0.00 | 579.80 | 0.06 | 0.47 | 1111.62 | 2132.94 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.21 | 0.00 | 580.42 | 3.61 | 3.64 | 1171.04 | 2242.09 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.08 | 0.00 | 580.22 | 2.55 | 3.06 | 1151.13 | 2205.45 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 579.94 | 0.00 | 580.02 | 1.35 | 2.23 | 1131.68 | 2169.45 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.85 | 0.00 | 579.88 | 0.50 | 1.36 | 1118.87 | 2146.02 |
| 1000.000 | 1000.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.81 | 0.06 | 0.47 | 1112.46 | 2134.47 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.56 | 0.00 | 580.75 | 3.24 | 3.47 | 1227.05 | 2366.81 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.32 | 0.00 | 580.46 | 2.39 | 2.96 | 1189.40 | 2277.34 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.07 | 0.00 | 580.14 | 1.31 | 2.19 | 1150.85 | 2204.83 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.90 | 0.00 | 579.93 | 0.50 | 1.35 | 1125.73 | 2158.57 |
| 1940.000 | 940.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.81 | 0.06 | 0.47 | 1113.26 | 2135.71 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.65 | 0.00 | 580.83 | 3.15 | 3.44 | 1239.67 | 2399.48 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.39 | 0.00 | 580.52 | 2.35 | 2.94 | 1198.94 | 2295.53 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.10 | 0.00 | 580.18 | 1.30 | 2.18 | 1155.90 | 2214.24 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.91 | 0.00 | 579.94 | 0.49 | 1.35 | 1127.60 | 2161.98 |
| 2200.000 | 260.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.48 | 2136.30 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.72 | 0.00 | 580.90 | 3.08 | 3.41 | 1249.67 | 2425.47 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.44 | 0.00 | 580.57 | 2.31 | 2.92 | 1206.37 | 2313.50 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.13 | 0.00 | 580.20 | 1.29 | 2.17 | 1159.82 | 2221.54 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.92 | 0.00 | 579.95 | 0.49 | 1.35 | 1129.04 | 2164.61 |
| 2400.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.81 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.65 | 2136.61 |

| BECNO | KLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.78 | 0.00 | 580.96 | 3.02 | 3.38 | 1259.96 | 2452.27 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.49 | 0.00 | 580.62 | 2.28 | 2.90 | 1213.87 | 2332.80 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.16 | 0.00 | 580.23 | 1.28 | 2.17 | 1163.75 | 2228.90 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.93 | 0.00 | 579.96 | 0.49 | 1.34 | 1130.48 | 2167.26 |
| 2600.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.82 | 2136.92 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.85 | 0.00 | 581.02 | 2.91 | 3.36 | 1268.66 | 2496.40 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.53 | 0.00 | 580.66 | 2.21 | 2.88 | 1220.49 | 2365.85 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.18 | 0.00 | 580.26 | 1.26 | 2.16 | 1167.41 | 2245.14 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.94 | 0.00 | 579.97 | 0.49 | 1.34 | 1131.86 | 2174.54 |
| 2800.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1113.97 | 2139.52 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 580.91 | 0.00 | 581.08 | 2.89 | 3.33 | 1279.85 | 2504.27 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 3520.00 | 580.58 | 0.00 | 580.71 | 2.21 | 2.87 | 1228.45 | 2370.42 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.21 | 0.00 | 580.28 | 1.26 | 2.15 | 1171.56 | 2240.06 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.95 | 0.00 | 579.98 | 0.49 | 1.34 | 1133.36 | 2172.03 |
| 3000.000 | 200.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1114.16 | 2137.53 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 4260.00 | 581.06 | 0.00 | 581.22 | 2.75 | 3.27 | 1303.61 | 2566.77 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 3320.00 | 580.69 | 0.00 | 580.82 | 2.12 | 2.82 | 1246.04 | 2416.03 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 2520.00 | 580.27 | 0.00 | 580.34 | 1.24 | 2.13 | 1181.18 | 2261.73 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 1520.00 | 579.98 | 0.00 | 580.00 | 0.49 | 1.34 | 1136.93 | 2179.09 |
| 3500.000 | 500.00 | 0.00 | 0.00 | 565.00 | 520.00 | 579.82 | 0.00 | 579.82 | 0.06 | 0.47 | 1114.58 | 2138.29 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 4260.00 | 581.26 | 0.00 | 581.33 | 0.68 | 2.18 | 1955.11 | 5148.95 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 3520.00 | 580.85 | 0.00 | 580.90 | 0.51 | 1.86 | 1896.22 | 4933.42 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 2520.00 | 580.36 | 0.00 | 580.39 | 0.29 | 1.38 | 1828.25 | 4686.68 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 1520.00 | 580.01 | 0.00 | 580.02 | 0.11 | 0.85 | 1778.72 | 4508.98 |
| 4000.000 | 500.00 | 0.00 | 0.00 | 560.00 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.30 | 1753.67 | 4419.61 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 4260.00 | 581.27 | 0.00 | 581.35 | 0.62 | 2.14 | 1990.07 | 5404.53 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 3520.00 | 580.86 | 0.00 | 580.91 | 0.46 | 1.82 | 1937.00 | 5185.12 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 2520.00 | 580.37 | 0.00 | 580.40 | 0.26 | 1.34 | 1875.03 | 4932.44 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 1520.00 | 580.01 | 0.00 | 580.02 | 0.10 | 0.83 | 1829.23 | 4748.16 |
| 4199.000 | 199.00 | 0.00 | 0.00 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.29 | 1804.97 | 4651.46 |
| 4200.000 | 1.00 | 591.42 | 589.50 | 557.50 | 4260.00 | 581.27 | 0.00 | 581.35 | 0.98 | 2.37 | 1877.11 | 4310.24 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 3520.00 | 580.86 | 0.00 | 580.92 | 0.72 | 1.93 | 1827.93 | 4150.81 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 2520.00 | 580.37 | 0.00 | 580.40 | 0.40 | 1.43 | 1769.97 | 3964.51 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 1520.00 | 580.01 | 0.00 | 580.03 | 0.16 | 0.88 | 1727.69 | 3829.73 |
| 4200.000 | 1.00 | 591.42 | 588.50 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.02 | 0.31 | 1705.28 | 3758.69 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 4260.00 | 581.28 | 0.00 | 581.36 | 0.98 | 2.27 | 1877.25 | 4310.68 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 3520.00 | 580.86 | 0.00 | 580.92 | 0.72 | 1.93 | 1828.03 | 4151.12 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 2520.00 | 580.37 | 0.00 | 580.40 | 0.40 | 1.43 | 1770.03 | 3964.69 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 1520.00 | 580.01 | 0.00 | 580.03 | 0.16 | 0.88 | 1727.72 | 3829.79 |
| 4214.000 | 14.00 | 591.42 | 588.50 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.02 | 0.31 | 1705.29 | 3758.70 |

| SECND | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 4260.00 | 581.29 | 0.00 | 581.36 | 0.55 | 2.14 | 2002.47 | 5719.76 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 3520.00 | 580.87 | 0.00 | 580.92 | 0.41 | 1.82 | 1947.91 | 5464.89 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 2520.00 | 580.38 | 0.00 | 580.40 | 0.24 | 1.34 | 1884.77 | 5175.20 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 1520.00 | 580.02 | 0.00 | 580.03 | 0.09 | 0.83 | 1838.80 | 4968.44 |
| 4215.000 | 1.00 | 0.00 | 0.00 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.29 | 1814.46 | 4860.05 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 4260.00 | 581.29 | 0.00 | 581.36 | 0.66 | 2.14 | 1986.59 | 5248.51 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 3520.00 | 580.87 | 0.00 | 580.92 | 0.49 | 1.83 | 1926.68 | 5037.87 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 2520.00 | 580.38 | 0.00 | 580.40 | 0.28 | 1.36 | 1857.19 | 4775.02 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 1520.00 | 580.02 | 0.00 | 580.03 | 0.11 | 0.84 | 1807.20 | 4595.28 |
| 4225.000 | 10.00 | 0.00 | 0.00 | 557.50 | 520.00 | 579.83 | 0.00 | 579.83 | 0.01 | 0.29 | 1780.95 | 4501.60 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 4260.00 | 581.34 | 0.00 | 581.59 | 4.76 | 4.02 | 1170.84 | 1952.39 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 3520.00 | 580.91 | 0.00 | 581.11 | 3.95 | 3.59 | 1042.11 | 1770.28 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 2520.00 | 580.40 | 0.00 | 580.52 | 2.53 | 2.80 | 918.18 | 1583.83 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 1520.00 | 580.03 | 0.00 | 580.08 | 1.07 | 1.79 | 854.72 | 1466.46 |
| 4600.000 | 375.00 | 0.00 | 0.00 | 567.00 | 520.00 | 579.83 | 0.00 | 579.83 | 0.14 | 0.63 | 825.94 | 1408.81 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 4260.00 | 581.58 | 0.00 | 582.02 | 14.78 | 5.53 | 897.98 | 1107.97 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 3520.00 | 581.11 | 0.00 | 581.52 | 14.32 | 5.23 | 750.18 | 930.27 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 2520.00 | 580.54 | 0.00 | 580.84 | 11.28 | 4.39 | 599.47 | 750.13 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 1520.00 | 580.09 | 0.00 | 580.23 | 5.71 | 2.98 | 517.04 | 635.96 |
| 4900.000 | 300.00 | 0.00 | 0.00 | 573.00 | 520.00 | 579.84 | 0.00 | 579.85 | 0.81 | 1.09 | 478.37 | 577.09 |

