00BREAK00

1) COUNTY: Arenac

2) STUDY NAME: ~~City of~~ Au Gres City / Twp

3) WATERCOURSE: Au Gres River

4) DOCUMENT TYPE: 100-YEAR NATURAL

00BREAK00

Twp 2

City of Au Gres, MI - FIS
100-year flood
Au Gres River - Encroached run
Input: AUGRE.EN Output: AG7

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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
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USACOE DETROIT HBOO VOS 5.1.1 PRINTER 6

EE LEE 16 APR 87 15:24:34

TERMINAL.113

THIS RUN EXECUTED 16 APR 87 15:16:02

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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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C
T1   CITY OF AU GRES, MI  - FIS
T2   100-YEAR FLOOD
T3   AU GRES RIVER

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0        2        0.        0.   0.000000     0.00      0 0       0.    579.500    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

QT     2.000  2000.000  2000.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
NC     0.030     0.030     0.030     0.100     0.300     0.000     0 000     0.000     0.000     0.000
ET     0 000     0.000     1.400     0 000     0.000     0 000     0.000     0 000     0.000     0.000
          VALLEY SECTION LOCATED AT LIGHT AT THE END OF THE EAST BREAKWATER.
          ALL CROSS-SECTIONS IN THIS RUN WERE DERIVED FROM CORPS OF ENGINEERS
          1976 SOUNDINGS AND EXTENDED USING 2-FT  CONTOUR MAPS (1976).
          ALL ELEVATIONS CONVERTED FROM IGLD TO NGVD BY ADDING 1.2 FEET
X1     0.000    18 000     0.000   290.000     0.000     0.000     0.000     0 000     1.200     0 000
GR   588.800     0.000   580.000    40.000   575 100    90.000   573.800   100.000   569.900   110.000
GR   570 000   120 000   570.000   130.000   570 100   140.000   570 100   150.000   570.100   160.000
GR   570.100   170 000   570.100   180.000   571.000   190 000   574 300   200.000   576.500   210 000
GR   578.300   220.000   580.000   275.000   581.700   290.000     0.000     0 000     0.000     0.000

X1   500.000    20.000    15.000   285.000   500 000   500 000   500.000     0.000     1.200     0.000
GR   587.900     0.000   584.000    15.000   582.000    20.000   580.000    25.000   578.600    30.000
GR   573.300   100.000   575.300   110 000   573 300   120.000   570 600   130.000   570.100   140.000
GR   570.100   150.000   569.800   160.000   569.800   170.000   570.000   180.000   570 000   190.000
GR   569.900   200.000   570.200   210.000   575.500   220.000   578.600   280.000   580.000   285.000

X1  1000 000    20.000    20.000   280.000   500.000   500.000   500.000     0.000     1.200     0.000
GR   587.100     0.000   584.000    20 000   582.000    25.000   580.000    30.000   578.600    35.000
GR   575.300    95 000   575.300   105 000   573.300   115.000   570.600   125.000   570.100   135.000
GR   570 100   145.000   569.800   155.000   569.000   165.000   570 000   175.000   570.000   185.000
GR   569.900   195.000   570.200   205.000   575.500   215.000   578.600   275 000   580 000   280.000
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X1   1500.000    18.000     0.000   290.000   500.000   500.000   500.000     0.000     1.200     0.000
GR    586.500     0.000   580.000    25.000   576.300    80.000   573.000    90.000   570.600   100.000
GR    570.300   110.000   570.200   120.000   570.000   130.000   570.000   140.000   569.900   150.000
GR    569.900   160.000   570.000   170.000   570.400   180.000   574.200   190.000   574.500   200.000
GR    575.400   210.000   580.000   280.000   581.700   290.000     0.000     0.000     0.000     0.000

X1   2000.000    20.000    20.000   290.000   500.000   500.000   500.000     0.000     1.200     0.000
GR    585.800     0.000   584.000    20.000   582.000    25.000   580.000    30.000   578.600    35.000
GR    577.500   100.000   576.100   110.000   574.000   120.000   570.000   130.000   570.100   140.000
GR    570.300   150.000   570.300   160.000   570.400   170.000   570.700   180.000   570.900   190.000
GR    571.200   200.000   573.200   210.000   575.300   220.000   578.600   285.000   580.000   290.000