100 YEAR FLOOD--4260 CFS

SUMMARY PRINTOUT TABLE 150

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFXWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 0.000 | 4260.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 3520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 2520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 1520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 0.000 | 520.00 | 579.80 | 0.00 | 0.00 | 0.00 | 142.35 | 0.00 |
| 1000.000 | 4260.00 | 580.21 | 0.00 | 0.41 | 0.00 | 150.52 | 1000.00 |
| 1000.000 | 3520.00 | 580.08 | -0.13 | 0.28 | 0.00 | 147.83 | 1000.00 |
| 1000.000 | 2520.00 | 579.94 | -0.14 | 0.14 | 0.00 | 145.16 | 1000.00 |
| 1000.000 | 1520.00 | 579.85 | -0.09 | 0.05 | 0.00 | 143.37 | 1000.00 |
| 1000.000 | 520.00 | 579.81 | -0.05 | 0.01 | 0.00 | 142.47 | 1000.00 |
| 1940.000 | 4260.00 | 580.56 | 0.00 | 0.35 | 0.00 | 156.09 | 940.00 |
| 1940.000 | 3520.00 | 580.32 | -0.24 | 0.25 | 0.00 | 152.96 | 940.00 |
| 1940.000 | 2520.00 | 580.07 | -0.25 | 0.13 | 0.00 | 147.80 | 940.00 |
| 1940.000 | 1520.00 | 579.90 | -0.17 | 0.05 | 0.00 | 144.33 | 940.00 |
| 1940.000 | 520.00 | 579.81 | -0.09 | 0.01 | 0.00 | 142.58 | 940.00 |
| 2200.000 | 4260.00 | 580.65 | 0.00 | 0.09 | 0.00 | 156.87 | 260.00 |
| 2200.000 | 3520.00 | 580.39 | -0.26 | 0.06 | 0.00 | 154.21 | 260.00 |
| 2200.000 | 2520.00 | 580.10 | -0.28 | 0.03 | 0.00 | 148.48 | 260.00 |
| 2200.000 | 1520.00 | 579.91 | -0.19 | 0.01 | 0.00 | 144.59 | 260.00 |
| 2200.000 | 520.00 | 579.81 | -0.10 | 0.00 | 0.00 | 142.61 | 260.00 |
| 2400.000 | 4260.00 | 580.72 | 0.00 | 0.07 | 0.00 | 157.49 | 200.00 |
| 2400.000 | 3520.00 | 580.44 | -0.28 | 0.05 | 0.00 | 154.79 | 200.00 |
| 2400.000 | 2520.00 | 580.13 | -0.31 | 0.03 | 0.00 | 149.01 | 200.00 |
| 2400.000 | 1520.00 | 579.92 | -0.21 | 0.01 | 0.00 | 144.79 | 200.00 |
| 2400.000 | 520.00 | 579.81 | -0.11 | 0.00 | 0.00 | 142.64 | 200.00 |
| 2600.000 | 4260.00 | 580.78 | 0.00 | 0.07 | 0.00 | 158.13 | 200.00 |
| 2600.000 | 3520.00 | 580.49 | -0.30 | 0.05 | 0.00 | 155.27 | 200.00 |
| 2600.000 | 2520.00 | 580.16 | -0.33 | 0.03 | 0.00 | 149.54 | 200.00 |
| 2600.000 | 1520.00 | 579.93 | -0.23 | 0.01 | 0.00 | 144.99 | 200.00 |
| 2600.000 | 520.00 | 579.82 | -0.12 | 0.00 | 0.00 | 142.66 | 200.00 |
| 2800.000 | 4260.00 | 580.85 | 0.00 | 0.06 | 0.00 | 156.32 | 200.00 |
| 2800.000 | 3520.00 | 580.53 | -0.31 | 0.05 | 0.00 | 153.88 | 200.00 |
| 2800.000 | 2520.00 | 580.18 | -0.35 | 0.03 | 0.00 | 148.97 | 200.00 |
| 2800.000 | 1520.00 | 579.94 | -0.24 | 0.01 | 0.00 | 144.64 | 200.00 |
| 2800.000 | 520.00 | 579.82 | -0.12 | 0.00 | 0.00 | 142.42 | 200.00 |
| 3000.000 | 4260.00 | 580.91 | 0.00 | 0.06 | 0.00 | 159.35 | 200.00 |
| 3000.000 | 3520.00 | 580.58 | -0.33 | 0.05 | 0.00 | 156.18 | 200.00 |
| 3000.000 | 2520.00 | 580.21 | -0.37 | 0.03 | 0.00 | 150.59 | 200.00 |
| 3000.000 | 1520.00 | 579.95 | -0.26 | 0.01 | 0.00 | 145.39 | 200.00 |
| 3000.000 | 520.00 | 579.82 | -0.13 | 0.00 | 0.00 | 142.71 | 200.00 |

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFWNS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 3500.000 | 4260.00 | 581.06 | 0.00 | 0.15 | 0.00 | 160.79 | 500.00 |
| 3500.000 | 3520.00 | 580.69 | -0.36 | 0.11 | 0.00 | 157.27 | 500.00 |
| 3500.000 | 2520.00 | 580.27 | -0.42 | 0.06 | 0.00 | 151.87 | 500.00 |
| 3500.000 | 1520.00 | 579.98 | -0.30 | 0.02 | 0.00 | 145.89 | 500.00 |
| 3500.000 | 520.00 | 579.82 | -0.16 | 0.00 | 0.00 | 142.77 | 500.00 |
| 4000.000 | 4260.00 | 581.26 | 0.00 | 0.20 | 0.00 | 146.68 | 500.00 |
| 4000.000 | 3520.00 | 580.85 | -0.41 | 0.15 | 0.00 | 141.56 | 500.00 |
| 4000.000 | 2520.00 | 580.36 | -0.48 | 0.09 | 0.00 | 139.58 | 500.00 |
| 4000.000 | 1520.00 | 580.01 | -0.35 | 0.03 | 0.00 | 138.13 | 500.00 |
| 4000.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 137.38 | 500.00 |
| 4199.000 | 4260.00 | 581.27 | 0.00 | 0.02 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 3520.00 | 580.86 | -0.42 | 0.01 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 2520.00 | 580.37 | -0.49 | 0.01 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 1520.00 | 580.01 | -0.36 | 0.00 | 0.00 | 127.00 | 199.00 |
| 4199.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 127.00 | 199.00 |
| 4200.000 | 4260.00 | 581.27 | 0.00 | 0.00 | 0.00 | 128.41 | 1.00 |
| 4200.000 | 3520.00 | 580.36 | -0.42 | 0.00 | 0.00 | 128.32 | 1.00 |
| 4200.000 | 2520.00 | 580.37 | -0.49 | 0.00 | 0.00 | 128.20 | 1.00 |
| 4200.000 | 1520.00 | 580.01 | -0.36 | 0.00 | 0.00 | 128.11 | 1.00 |
| 4200.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 128.07 | 1.00 |
| 4214.000 | 4260.00 | 581.28 | 0.00 | 0.00 | 0.00 | 128.41 | 14.00 |
| 4214.000 | 3520.00 | 580.86 | -0.42 | 0.00 | 0.00 | 128.32 | 14.00 |
| 4214.000 | 2520.00 | 580.37 | -0.49 | 0.00 | 0.00 | 128.20 | 14.00 |
| 4214.000 | 1520.00 | 580.01 | -0.36 | 0.00 | 0.00 | 128.11 | 14.00 |
| 4214.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 128.07 | 14.00 |
| 4215.000 | 4260.00 | 581.29 | 0.00 | 0.01 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 3520.00 | 580.87 | -0.42 | 0.01 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 2520.00 | 580.38 | -0.49 | 0.01 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 1520.00 | 580.02 | -0.36 | 0.00 | 0.00 | 129.00 | 1.00 |
| 4215.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 129.00 | 1.00 |
| 4225.000 | 4260.00 | 581.29 | 0.00 | 0.00 | 0.00 | 143.37 | 10.00 |
| 4225.000 | 3520.00 | 580.87 | -0.42 | 0.00 | 0.00 | 141.66 | 10.00 |
| 4225.000 | 2520.00 | 580.38 | -0.49 | 0.00 | 0.00 | 139.64 | 10.00 |
| 4225.000 | 1520.00 | 580.02 | -0.36 | 0.00 | 0.00 | 138.17 | 10.00 |
| 4225.000 | 520.00 | 579.83 | -0.19 | 0.00 | 0.00 | 137.39 | 10.00 |
| 4600.000 | 4260.00 | 581.34 | 0.00 | 0.05 | 0.00 | 323.50 | 375.00 |
| 4600.000 | 3520.00 | 580.91 | -0.43 | 0.04 | 0.00 | 271.64 | 375.00 |
| 4600.000 | 2520.00 | 580.40 | -0.51 | 0.02 | 0.00 | 186.67 | 375.00 |
| 4600.000 | 1520.00 | 580.03 | -0.37 | 0.01 | 0.00 | 153.81 | 375.00 |
| 4600.000 | 520.00 | 579.83 | -0.20 | 0.00 | 0.00 | 141.06 | 375.00 |

| SECNO | Q | LWSEL | DIFWSP | DIFWSX | DIFWNS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 4900.000 | 4260.00 | 581.58 | 0.00 | 0.23 | 0.00 | 336.19 | 300.00 |
| 4900.000 | 3320.00 | 581.11 | -0.46 | 0.20 | 0.00 | 293.40 | 300.00 |
| 4900.000 | 2520.00 | 580.54 | -0.57 | 0.14 | 0.00 | 224.37 | 300.00 |
| 4900.000 | 1520.00 | 580.09 | -0.45 | 0.06 | 0.00 | 159.16 | 300.00 |
| 4900.000 | 520.00 | 579.24 | -0.25 | 0.01 | 0.00 | 139.13 | 300.00 |

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp

3) WATERCOURSE: Manistee River

4) DOCUMENT TYPE: 10, 50, 100, 500 year Flood Unencroached

00BREAK00

MANISTEE TOWNSHIP, FIS

MANISTEE RIVER (REVISED)

100-YR FLOOD - UNENCROACHED

INP= MNST.H2

```
EEEEEE   EEEEEE          L        EEEEEE   EEEEEE
E        E                 L     E        E
E        E                 L     E        E
EEEE     EEEE              L     EEEE     EEEE
E        E                 L     E        E
EEEEEE   EEEEEE            LLLLLL EEEEEE   EEEEEE
```

USACOE DETROIT H800 VOS 5 1.1  PRINTER: 6

EE LEC  1 APR 87  8:51:29

TERMINAL. 105

THIS RUN EXECUTED 1 APR 87 8:51:01

```
*****************************************************
  HEC2 RELEASE DATED NOV 79 UPDATED MAY  1984
  ERROR CORR -  01.02.03 04.05.06
  MODIFICATION -  50.51.52 53.54.55.56
*****************************************************
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T1    MANISTEE TOWNSHIP, FIS
T2    MANISTEE RIVER
T3    100 YEAR FLOOD

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       2        0        0.   0.000000   0.00     0.0      0      579.800   0.000

J2  NPROF     IFLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    -1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

NC      0.035     0.035     0.030     0.500     1.000     0.000     0.000     0.000     0.000     0.000
GT      1.000  4640.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
          CROSS SECTION AT MANISTEE LAKE
X1      0.000    13.000  1500.000  1860.000     0.000     0.000     0.000     0.000    -4.360     0.000
X3      0.000     0.000     0.000  1348.000     0.000  2013.000     0.000     0.000     0.000     0.000
GR    587.300    50.000   584.300    50.000   583.500   945.000   583.400  1350.000   583.400  1500.000
GR    574.900  1520.000   575.620  1620.000   577.600  1790.000   577.600  1850.000   583.400  1860.000
GR    584.000  2000.000   585.600  2300.000   590.500  2340.000     0.000     0.000     0.000     0.000

          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
X1    700.000     8.000  1550.000  1790.000   800.000  1029.000   900.000     0.000     0.000     0.000
X3      0.000     0.000     0.000  1550.000     0.000  1780.000     0.000     0.000     0.000     0.000
GR    587.300  1200.000   582.000  1200.000   582.000  1550.000   571.570  1580.000   571.570  1760.000
GR    582.000  1780.000   585.600  1830.000   590.500  1880.000     0.000     0.000     0.000     0.000

X1   1010.000     6.000   620.000   900.000   110.000   110.000   110.000     0.000     0.000     0.000
GR    582.000   200.000   582.000   620.000   571.680   630.000   571.680   770.000   582.000   900.000
GR    582.000  1200.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

X1   1040.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

X1   1070.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

X1   1100.000     0.000     0.000     0.000    30.000    30.000    30.000     0.850     0.030     0.000

NC      0.000     0.000     0.000     0.500     1.000     0.000     0.000     0.000     0.000     0.000
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CROSS SECTION JUST BELOW RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1120.000 | 8.000 | 1042.100 | 1151.900 | 20.000 | 20.000 | 20.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |
| QR | 587.300 | 0.000 | 582.300 | 10.000 | 582.300 | 1042.100 | 571.790 | 1060.000 | 572.290 | 1130.000 |
| QR | 582.300 | 1151.900 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1121.000 | 50.000 | 1042.100 | 1151.900 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |
| QT | -50.000 | 0.000 | 592.000 | 587.300 | 10.000 | 592.000 | 582.300 | 1013.000 | 592.000 | 582.300 |
| QT | 0.000 | 1012.100 | 592.000 | 590.000 | 1014.000 | 592.000 | 590.000 | 1014.100 | 592.000 | 582.300 |
| QT | 0.000 | 1015.000 | 592.000 | 582.300 | 1015.100 | 592.000 | 590.000 | 1026.000 | 592.000 | 590.000 |
| QT | 0.000 | 1026.100 | 592.000 | 583.200 | 1027.000 | 592.000 | 583.200 | 1027.100 | 592.000 | 590.000 |
| QT | 0.000 | 1037.000 | 592.000 | 590.000 | 1037.100 | 592.000 | 582.300 | 1038.000 | 592.000 | 582.300 |
| QT | 0.000 | 1038.100 | 592.000 | 589.100 | 1039.000 | 592.000 | 589.100 | 1039.100 | 592.000 | 582.300 |
| QT | 0.000 | 1040.000 | 592.000 | 582.300 | 1040.100 | 592.000 | 589.100 | 1041.000 | 592.000 | 589.100 |
| QT | 0.000 | 1041.100 | 592.000 | 582.300 | 1042.000 | 592.000 | 582.300 | 1042.100 | 592.000 | 589.100 |
| QT | 0.000 | 1060.000 | 592.000 | 589.100 | 1130.000 | 592.000 | 589.100 | 1151.900 | 592.000 | 589.100 |
| QT | 0.000 | 1152.000 | 592.000 | 582.300 | 1153.000 | 592.000 | 582.300 | 1153.100 | 592.000 | 589.100 |
| QT | 0.000 | 1154.000 | 592.000 | 589.100 | 1154.100 | 592.000 | 582.300 | 1155.000 | 592.000 | 582.300 |
| QT | 0.000 | 1155.100 | 592.000 | 589.100 | 1156.000 | 592.000 | 589.100 | 1156.100 | 592.000 | 582.300 |
| QT | 0.000 | 1157.000 | 592.000 | 582.300 | 1157.100 | 592.000 | 590.000 | 1166.000 | 592.000 | 590.000 |
| QT | 0.000 | 1166.100 | 592.000 | 582.500 | 1167.000 | 592.000 | 582.500 | 1167.100 | 592.000 | 590.000 |
| QT | 0.000 | 1179.000 | 592.000 | 590.000 | 1179.100 | 592.000 | 582.700 | 1180.000 | 592.000 | 582.700 |
| QT | 0.000 | 1180.100 | 592.000 | 590.000 | 1192.000 | 592.000 | 590.000 | 1192.100 | 592.000 | 582.900 |
| QT | 0.000 | 1292.000 | 592.000 | 585.600 | 2292.000 | 592.000 | 590.500 | 0.000 | 0.000 | 0.000 |
| QR | 587.300 | 0.000 | 582.300 | 10.000 | 582.300 | 1013.000 | 582.300 | 1013.100 | 582.300 | 1014.000 |
| QR | 582.300 | 1014.100 | 582.300 | 1015.000 | 582.300 | 1015.100 | 582.300 | 1026.000 | 582.300 | 1026.100 |
| QR | 582.300 | 1027.000 | 582.300 | 1027.100 | 582.300 | 1037.000 | 582.300 | 1037.100 | 582.300 | 1038.000 |
| QR | 582.300 | 1038.100 | 582.300 | 1039.000 | 582.300 | 1039.100 | 582.300 | 1040.000 | 582.300 | 1040.100 |
| QR | 582.300 | 1041.000 | 582.300 | 1041.100 | 582.300 | 1042.000 | 582.300 | 1042.100 | 571.790 | 1060.000 |
| QR | 572.290 | 1130.000 | 582.300 | 1151.900 | 582.300 | 1152.000 | 582.300 | 1153.000 | 582.300 | 1153.100 |
| QR | 582.300 | 1154.000 | 582.300 | 1154.100 | 582.300 | 1155.000 | 582.300 | 1155.100 | 582.300 | 1156.000 |
| QR | 582.300 | 1156.100 | 582.300 | 1157.000 | 582.300 | 1157.100 | 582.500 | 1166.000 | 582.500 | 1166.100 |
| QR | 582.500 | 1167.000 | 582.500 | 1167.100 | 582.700 | 1179.000 | 582.700 | 1179.100 | 582.700 | 1180.000 |
| QR | 582.700 | 1130.100 | 582.900 | 1192.000 | 582.900 | 1192.100 | 585.600 | 1292.000 | 590.500 | 2292.000 |

CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1146.000 | 0.000 | 0.000 | 0.000 | 25.000 | 25.000 | 25.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1147.000 | 8.000 | 1042.100 | 1151.900 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1013.000 | 592.000 | 1192.100 | 592.000 | 0.000 | 0.000 | 0.000 |
| QR | 587.300 | 0.000 | 582.300 | 10.000 | 582.300 | 1042.100 | 571.790 | 1060.000 | 572.290 | 1130.000 |
| QR | 582.300 | 1151.900 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1177.000 | 8.000 | 1035.000 | 1155.000 | 30.000 | 30.000 | 30.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 990.000 | 0.000 | 1155.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| QR | 587.300 | 0.000 | 581.300 | 10.000 | 581.300 | 1035.000 | 572.000 | 1060.000 | 572.740 | 1130.000 |
| QR | 581.300 | 1155.000 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
UPSTREAM OF THE RAILROAD BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1364.000 | 8.000 | 1027.000 | 1150.000 | 137.000 | 187.000 | 187.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 625.000 | 0.000 | 1175.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 0.000 | 582.000 | 10.000 | 582.000 | 1027.000 | 572.300 | 1060.000 | 572.800 | 1130.000 |
| GR | 582.300 | 1150.000 | 585.600 | 1292.000 | 590.500 | 2292.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.000 | 0.100 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 1526.000 | 8.000 | 1620.000 | 1740.000 | 113.000 | 162.000 | 162.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1200.000 | 582.000 | 1200.000 | 582.000 | 1620.000 | 572.170 | 1640.000 | 572.770 | 1720.000 |
| GR | 582.000 | 1740.000 | 585.600 | 1830.000 | 590.500 | 1880.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 1851.000 | 8.000 | 1600.000 | 1750.000 | 225.000 | 325.000 | 325.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1200.000 | 582.000 | 1200.000 | 582.000 | 1600.000 | 572.500 | 1620.000 | 573.000 | 1730.000 |
| GR | 582.000 | 1750.000 | 585.600 | 1930.000 | 590.500 | 1980.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| QT | 1.000 | 8520.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.080 | 0.080 | 0.030 | 0.100 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| X1 | 2500.000 | 8.000 | 1550.000 | 1780.000 | 450.000 | 649.000 | 649.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1200.000 | 582.000 | 1200.000 | 582.000 | 1550.000 | 573.140 | 1580.000 | 574.140 | 1760.000 |
| GR | 582.000 | 1780.000 | 585.600 | 1930.000 | 590.500 | 1980.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3515.000 | 12.000 | 1500.000 | 1360.000 | 1015.000 | 1015.000 | 1015.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 1365.000 | 0.000 | 1898.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 587.300 | 1100.000 | 582.100 | 1100.000 | 582.000 | 1200.000 | 582.000 | 1350.000 | 582.000 | 1500.000 |
| GR | 574.350 | 1520.000 | 575.350 | 1620.000 | 577.050 | 1790.000 | 577.050 | 1850.000 | 582.100 | 1860.000 |
| GR | 585.600 | 1910.000 | 590.300 | 1960.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NC | 0.000 | 0.000 | 0.000 | 0.500 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3870.000 | 77.000 | 1500.000 | 1955.000 | 355.000 | 355.000 | 355.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| GR | 584.300 | 50.000 | 583.900 | 800.000 | 583.600 | 950.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 579.600 | 1505.000 | 578.800 | 1510.000 | 576.900 | 1515.000 | 577.200 | 1520.000 | 577.000 | 1525.000 |
| GR | 576.300 | 1530.000 | 578.000 | 1535.000 | 576.600 | 1540.000 | 575.200 | 1545.000 | 576.200 | 1550.000 |
| GR | 574.500 | 1554.000 | 577.400 | 1560.000 | 575.500 | 1565.000 | 574.900 | 1570.000 | 578.700 | 1575.000 |
| GR | 578.900 | 1580.000 | 578.900 | 1585.000 | 578.800 | 1590.000 | 578.600 | 1595.000 | 577.900 | 1600.000 |
| GR | 577.600 | 1605.000 | 576.100 | 1610.000 | 576.300 | 1614.000 | 576.500 | 1620.000 | 577.200 | 1625.000 |
| GR | 579.100 | 1630.000 | 579.300 | 1635.000 | 579.300 | 1640.000 | 579.500 | 1645.000 | 579.100 | 1650.000 |
| GR | 579.300 | 1655.000 | 579.200 | 1660.000 | 579.400 | 1665.000 | 579.900 | 1670.000 | 578.100 | 1674.000 |
| GR | 578.700 | 1680.000 | 579.700 | 1685.000 | 579.800 | 1690.000 | 580.000 | 1695.000 | 580.000 | 1700.000 |
| GR | 579.900 | 1705.000 | 580.100 | 1710.000 | 579.600 | 1715.000 | 579.700 | 1720.000 | 579.900 | 1725.000 |
| GR | 579.900 | 1730.000 | 578.500 | 1734.000 | 579.200 | 1740.000 | 579.600 | 1745.000 | 579.900 | 1750.000 |
| GR | 580.400 | 1755.000 | 580.400 | 1760.000 | 580.500 | 1765.000 | 580.400 | 1770.000 | 580.600 | 1775.000 |
| GR | 580.500 | 1780.000 | 580.400 | 1785.000 | 579.400 | 1790.000 | 578.700 | 1794.000 | 579.500 | 1800.000 |
| GR | 579.300 | 1805.000 | 580.300 | 1810.000 | 580.400 | 1815.000 | 580.500 | 1820.000 | 579.400 | 1825.000 |
| GR | 578.700 | 1830.000 | 577.900 | 1835.000 | 577.800 | 1840.000 | 579.300 | 1845.000 | 579.100 | 1850.000 |
| GR | 583.400 | 1855.000 | 584.700 | 2005.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3871.000 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| X4 | 12.000 | 583.400 | 1500.100 | 590.400 | 1555.000 | 590.400 | 1559.000 | 590.500 | 1615.000 | 590.500 |
| X4 | 1619.000 | 590.600 | 1675.000 | 590.600 | 1679.000 | 590.700 | 1735.000 | 590.700 | 1739.000 | 590.800 |
| X4 | 1795.000 | 590.800 | 1799.000 | 583.400 | 1854.900 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BT | -19.000 | 50.000 | 588.100 | 0.000 | 200.000 | 588.000 | 0.000 | 950.000 | 590.000 | 0.000 |
| BT | 0.000 | 1350.000 | 593.200 | 0.000 | 1500.000 | 595.500 | 583.400 | 1500.100 | 595.500 | 590.400 |
| BT | 0.000 | 1555.000 | 595.900 | 590.400 | 1559.000 | 595.900 | 590.400 | 1615.000 | 595.900 | 590.500 |
| BT | 0.000 | 1619.000 | 595.900 | 590.500 | 1675.000 | 595.900 | 590.600 | 1679.000 | 595.900 | 590.600 |
| BT | 0.000 | 1735.000 | 595.900 | 590.700 | 1739.000 | 595.900 | 590.700 | 1795.000 | 595.900 | 590.800 |
| BT | 0.000 | 1799.000 | 595.900 | 590.800 | 1854.900 | 595.900 | 590.800 | 1855.000 | 595.900 | 583.400 |
| BT | 0.000 | 2005.000 | 595.300 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

UPSTREAM FACE OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3900.000 | 0.000 | 0.000 | 0.000 | 29.000 | 29.000 | 29.000 | 0.000 | 0.000 | 0.000 |
| X2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |

CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 3901.000 | 77.000 | 1500.000 | 1855.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| X3 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 595.500 | 595.900 | 0.000 |
| GR | 384.300 | 50.000 | 583.900 | 200.000 | 583.600 | 950.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 579.600 | 1505.000 | 578.800 | 1510.000 | 576.900 | 1515.000 | 577.200 | 1520.000 | 577.000 | 1525.000 |
| GR | 576.300 | 1530.000 | 578.000 | 1535.000 | 576.600 | 1540.000 | 575.200 | 1545.000 | 576.200 | 1550.000 |
| GR | 574.600 | 1554.000 | 577.400 | 1560.000 | 575.000 | 1565.000 | 574.900 | 1570.000 | 578.700 | 1575.000 |
| GR | 578.900 | 1580.000 | 578.900 | 1585.000 | 578.800 | 1590.000 | 578.600 | 1595.000 | 577.900 | 1600.000 |
| GR | 577.600 | 1605.000 | 576.100 | 1610.000 | 576.300 | 1614.000 | 576.500 | 1620.000 | 577.200 | 1625.000 |
| GR | 579.100 | 1630.000 | 579.300 | 1635.000 | 579.300 | 1640.000 | 579.500 | 1645.000 | 579.100 | 1650.000 |
| GR | 579.300 | 1655.000 | 579.200 | 1660.000 | 579.400 | 1665.000 | 579.900 | 1670.000 | 578.100 | 1674.000 |
| GR | 578.700 | 1680.000 | 579.700 | 1685.000 | 579.800 | 1690.000 | 580.000 | 1695.000 | 580.000 | 1700.000 |
| GR | 579.900 | 1705.000 | 580.100 | 1710.000 | 579.600 | 1715.000 | 579.700 | 1720.000 | 579.900 | 1725.000 |
| GR | 579.900 | 1730.000 | 578.500 | 1734.000 | 579.200 | 1740.000 | 579.600 | 1745.000 | 579.900 | 1750.000 |
| GR | 580.400 | 1755.000 | 580.400 | 1760.000 | 580.500 | 1765.000 | 580.400 | 1770.000 | 580.600 | 1775.000 |
| GR | 580.500 | 1780.000 | 580.400 | 1785.000 | 579.400 | 1790.000 | 578.700 | 1794.000 | 579.500 | 1800.000 |
| GR | 579.800 | 1805.000 | 580.300 | 1810.000 | 580.400 | 1815.000 | 580.500 | 1820.000 | 579.400 | 1825.000 |
| GR | 578.700 | 1830.000 | 577.900 | 1835.000 | 577.800 | 1840.000 | 579.300 | 1845.000 | 579.100 | 1850.000 |
| GR | 583.400 | 1855.000 | 584.100 | 2005.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
UPSTREAM OF HIGHWAY 55 BRIDGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 4321.000 | 13.000 | 1500.000 | 1860.000 | 420.000 | 420.000 | 420.000 | 0.000 | 0.000 | 0.000 |
| X3 | 0.000 | 0.000 | 0.000 | 946.000 | 0.000 | 2141.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GR | 387.300 | 50.000 | 584.300 | 50.000 | 583.500 | 945.000 | 583.400 | 1350.000 | 583.400 | 1500.000 |
| GR | 574.900 | 1520.000 | 575.620 | 1620.000 | 577.600 | 1790.000 | 577.600 | 1850.000 | 583.400 | 1860.000 |
| GR | 584.000 | 2000.000 | 585.600 | 2300.000 | 590.500 | 2940.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| EJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