X1   2500.000    21.000    40.000   330.000   500.000   500.000   500.000     0.000     1.200     0.000
GR    585.700     0.000   584.000    40.000   582.000    45.000   580.000    50.000   578.600    60.000
GR    576.800   125.000   571.100   135.000   571.200   145.000   570.500   155.000   570.300   165.000
GR    570.200   175.000   570.100   185.000   570.100   195.000   570.200   205.000   570.300   215.000
GR    571.700   225.000   574.500   235.000   575.400   245.000   578.600   305.000   580.000   315.000
GR    581.600   330.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

X1   3000.000    19.000     0.000   290.000   500.000   500.000   500.000     0.000     1.200     0.000
GR    585.600     0.000   580.000    20.000   576.100    80.000   575.900    90.000   574.900   100.000
GR    569.800   110.000   569.300   120.000   569.300   130.000   569.300   140.000   569.800   150.000
GR    569.700   160.000   570.200   170.000   570.800   180.000   572.000   190.000   576.800   200.000
GR    577.300   210.000   578.700   220.000   580.000   280.000   581.700   290.000     0.000     0.000

X1   3500.000    25.000    40.000   320.000   500.000   500.000   500.000     0.000     1.200     0.000
GR    585.900     0.000   584.000    40.000   582.000    45.000   580.000    50.000   578.600    60.000
GR    578.100   100.000   575.500   110.000   575.200   120.000   575.000   130.000   573.000   140.000
GR    570.500   150.000   570.300   160.000   570.400   170.000   570.500   180.000   570.800   190.000
GR    570.800   200.000   570.600   210.000   570.800   220.000   570.000   230.000   572.900   240.000
GR    574.400   250.000   577.000   260.000   578.400   300.000   578.600   310.000   581.400   320.000

X1   4000.000    21.000    40.000   290.000   500.000   500.000   500.000     0.000     1.200     0.000
GR    585.700     0.000   584.000     5.000   582.000    15.000   580.000    40.000   578.600    55.000
GR    578.400    95.000   573.800   105.000   574.800   115.000   570.800   125.000   570.000   135.000
GR    569.600   145.000   569.800   155.000   570.100   165.000   570.300   175.000   570.500   185.000
GR    570.800   195.000   571.100   205.000   574.700   215.000   575.600   225.000   578.000   260.000
GR    580.000   290.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

QT      2.000  3820.000  3820.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
NH      6.000     0.040    60.000     0.030   260.000     0.040   320.000     0.045  1615.000     0.040
NH   1640.000     0.030  1701.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
ET      0.000     4.100     4.100     0.000   320.000     0.000     0.000     0.000     0.000     0.000
          VALLEY SECTIONS 10 TO 3 HAVE BEEN CONVERTED
          FROM IGLD DATUM TO NGVD DATUM BY ADDING 1.2 FT   THE REMAINING
          CROSS SECTIONS ARE REFERENCED TO NGVD
          COMBINATION OF SECTION 4500 IN AU GRES RIVER, OVERFLOW WEIR IN RIGHT
          OVERBANK OF AU GRES RIVER, AND IN UNNAMED SMALL CHANNEL
X1   4500.000    40.000    60.000   320.000   500.000   500.000   500.000     0.000     1.200     0.000
X5      2.000   580.300   580.400     0.000     0.000     0.000     0.000     0.000     0.000     0.000
GR    584.000     0.000   584.000    60.000   580.000    80.000   576.700   130.000   576.200   140.000
GR    571.000   150.000   573.200   160.000   571.900   170.000   570.800   180.000   570.400   190.000
GR    570.400   200.000   570.200   210.000   570.200   220.000   570.200   230.000   572.200   240.000
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GR    576.500    250.000    578.100    260.000    578.700    320 000    582.000    320.000    581.800    420.000
GR    580 000    535.000    579.000    620.000    578 700    795.000    578.700    970.000    578.700   1145.000
GR    579.000   1220.000    579.600   1260.000    580 200   1365.000    580.200   1465 000    580.300   1573.000
GR    582.000   1615.000    581.900   1615.000    580.800   1640.000    576.100   1650 000    573.800   1660.000
GR    573.500   1670.000    573.300   1680.000    573 300   1690.000    573.300   1700.000    583.000   1701 000