```
  SECNO     DEPTH     CASEL     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

DCHV=   0.500 CEHV=   1.000
*SECND 0.000

3470 ENCROACHMENT STATIONS=    1348.0    2013.0  TYPE=     1  TARGET=     665.000
          CROSS SECTION AT MANISTEE LAKE
     0.00      9.26    579.80      0.00    579.80    579.84      0.04      0.00      0.00    579.04
    4640.       37.     4589.       15.       116.     2704.       66.        0.        0.    579.04
     0.00      0.32      1.70      0.22     0.035     0.030     0.035     0.000    570.54   1348.00
 0.000081        0.        0.        0.         0         0         0      0.00    665.00   2013.00


*SECND 900.000

3470 ENCROACHMENT STATIONS=    1350.0    1780.0  TYPE=     1  TARGET=     230.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          RAILROAD BRIDGE
   900.00      8.34    579.91      0.00      0.00    580.03      0.12      0.11      0.08    582.00
    4640.        0.     4640.        0.         0     1368.         0        47        9.  100000.00
     0.09      0.00      2.73      0.00     0.000     0.030     0.000     0.000    571.57   1556.01
 0.000216      800.      900.     1029.         2         0         0      0.00    219.99   1776.00

*SECND 1010.000
  1010.00      8.26    579.94      0.00      0.00    580.14      0.20      0.03      0.09    582.00
    4640        0.     4640        0.         0     1288.         0        51       10.    582.00
     0.10      0.00      3.60      0.00     0.000     0.030     0.000     0.000    571.69    622.00
 0.000375      110.      110.      110.         1         0         0      0.00    172.00    794.00

*SECND 1040.000
  1040.00      8.25    579.96      0.00      0.00    580.24      0.28      0.01      0.08    582.03
    4640.        0.     4640        0.         0     1093.        0.        52       10.    582.03
     0.10      0.00      4.25      0.00     0.000     0.030     0.000     0.000    571.71    558.71
 0.000522       30.       20.       30         0         0         0      0.00    146.15    704.86

*SECND 1070.000
  1070.00      8.23    579.97      0.00      0.00    580.36      0.39      0.02      0.11    582.06
    4640.        0     4640.        0.         0      927.        0.        52.       10.    582.06
     0.10      0.00      5.00      0.00     0.000     0.030     0.000     0.000    571.74    504.91
 0.000746       30.       30.       30.         0         0         0      0.00    124.20    629.11
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      QCH       AROB      VOL       TNA    LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 1100 000
 1100 00     8.23    580 00      0.00      0 00    580.54      0.54      0.03      0.15    582.09
   4640        0.     4640.        0         0      788.        0.       53.       10.     582.09
   0 10      0.00      5 89      0.00     0.000     0.030     0.000     0.000    571.77    459.18
 0 001055      30        30.       30.        0         0         0      0.00    105.55    564.73

ICHV=   0.500 CERV=   1.000
*SECNO 1120 000

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
 ELENCL=    592.00  ELENCR=    592 00
          CROSS SECTION JUST BELOW RAILROAD BRIDGE
 1120.00     8.24    580 03      0.00      0 00    580.75      0.72      0.03      0.18    582.30
   4640        0.     4640.        0.        0.      682.        0.       53.       10.     582.30
   0.10      0.00      6 81      0.00     0.000     0.030     0.000     0.000    571.79   1045.98
 0 001557     20.        20        20         0         0         0      0.00    100.92   1146 91

*SECNO 1121.000

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592 00 MAX ELLC=  590.50

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179.100
 ELENCL=    592.00  ELENCR=    592.00
          CROSS SECTION AT DOWNSTREAM FACE OF RAILROAD BRIDGE
 1121 00     8.24    580.03      0.00      0.00    580.75      0.72      0.00      0.00    582.30
   4640        0.     4640.        0.         0      682         0       53.       10.     582.30
   0.10      0.00      6.80      0.00     0.000     0 030     0.000     0.000    571.79   1045 97
 0 001551      1.         1.        1         0         0         0      0.00    100.96   1146.93

*SECNO 1145 000

3370 NORMAL BRIDGE,NRD= 50 MIN ELTRD=  592.00 MAX ELLC=  590.50

3470 ENCROACHMENT STATIONS=    1013.0    1192.1  TYPE=     1  TARGET=     179 100
 ELENCL=    592.00  ELENCR=    592.00
          CROSS SECTION AT UPSTREAM FACE OF RAILROAD BRIDGE
 1146 00     8 29    580 03      0.00      0 00    580.79      0.71      0.04      0.01    582.30
   4640.       0      4640        0.         0      687.        0        54.       10      582.30
   0 11      0.00      6.75      0.00     0 000     0 030     0.000     0 000    571 79   1045.89
 0.001519     25.        25       25.         1         0         0      0.00    101 15   1147.03
```

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  SECNO     DEPTH     CNSEL     CRTWS     USELK     EG        HV        HL        DLOSS    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 1147.000

3470 ENCROACHMENT STATIONS=     1013.0     1192.1  TYPE=      1  TARGET=      179.100
 ELENCL=     592.00  ELENCR=     592.00
          CROSS SECTION JUST UPSTREAM OF RAILROAD BRIDGE
  1147 00     8.30    580.09     0 00      0 00    580.79     0.71      0.00      0.00    582.30
    4640        0.     4640.       0.         0      683.       0.       54.       10.     582.30
     0 11     0.00      6 74     0.00     0.000     0 030    0.000     0.000    571.79   1045.87
 0 001512       1.        1.       1.         0         0        0      0.00    101.18   1147.06

SECNO 1177 000

3470 ENCROACHMENT STATIONS=      990.5     1155.0  TYPE=      1  TARGET=      165.000
  1177.00     8.23    580 23     0.00      0.00    580.87     0.64      0 04      0.03    581.30
    4640.        0     4640.       0.         0.      724.       0.       54.       10.  100000 00
     0 11     0 00      6 41     0 00     0.000     0.030    0.000     0.000    572.00   1037.86
 0.001471      30.        30      30.         2         0        0      0.00    114.03   1151.89

SECNO 1364.000

3470 ENCROACHMENT STATIONS=      625.0     1175.0  TYPE=      1  TARGET=      550.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF THE RAILROAD BRIDGE
  1364.00     8.24    580.54     0.00      0 00    581.15     0.61      0.27      0.01    582.00
    4640.        0.     4640       0.         0.      738.       0.       57.        11     582.30
     0 11     0 00      6 29     0.00     0.000     0.030    0.000     0.000    572.30   1031.97
 0.001389     137.       187.     187.         2         0        0      0.00    114.32   1146 29

CCHV=   0.100 CEHV=   0.300
SECNO 1526 000
  1526 00     8.68    580 85     0 00      0 00    581.35     0.50      0.19      0.01    582.00
    4640        0.     4640       0.         0.      818.       0.       60.       11.     582.00
     0.12     0.00      5 67     0.00     0.000     0 030    0.000     0.000    572.17   1622 33
 0 001002     113.       162      162         2         0        0      0.00    115.19   1737.52

SECNO 1651.000
  1651.00     8 83    581 33     0.00      0 00    581 60     0.28      0.23      0.02    582.00
    4640        0     4640.       0.         0     1102       0.       67.       12.     582.00
     0 14     0.00      4 21     0.00     0.000     0 030    0.000     0 000    572 50   1601.42
 0 000509     225.       325     325.         2         0        0      0.00    147 09   1748.50
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

CCHV=   0.100 CEHV=   0.300
*SECNO 2500.000
 2500.00     8.52    531.66      0.00      0.00    582.08      0.42      0.44      0.04    582.00
   8520.       0.     8520.        0.         0     1639.         0       88.       15.    582.00
    0.18     0.00      5.20      0.00     0.000     0.030     0.000     0.000    573.14   1551.14
 0.000805    450.       649      649.         2         0         0      0.00    228.01   1779.15

*SECNO 3515.000

3470 ENCROACHMENT STATIONS=    1365.0    1998.0  TYPE=     1  TARGET=     533.000
          CROSS SECTION AT FULL EXPANSION OF FLOW BELOW
          HIGHWAY 55 BRIDGE
 3515.00     8.16    582.51      0.00      0.00    582.73      0.21      0.62      0.02    582.00
   8520       13.     8502        0.       69.     2284.         1       134.        23    582.10
    0.25     0.26      3.72      0.14     0.080     0.030     0.080     0.000    574.35   1365.00
 0.000486   1015.      1015      1015         2         0         0      0.00    500.92   1865.92

CCHV=   0.500 CEHV=   1.000
*SECNO 3870.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST BELOW HIGHWAY 55 BRIDGE
 3870.00     8.34    582.84      0.00      0.00    583.38      0.54      0.32      0.33    583.40
   8520.       0.     8520.        0.         0.    1439.         0.       150.       27.    583.40
    0.27     0.00      5.92      0.00     0.000     0.030     0.000     0.000    574.50   1500.74
 0.002271    355.       355      355.         2         0         0      0.00    353.60   1854.35

SECNO 3871.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      595.50 ELREA=      595.90

          DOWNSTREAM FACE OF HIGHWAY 55 BRIDGE
 3871.00     8.34    582.84      0.00      0.00    583.51      0.67      0.00      0.13    583.40
   8520.       0.     8520        0.         0.    1297.         0.       150.       27.    583.40
    0.27     0.00      6.57      0.00     0.000     0.030     0.000     0.000    574.50   1500.82
 0.003455      1.         1         1         0         0         0      0.00    327.33   1354.26
```

```
 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 3900.000

3265 DIVIDED FLOW

3370 NORMAL BRIDGE,NRD= 19 MIN ELTRD=  588.00 MAX ELLC=  590.80

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          UPSTREAM FACE OF HIGHWAY 55 BRIDGE
  3900.00     8.52    533.02      0.00      0.00    583.63      0.61      0.09      0.03    583.40
   8520.        0.     8520.        0.        0.    1356.         0       151        27     583.40
    0.27      0.00      6.28      0.00     0.000     0.030     0.000     0.000    574.50   1500.59
 0.002999       29       29.       29.         2         0         0      0.00    327.91   1854.47

SECNO 2901.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE,ELLEA=      595.50 ELREA=      595.90

          CROSS SECTION JUST UPSTREAM OF HIGHWAY 55 BRIDGE
  3901.00     8.78    533.28      0.00      0.00    583.72      0.44      0.00      0.09    583.40
   8520.        0     8520.         0         0.    1597.         0       151.       27.     583.40
    0.27      0.00      5.34      0.00     0.000     0.030     0.000     0.000    574.50   1500.15
 0.001614        1.        1         1.         2         0         0      0.00    354.71   1854.86

SECNO 4321.000

3470 ENCROACHMENT STATIONS=      946.0     2141.0  TYPE=      1  TARGET=     1195.000
          CROSS SECTION AT BEGINNING OF CONTRACTION OF FLOW
          UPSTREAM OF HIGHWAY 55 BRIDGE
  4321.00     9.05    583.95      0.00      0.00    584.11      0.16      0.25      0.14    583.40
   8520.       59.     9457.        5.      283.     2628.       35.      173.       34.     583.40
    0.31      0.21      8.22      0.14     0.080     0.030     0.080     0.000    574.90    946.00
 0.000302     420.      420.      420.         2         0         0      0.00   1041.86   1987.86
```

THIS RUN EXECUTED 1 APR 87 8:51.06

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

0 YEAR FLOOD

SUMMARY PRINTOUT TABLE 150

| SECNO | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | IOK*S | VCH | AREA | QIK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.00 | 570.54 | 4640.00 | 579.80 | 0.00 | 579.84 | 0.81 | 1.70 | 2885.45 | 5160.00 |
| 900.000 | 900.00 | 0.00 | 0.00 | 571.57 | 4640.00 | 579.91 | 0.00 | 580.03 | 2.16 | 2.78 | 1668.34 | 3157.12 |
| 1010.000 | 110.00 | 0.00 | 0.00 | 571.68 | 4640.00 | 579.94 | 0.00 | 580.14 | 3.75 | 3.60 | 1287.85 | 2396.57 |
| 1040.000 | 30.00 | 0.00 | 0.00 | 571.71 | 4640.00 | 579.96 | 0.00 | 580.24 | 5.28 | 4.25 | 1092.63 | 2019.11 |
| 1070.000 | 30.00 | 0.00 | 0.00 | 571.74 | 4640.00 | 579.97 | 0.00 | 580.36 | 7.46 | 5.00 | 927.24 | 1699.00 |
| 1100.000 | 30.00 | 0.00 | 0.00 | 571.77 | 4640.00 | 580.00 | 0.00 | 580.54 | 10.55 | 5.89 | 787.54 | 1428.69 |
| 1120.000 | 20.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.57 | 6.81 | 681.54 | 1175.92 |
| 1121.000 | 1.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.03 | 0.00 | 580.75 | 15.51 | 6.80 | 682.42 | 1178.15 |
| 1146.000 | 25.00 | 592.00 | 590.50 | 571.79 | 4640.00 | 580.08 | 0.00 | 580.79 | 15.19 | 6.75 | 687.30 | 1190.63 |
| 1147.000 | 1.00 | 0.00 | 0.00 | 571.79 | 4640.00 | 580.09 | 0.00 | 580.79 | 15.12 | 6.74 | 688.30 | 1193.17 |
| 1177.000 | 30.00 | 0.00 | 0.00 | 572.00 | 4640.00 | 580.23 | 0.00 | 580.87 | 14.71 | 6.41 | 723.76 | 1209.80 |
| 1364.000 | 187.00 | 0.00 | 0.00 | 572.30 | 4640.00 | 580.54 | 0.00 | 581.15 | 13.89 | 6.29 | 737.59 | 1245.14 |
| 1526.000 | 162.00 | 0.00 | 0.00 | 572.17 | 4640.00 | 580.85 | 0.00 | 581.35 | 10.02 | 5.67 | 818.28 | 1465.90 |
| 1851.000 | 325.00 | 0.00 | 0.00 | 572.50 | 4640.00 | 581.33 | 0.00 | 581.60 | 5.09 | 4.21 | 1102.45 | 2056.53 |
| 2500.000 | 649.00 | 0.00 | 0.00 | 573.14 | 8520.00 | 581.66 | 0.00 | 582.08 | 8.05 | 5.20 | 1639.49 | 3002.24 |
| *3515.000 | 1015.00 | 0.00 | 0.00 | 574.35 | 8520.00 | 582.51 | 0.00 | 582.73 | 4.86 | 3.72 | 2354.48 | 3866.61 |
| 3870.000 | 355.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.38 | 22.71 | 5.92 | 1439.03 | 1787.67 |

| SECND | XLCH | ELTRD | ELLC | ELMIN | Q | CWSEL | CRIWS | EG | 10K*S | VCH | AREA | .01K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3871.000 | 1.00 | 588.00 | 590.80 | 574.50 | 8520.00 | 582.84 | 0.00 | 583.51 | 34.55 | 6.57 | 1296.72 | 1449.42 |
| 3900.000 | 29.00 | 589.00 | 590.80 | 574.50 | 8520.00 | 583.02 | 0.00 | 583.63 | 29.99 | 6.28 | 1356.45 | 1555.90 |
| 3901.000 | 1.00 | 0.00 | 0.00 | 574.50 | 8520.00 | 583.28 | 0.00 | 583.72 | 16.14 | 5.34 | 1596.86 | 2120.73 |
| 4321.000 | 420.00 | 0.00 | 0.00 | 574.90 | 8520.00 | 583.95 | 0.00 | 584.11 | 3.02 | 3.22 | 2946.01 | 4904.24 |