NC      0.040      0.040      0.035      0.000      0 000      0 000      0.000      0.000      0.000      0 000
ET      0.000      4.100      1.400    384.000    582.000      0.000      0.000      0.000      0.000      0.000
          VALLEY SECTION NO. 9 IN AU GRES RIVER - CHANNEL POINTS WERE TAKEN
          FROM CORPS OF ENGINEERS SOUNDINGS - POINTS ABOVE THE EXISTING WATER
          SURFACE WERE FIELD MEASURED - CROSS SECTION A
X1   5560.000     48.000    384.000    582.000   1060.000    800.000   1060.000      0.000      1.200      0.000
GR    585.800      0 000    585.300     17.000    579.200     39.000    579.800    100.000    580.000    200.000
GR    581.400    250.000    581.700    300.000    581.900    384.000    578.000    384.000    577 200    420.000
GR    574.800    430.000    572.600    440.000    572 300    450.000    572.000    460.000    571 700    470.000
GR    570.800    480.000    570.200    490.000    570 400    500.000    570.800    510.000    570 800    520.000
GR    571 700    530.000    571.100    540.000    578.000    569.000    582.300    582 000    582.400    600.000
GR    584.000    700.000    581 700    800.000    582.300    900.000    582 300    900.000    582.200   1000.000
GR    582.200   1000 000    582.600   1100.000    581 900   1200.000    582.100   1300.000    582 000   1400.000
GR    581 700   1500.000    581.900   1600.000    582.000   1700.000    581.800   1800.000    582.000   1900.000
GR    581.900   2000.000    581.000   2100.000    582 000   2200 000    581 800   2300.000    581.900   2400.000
GR    581.700   2500.000    581.600   2600.000    582.200   2690.000      0 000      0.000      0.000      0.000

ET      0.000      4.100      0.000    220.000    400.000      0.000      0.000      0.000      0.000      0.000
          VALLEY SECTION 8 - CROSS SECTION B
X1   6820.000     36.000    220.000    400.000   1260.000   1260.000   1260.000      0.000      1.200      0.000
GR    583.200      0.000    581.000    100.000    582.200    200 000    582.000    220 000    576.800    220 000
GR    576 100    240.000    574.700    250.000    573.300    260 000    572.300    270.000    570.100    280.000
GR    570.000    290 000    569.800    300.000    569.400    310 000    569.700    320.000    570.400    330 000
GR    570.500    340 000    570.600    350.000    571.400    360.000    574 600    370.000    575.500    380.000
GR    578 000    390 000    582 100    400.000    584.400    500.000    585.300    600.000    585 000    700.000
GR    580.000    800 000    580.000    900.000    580 700   1000.000    580.700   1100.000    580 600   1200.000
GR    580 600   1300.000    580.700   1400.000    580.000   1500.000    580.800   1600.000    580.700   1700.000
GR    580.800   1800.000      0.000      0.000      0 000      0.000      0 000      0.000      0.000      0.000