10 YEAR FLOOD

SUMMARY PRINTOUT TABLE 55

| SECNO | Q | CWSEL | DIFWSP | DIFWSX | DIFKWS | TOPWID | XLCH |
|---|---|---|---|---|---|---|---|
| 0.000 | 4640.00 | 579.80 | 0.00 | 0.00 | 0.00 | 665.00 | 0.00 |
| 900.000 | 4640.00 | 579.91 | 0.00 | 0.11 | 0.00 | 219.99 | 900.00 |
| 1010.000 | 4640.00 | 579.94 | 0.00 | 0.03 | 0.00 | 172.00 | 110.00 |
| 1040.000 | 4640.00 | 579.96 | 0.00 | 0.01 | 0.00 | 146.15 | 30.00 |
| 1070.000 | 4640.00 | 579.97 | 0.00 | 0.02 | 0.00 | 124.20 | 30.00 |
| 1100.000 | 4640.00 | 580.00 | 0.00 | 0.03 | 0.00 | 105.55 | 30.00 |
| 1120.000 | 4640.00 | 580.03 | 0.00 | 0.03 | 0.00 | 100.92 | 20.00 |
| 1121.000 | 4640.00 | 580.03 | 0.00 | 0.00 | 0.00 | 100.96 | 1.00 |
| 1146.000 | 4640.00 | 580.08 | 0.00 | 0.05 | 0.00 | 101.15 | 25.00 |
| 1147.000 | 4640.00 | 580.09 | 0.00 | 0.00 | 0.00 | 101.18 | 1.00 |
| 1177.000 | 4640.00 | 580.23 | 0.00 | 0.15 | 0.00 | 114.03 | 30.00 |
| 1364.000 | 4640.00 | 580.54 | 0.00 | 0.30 | 0.00 | 114.32 | 187.00 |
| 1526.000 | 4640.00 | 580.85 | 0.00 | 0.32 | 0.00 | 115.19 | 162.00 |
| 1851.000 | 4640.00 | 581.33 | 0.00 | 0.47 | 0.00 | 147.09 | 325.00 |
| 2500.000 | 8520.00 | 581.66 | 0.00 | 0.34 | 0.00 | 228.01 | 649.00 |
| 3515.000 | 8520.00 | 582.51 | 0.00 | 0.85 | 0.00 | 500.92 | 1015.00 |
| 3870.000 | 8520.00 | 582.84 | 0.00 | 0.32 | 0.00 | 353.60 | 355.00 |
| 3871.000 | 8520.00 | 582.84 | 0.00 | 0.00 | 0.00 | 327.33 | 1.00 |
| 3900.000 | 8520.00 | 583.02 | 0.00 | 0.18 | 0.00 | 327.91 | 29.00 |
| 3901.000 | 8520.00 | 583.28 | 0.00 | 0.26 | 0.00 | 354.71 | 1.00 |
| 4321.000 | 8520.00 | 583.95 | 0.00 | 0.67 | 0.00 | 1041.86 | 420.00 |

00BREAK00

1) COUNTY: Manistee

2) STUDY NAME: Manistee Twp.

3) WATERCOURSE: Manistee River Bar Lake Outlet

4) DOCUMENT TYPE: Analysis

00BREAK00

DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027

IN REPLY REFER TO

April 7, 1987

Great Lakes Hydraulics and Hydrology Branch

Mr. Dan Morgan, P.E.
Department Liaison
Land and Water Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Dear Mr. Morgan:

Submitted for your review and approval is a copy of the revised hydraulic calculations for the Manistee Township, Michigan Limited Detail Flood Insurance Study. Enclosed are the HEC-2 100-year runs for the Manistee River, including a run made for the additional channel which exists in the left overbank, and a brief write up dealing with the revisions made in response to your concerns as outlined in your January 21, 1987 correspondence.

From the hydraulic analyses performed on the channel which exists in the left overbank of the Manistee River, it was determined that this channel will carry approximately 45 percent of the 100-year flow. Therefore, as you suspected, the resulting flood-stages are significantly lower than those determined previously for the Manistee River. In addition, the floodway will be drawn to include the channel and bridge opening in the left overbank.

Since FEMA has requested the submittal of this report as soon as possible, a response from your office within two weeks would be appreciated. If you have any questions regarding the enclosed data, please contact Mr. Jeff Weiser at (313) 226-4886.

Sincerely,

P. M. O'Dell, P.E.
Chief, Engineering Division

Enclosures

CF: Norb Schwartz, Region V, FEMA

RECEIVED
APR 08 1987
NATURAL RESOURCES
LAND & WATER MGMT.

MANISTEE TOWNSHIP, MICHIGAN
LIMITED DETAIL FLOOD INSURANCE STUDY
REVISED HYDRAULIC COMPUTATION BACKGROUND INFORMATION

The Manistee River splits into two channels 2500 feet upstream of Manistee Lake which enter the lake at separate locations. In the Corps' initial submittal, just the Manistee River main channel was modeled without consideration of the flow carrying capacity of the secondary channel. In this submittal the secondary channel was analyzed from Manistee Lake to the confluence with the main channel for a range of flows up to 50 percent of the 100-year flow. The main channel was also rerun for an appropriate range of flows. An equal energy grade line was determined at the confluence of the two channels which resulted in a flow in each channel totaling up to the 100-year discharge of 8520 cfs. This analysis resulted in a flow of 4640 cfs for the Manistee River from Manistee Lake to cross section 2500., and a flow of 8520 cfs from that point to the study limits.

The revised Manistee River HEC-2 run resulted in flood stages significantly lower than those originally obtained, to the point that all but the farthest upstream cross section flood stage are below the Lake Michigan elevation of 583.8. Therefore, the flood stages will be equal to the Lake Michigan 100-year elevation for the majority of the Manistee River.

SEP 18 1986

Received
Hydrology
Nov 17, 1986
Leap

call Bruce H
when Reviewed

Planning Division - SS

Mr. Lawrence N. Witte, Chief
Engineering - Water Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

RECEIVED
SEP 25 1986
ENGINEERING-WATER
MANAGEMENT

Dear Mr. Witte:

Submitted for your review and approval is a copy of the hydrology developed for the Township of Manistee, Michigan Limited Detail Flood Insurance Study. Enclosed is a write up dealing with the analysis. Other items that will assist the review process are included.

If you have any questions regarding the enclosed data, please contact Mr. Joe Wanielista at (313) 226-6773.

Sincerely,

Original Signed

C. Argiroff, P.E.
Chief, Planning Division

Enclosures

CF: NCEED-L
NCEPD-SS

11-24-86
requested soils info.
described difference
in RO vol. Barlow
Manistee. ok
AHB

The original report and letter were sent previously under separate cover without enclosures. This copy accompanies the enclosures for your convenience.

Township of Manistee, Michigan
Flood Insurance Study
Hydrologic Analysis

The Flood Insurance Study for the Township of Manistee, Michigan is a limited detail study. The Lake Michigan coastline, Bar Lake, Bar Lake outlet, and the Manistee River from Manistee Lake to 1.2 miles upstream are included. Figure 1 shows the study area.

The 100-year frequency elevation, 583.8 ft. NGVD, will be used to determine flooding along the coastline. This value is for Reach B of Lake Michigan taken from the report on Great Lakes Open-Coast Flood Levels (Reference 1).

used 1952 to 1980 not 1981 why not from 1985 or 1986?

The hydrologic analysis of the Manistee River was taken from the City of Manistee Flood Insurance Study (Reference 2). The analysis was based on peak annual flows obtained from a U.S. Geological Survey gage located on the Manistee River approximately six miles ~~upstream~~ from Manistee Lake. The period of record was from 1952 to 1981. A flood flow frequency analysis was performed using Weibull plotting positions and the log Pearson III distribution (HECWRC program, Reference 3). A copy of the output from the flood flow frequency analysis is presented as Enclosure 1. The flows were then adjusted from the gage site to the edge of Manistee Lake by the drainage area ratio method with a coefficient of 0.8. The 100-year frequency flood flow at the gage site and at Manistee Lake's edge are shown in Table 1. The adjusted flow at Manistee Lake will be used as the flow for the Manistee River in this study.

we use .947 for the region

Table 1.
Manistee River
100-Year Frequency Flows

| Location | Drainage Area (sq. mi.) | Flow (cfs) |
|---|---|---|
| gage | 1780 approx | 8370 |
| Manistee Lake's edge | 1822 1819? | 8520 |

Suggest 8630 cfs

1985 book shows DA at Lake Mich 2000 sq miles (US 31)