ET      0.000      4.100      0.000   1000.000   1160.000      0.000      0.000      0 000      0 000      0.000
          VALLEY SECTION 7 - CROSS SECTION C
X1   7780.000     46.000   1000.000   1160.000    940.000    990.000    960 000      0.000      1.200      0.000
GR    582 700      0.000    581.000    100.000    580.900    200.000    581.400    300.000    581.000    400.000
GR    581.100    580.000    580.400    600 000    581.800    700.000    581 500    800.000    581.800    827 000
GR    581.300    900 000    581.400   1000.000    577 400   1001.000    576.900   1010.000    575.100   1020.000
GR    572.700   1030.000    570.700   1040.000    570 200   1050.000    570.100   1060.000    569.800   1070.000
GR    569.400   1080.000    569.500   1090.000    570 200   1100 000    570.100   1110.000    570.100   1120.000
GR    570.500   1130.000    575.700   1140.000    576.200   1150.000    581.000   1160 000    583.200   1200.000
GR    585.000   1300.000    583.000   1400.000    581 200   1500.000    580.900   1600.000    584 000   1800 000
GR    585.000   1900 000    580.900   2000.000    580.700   2100.000    581.300   2200.000    580.700   2300.000
GR    580.400   2400.000    580.400   2500 000    580.400   2600.000    580.400   2700.000    584.600   2757.000
GR    584.900   2763.000      0.000      0.000      0.000      0.000      0 000      0.000      0.000      0.000
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ET      0.000      4.100      0.000    813.000    970.000      0.000      0.000      0.000      0.000      0.000
          VALLEY SECTION 6 - CROSS SECTION D
X1   8640.000     43.000    813.000    970.000    860.000    860.000    860.000      0.000      1.200      0.000
GR    582.700      0.000    581.900     93.000    581.700    193.000    581.900    293.000    581.000    400.000
GR    581.300    493.000    580.900    593.000    583.300    612.000    582.200    693.000    581.700    793.800
GR    581.500    813.000    576.900    814.000    577.400    823.000    575.900    833.000    569.300    843.000
GR    573.900    853.000    570.500    863.000    569.000    873.000    569.500    883.000    569.300    893.000
GR    569.500    903.000    569.300    913.000    569.300    923.000    569.200    933.000    569.200    943.000
GR    573.000    953.000    578.100    963.000    581.100    970.000    580.000    993.000    581.500   1093.000
GR    581.100   1193.000    580.000   1293.000    580.200   1393.000    580.300   1493.000    579.700   1593.000
GR    579.600   1693.000    579.600   1793.000    579.600   1893.000    579.900   1993.000    580.000   2093.000
GR    580.800   2183.000    583.700   2186.000    583.500   2193.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      0.000   1167.000   1321.000      0.000      0.000      0.000      0.000      0.000
          VALLEY SECTION 5 - CROSS SECTION E
X1   9230.000     41.000   1167.000   1321.000    520.000    675.000    590.000      0.000      1.200      0.000
GR    582.500      0.000    582.600     91.000    582.500    191.000    582.500    291.000    582.600    391.000
GR    582.700    491.000    582.600    591.000    582.600    691.000    582.500    791.000    582.600    891.000
GR    582.600    991.000    582.300   1091.000    582.300   1167.000    577.200   1168.000    576.400   1171.000
GR    576.400   1181.000    572.400   1191.000    569.600   1201.000    569.600   1211.000    569.400   1221.000
GR    569.000   1231.000    569.400   1241.000    570.100   1251.000    570.000   1261.000    570.200   1271.000
GR    570.500   1281.000    571.000   1291.000    574.500   1301.000    576.800   1311.000    581.700   1321.000
GR    582.300   1391.000    582.700   1491.000    582.100   1591.000    582.100   1691.000    582.300   1791.000
GR    582.000   1891.000    582.600   1991.000    582.300   2001.000    582.400   2191.000    582.500   2391.000
GR    583.500   2591.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      0.000    856.000   1000.000      0.000      0.000      0.000      0.000      0.000
          VALLEY SECTION 4  CROSS SECTION F
X1  10430.000     46.000    856.000   1000.000   1260.000   1120.000   1200.000      0.000      1.200      0.000
GR    585.200      0.000    585.000    110.000    583.500    210.000    584.000    310.000    584.000    410.000
GR    583.500    510.000    583.000    610.000    582.000    650.000    581.500    710.000    581.400    810.000
GR    581.800    856.000    576.300    857.000    576.100    860.000    576.600    870.000    573.100    880.000
GR    571.100    890.000    570.400    900.000    569.500    910.000    570.700    920.000    569.400    930.000
GR    569.200    940.000    569.300    950.000    569.500    960.000    570.300    970.000    573.000    980.000
GR    575.400    990.000    576.000    995.000    582.000   1000.000    582.500   1030.000    583.000   1110.000
GR    583.200   1210.000    583.000   1310.000    583.200   1410.000    583.200   1510.000    583.400   1610.000
GR    583.400   1710.000    583.200   1810.000    583.000   1910.000    582.700   2010.000    585.000   2110.000
GR    583.300   2210.000    583.500   2310.000    583.500   2410.000    583.900   2510.000    585.000   2610.000
GR    585.200   2650.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