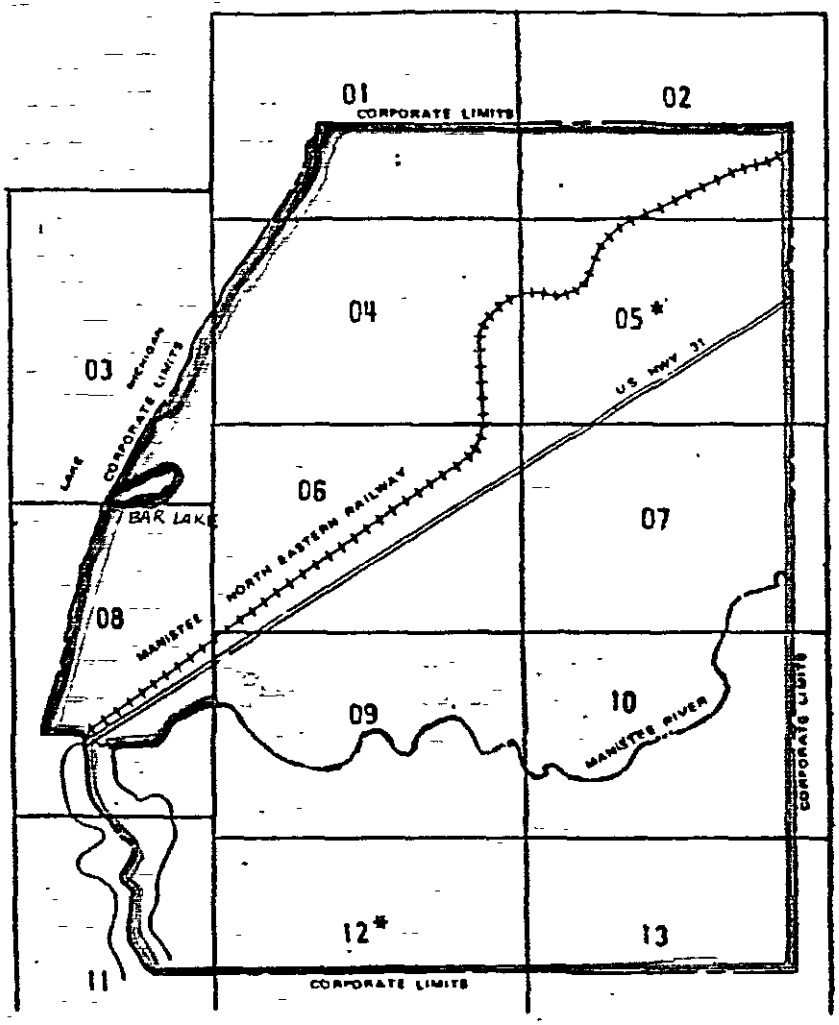
The hydrologic analysis for Bar Lake and its outlet was done with the HEC-1 Flood Hydrograph Package (Reference 4). An inflow hydrograph, a storage-elevation relationship, and a discharge-elevation relationship were developed to model the routing of a 10-day duration, 100-year frequency rainfall through Bar Lake and its outlet.

cont file less NC = 5.3 sq miles

5.42 .14 NC 5.28 P

The SCS method was used to model the excess rainfall runoff. The drainage area of 5.42 square miles was delineated on the provisional Onekama and Parkdale 7.5 minute quadrangles from the U.S. Geological Survey. An SCS curve number of 60 was determined by a weighted average based on soil types in the drainage basin. The soil types and their relative percentages were taken from a

& Moore, Bar Lake Swamp has two outlets




CORPORATE LIMITS

LIMITED DETAIL STUDY

FIGURE 1.

where are they?

soil type map provided by the National Forest Service. A time of concentration, $t_c$, of 3.72 hours was calculated using the provisional quadrangles referenced above and the following equation:

$t_c$ = 6.9 hr

not 3.72 hr.

$$t_c = \frac{\text{length, ft.}}{V \times 3600}$$

where the velocity, V in feet/sec., is a function of slope, S in percent, and flow type. The velocity was calculated using the following equations:

$V = 2.1\ S^{0.5}$ (small tributaries and swamps with channels)

$V = 1.2\ S^{0.5}$ (waterways and swamps without channels)

$V = 0.48\ S^{0.5}$ (sheet flow).

Tp =

The storage-elevation relationship was developed by planimetering the surface area of Bar Lake at elevations of 582.4 ft. (177.5 m.), 585.7 ft. (178.5 m.), and 590.6 ft. (180 m.). The map used was the 7.5 minute provisional Parkdale Quadrangle. The conic method provided by the HEC-1 model was used to compute the reservoir volume from the surface area versus elevation data.

The elevation-discharge relationship at Bar Lake outlet was developed through the use of the HEC-2 Water Surface Profiles program (Reference 5). The starting water surface elevation of Lake Michigan was the period of record average water surface elevation of 580.1 ft. NGVD (Reference 6). Manning's "n" values were .02 to .035 for the channel and .07 for the overbanks. Backwater profiles were run for various flows up to 100 cfs. The elevations 100 yards upstream of State Highway 110 bridge were plotted versus the discharges to develop the elevation-discharge curve. Enclosure 2 is the HEC-2 program output.

The results of the HEC-1 routing are shown in Table 2. The HEC-1 output is included in Enclosure 3. Since the 100-year frequency Bar Lake stage is higher than Lake Michigan's 100-year frequency stage, 583.8 ft. NGVD, routings were not required to determine if Lake Michigan's levels control the Bar Lake level.

Table 2.
HEC-1 Results for Bar Lake
100-Year Frequency

| Peak Inflow | Peak Outflow | Peak Stage |
|---|---|---|
| 1002 cfs | 50 cfs | 584.6 ft. NGVD |

Table 3. summarizes the proposed 100-year frequency flows and stages to be used for this study.

Table 3.
Summary of Proposed Flows and Stages

| Location | Flow (cfs) | Stage (ft. NGVD) |
|---|---|---|
| Lake Michigan Coastline | | 583.8 |
| Bar Lake | | 584.6 |
| Bar Lake Outlet | 50 | |
| Manistee River | 8520 | |

## References

(1) U.S. Army Corps of Engineers, Report on Great Lakes Open-Coast Flood Levels, February 1977.

(2) Federal Emergency Management Agency, Flood Insurance Study, City of Manistee, Michigan, 1985.

(3) U.S. Army Corps of Engineers, Flood Flow Frequency Analysis, Generalized Computer Program 723-X6-L7550, June 1976.

(4) U.S. Amy Corps of Engineers, Flood Hydrograph Package, Computer Program 723-6-L2010, July 1982.

(5) U.S. Army Corps of Engineers, Water Surface Profiles, Computer Program 723-X6-L202A, May 1984.

(6) U.S. Army Corps of Engineers, Detroit District, Monthly Bulletin of Lake Levels for the Great Lakes, July 1986.

DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027

IN REPLY REFER TO

January 13, 1987

NCEED-L

Mr. Lawrence N. Witte, Chief
Engineering - Water Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Dear Mr. Witte:

Submitted for your review and approval is a copy of the hydraulic calculations for the Manistee Township, Michigan Limited Detail Flood Insurance Study. Enclosed are the HEC-2 100-year unencroached and encroached runs, a map showing the location of cross sections along with the corresponding section numbers in the computer run, copies of the bridge sketches in the field notes, and a brief write up dealing with items that will assist the review process.

According to FEMA guidelines, the information supplied to aid in the review process is not intended for flood plain management purposes or distribution to other individuals at this time. Before using or distributing this information, approval should be obtained from FEMA.

Since FEMA has requested the submittal of this report as soon as possible, a response from your office within two weeks would be appreciated. If you have any questions regarding the enclosed data, please contact Mr. Bruce Holbrook at (313) 226-6772.

Sincerely,

for P. M. O'Dell, P.E.
Chief, Engineering Division

Enclosures

MANISTEE TOWNSHIP, MICHIGAN
LIMITED DETAIL FLOOD INSURANCE STUDY
HYDRAULIC COMPUTATION BACKGROUND INFORMATION

Two streams were studied, the Manistee River and Bar Lake Outlet. The Manistee River was studied from Manistee Lake, the downstream corporate limit, to 420 feet upstream of the M-55 Highway Bridge. Bar Lake Outlet was studied from Lake Michigan to Bar Lake.

During the hydrologic analysis of Bar Lake stages, it was necessary to develop an outlet rating curve. To accomplish this, a backwater run was made on Bar Lake Outlet and submitted with the hydrologic analysis. That run was approved with the hydrology and will not be resubmitted at this time. No encroached run was made due to the minimal topwidths obtained downstream of Bar Lake.

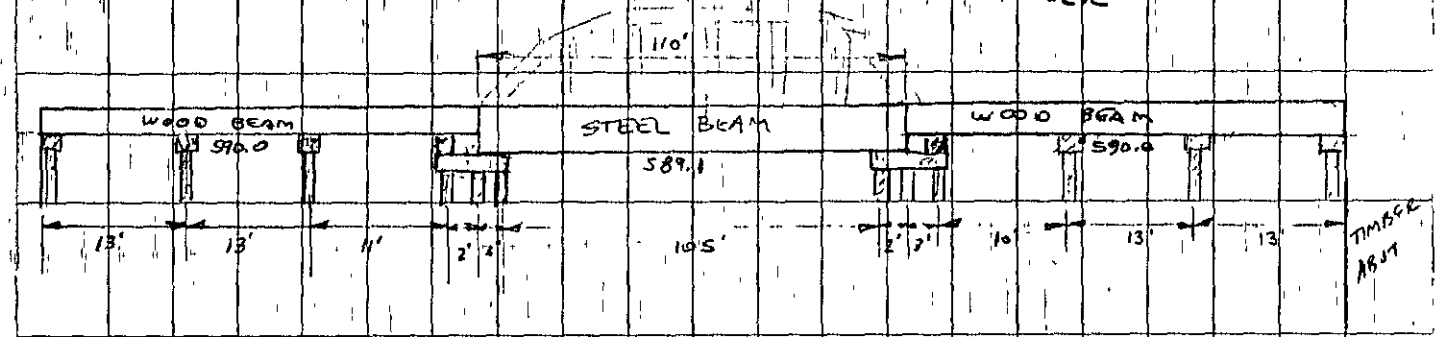
Manning's "n" values were obtained for the study during a site visit.

The starting water surface elevation on the Manistee River was taken from values determined during the City of Manistee FIS. During that study, one of the conditions investigated was a normal stage on Lake Michigan with 100-year discharge on the Manistee River, including routing through Manistee Lake. The stage obtained on Manistee Lake is the value being used in this study.

MANISTEE, MICH. 10/20/86 11:45 AM

W/S 581.73

RR BRIDGE D/S OF M-55 HWY ON MAIN BRANCH OF MANISTEE RIVER




BRIDGE IS SINGLE TRACK

U/S STEEL BEAM 589.1

U/S WOOD TIMBER 590.0

HEC-2 Cross Section # 1121.0

MANISTEE RIVER

1

P 19

MANISTEE MICH. FIS

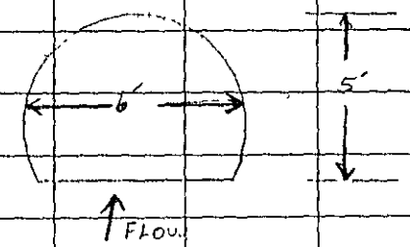
DATA FOR C.M.P. UNDER LAKESHORE DRIVE (M-110) AT BAR LAKE.

℄ ROAD ELEVATIONS AT CMP @ BAR LAKE

2

P-19

CMP AT BAR LAKE OUTLET TO LAKE MICHIGAN




(BOTTOM OF PIPE IS FLAT)

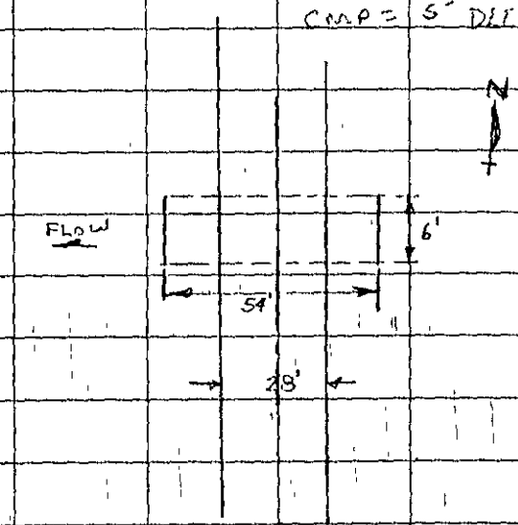
NO SKEW

ROAD = 28' WIDE

CMP = 54' LONG

CMP = 6' WIDE

CMP = 5' DEEP

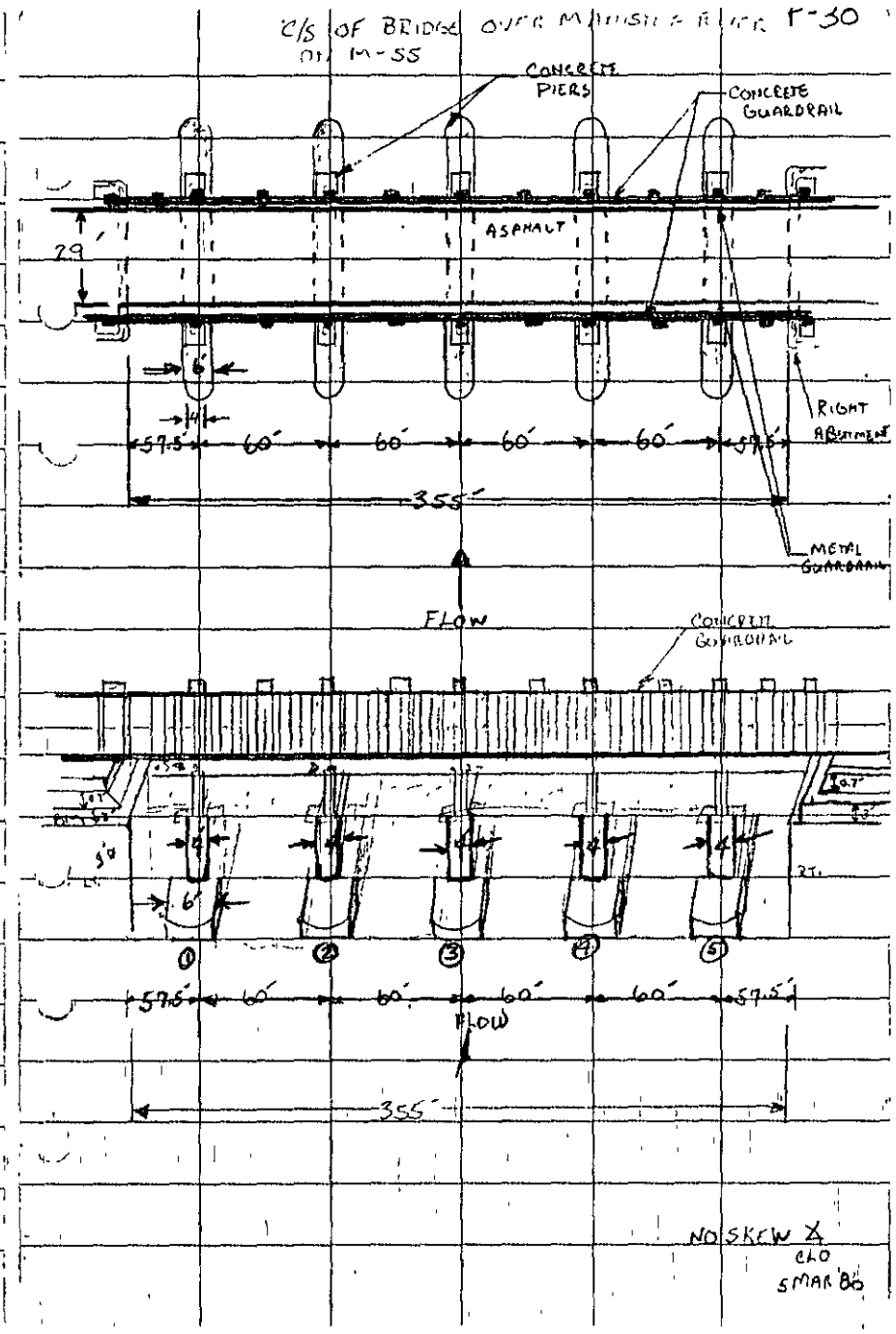



HEC-2 Cross Section

| | | |
|---|---|---|
| X1 | 121.0 | (D/S FACE) |
| X1 | 175.0 | (U/S FACE) |

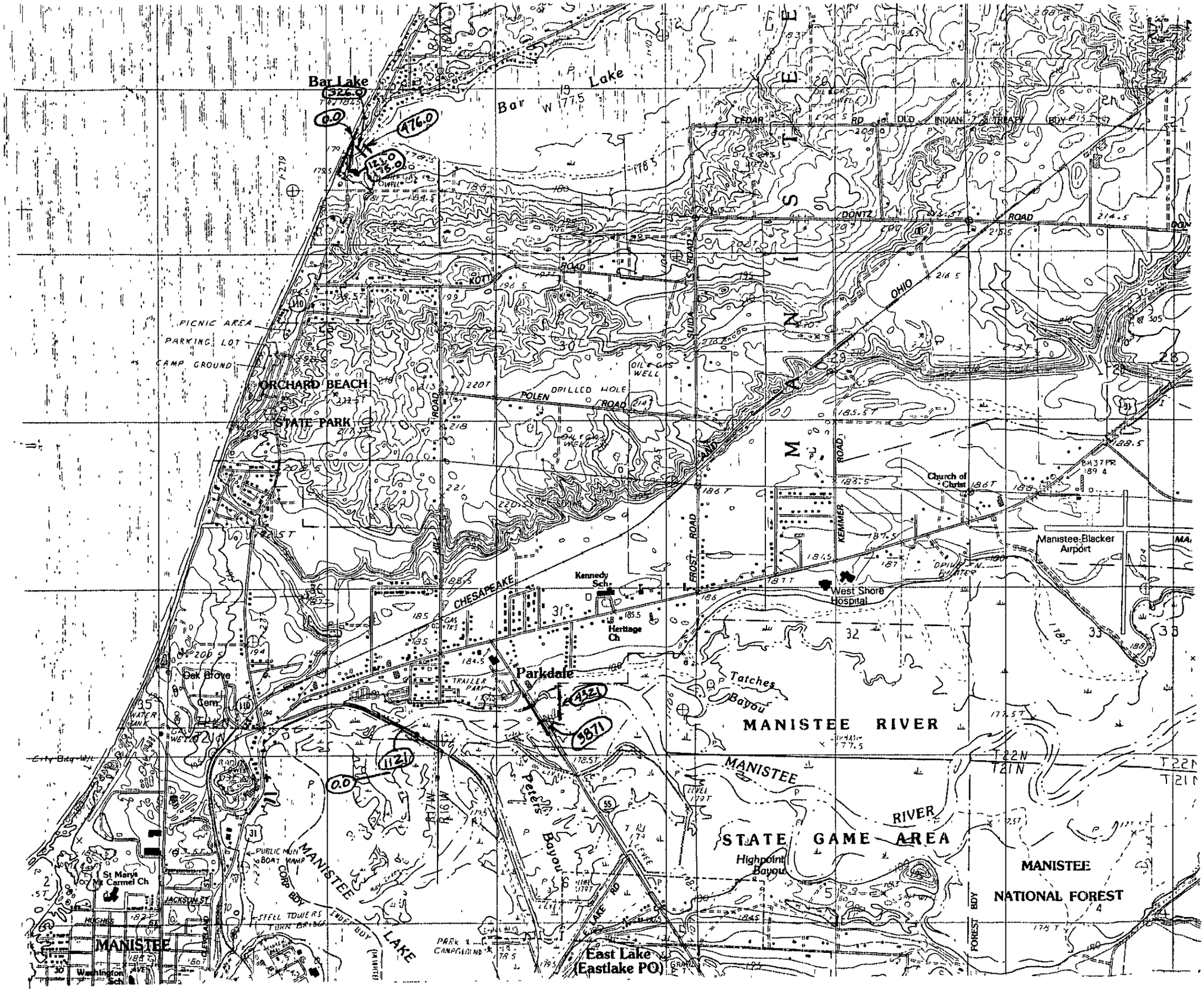
BAR LAKE OUTLET

Bridge c/s MANISTEE mich
over MANISTEE River M-55




HEC-2 CROSS SECTION XI 3871.0

MANISTEE RIVER


Bar Lake
Bar Lake
326.0
0.0
476.0
12.0
178.0
CEDAR RD
OLD INDIAN TREATY BDY
DONTZ ROAD
KOTTS ROAD
SLIDA ROAD
OHIO
PICNIC AREA
PARKING LOT
CAMP GROUND
ORCHARD BEACH
STATE PARK
OIL & GAS WELL
DRILLED HOLE
POLEN ROAD
FROST ROAD
KEMMER ROAD
Church of Christ
Manistee-Blacker Airport
West Shore Hospital
Kennedy Sch
Heritage Ch
CHESAPEAKE
Parkdale
TRAILER PARK
Oak Grove Cem
Tatches Bayou
MANISTEE RIVER
MANISTEE RIVER
STATE GAME AREA
Highpoint Bayou
MANISTEE NATIONAL FOREST
Peters Bayou
MANISTEE LAKE
PUBLIC MUN BOAT RAMP
CORP BDY
STEEL TOWERS
TURN BRIDGE
PARK & CAMPGROUND
East Lake (Eastlake PO)
St Marys Mt Carmel Ch
JACKSON ST
HUGHES
MANISTEE
Washington Sch
T 22 N
T 21 N
R 19 W
R 17 W
31
32
33
35
36
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