ET      0.000      4.100      0.000    546.000    687.000      0.000      0.000      0.000      0.000      0.000
          VALLEY SECTION 3 - CROSS SECTION G
X1  11940.000     28.000    546.000    687.000   1410.000   1610.000   1510.000      0.000      1.200      0.000
GR    586.100      0.000    584.000    100.000    583.700    200.000    583.000    300.000    582.000    400.000
GR    583.300    500.000    582.700    546.000    576.400    549.000    575.500    560.000    571.500    565.000
GR    570.800    570.000    570.000    580.000    569.500    590.000    569.500    613.000    571.500    630.000
GR    572.000    639.000    572.800    646.000    574.200    650.000    575.500    660.000    575.800    665.000
GR    576.000    670.000    576.200    680.000    576.400    685.000    582.200    687.000    582.400    700.000
GR    581.600    800.000    582.700    900.000    584.600    991.000      0.000      0.000      0.000      0.000
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MICHIGAN AVENUE (#1) - CROSS SECTION H

X1	12400.000	71.000	240.000	380.000	510.000	410.000	460.000	0.000	0.000	0.000
GR	587.600	0 000	587.200	10 000	586.900	20.000	586.800	30.000	586.800	40.000
GR	586 800	50.000	586.700	60.000	586.600	70 000	586.600	100.000	586.700	110.000
GR	586 600	120.000	586.900	130 000	587.000	140.000	587 400	150.000	587.900	160.000
GR	588.400	170.000	588.800	180.000	589.200	190.000	589.500	200.000	589.900	210.000
GR	590.200	220 000	590.500	230.000	590.600	240.000	590.300	250.000	589.000	256.000
GR	579.700	257.000	579.100	260.000	577.900	265.000	576.600	270.000	574.800	275.000
GR	572.800	280.000	571.800	285.000	571.400	290.000	571.500	295 000	571.400	300.000
GR	571 400	305.000	571.700	310.000	572.600	315 000	573.000	320.000	572.900	325 000
GR	572.500	330.000	572.600	335.000	572.800	340 000	573.000	345.000	573.600	350.000
GR	575.300	355.000	578.200	360.000	579.000	366.000	588.400	370 000	590.100	380 000
GR	589.900	390.000	589.700	400.000	589 500	410.000	589.100	420.000	588.700	430.000
GR	588 200	440 000	588.100	450.000	588.000	460.000	587 800	470.000	587 600	480.000
GR	587 300	490.000	587 100	500.000	586.900	510.000	586.800	520.000	586.600	530.000
GR	586.600	540.000	586.500	550.000	586.300	560.000	586.200	570.000	586.200	610.000
GR	586.400	620 000	0.000	0.000	0 000	0.000	0.000	0.000	0.000	0.000

CROSS SECTION 1

X1	13180.000	75.000	270.000	390.000	780 000	780.000	780.000	0 000	0.000	0.000
GR	586.800	0.000	586.900	10.000	586.700	20.000	586.600	30.000	586.800	40.000
GR	586.700	50.000	587.200	60 000	587.300	70.000	587.500	80.000	587.600	90.000
GR	587.700	100.000	588.100	110.000	588.000	120.000	587.800	130.000	587.800	140.000
GR	587.700	150.000	587.800	160 000	588 100	170.000	587.500	180.000	585.600	200.000
GR	585 400	210.000	585.100	220 000	584.800	230 000	584.900	240.000	584.800	250.000
GR	584.800	260.000	583.300	270.000	581.700	275.000	579.700	280.000	579.200	285.000
GR	578.100	290.000	577.600	295.000	576.200	300.000	575 400	305.000	574.300	310.000
GR	573 400	315 000	572.600	320.000	572.000	325 000	571 600	330.000	571.500	335.000
GR	571 400	340 000	571 500	345.000	571.400	350.000	571.500	355.000	571.700	360.000
GR	571.900	365.000	573.800	370 000	575.300	375 000	576.900	380.000	581.700	385.000
GR	584.000	390.000	586 800	400.000	586.800	410.000	587.000	420.000	587.200	430.000
GR	587.600	440 000	587.700	450.000	587.800	460.000	587.600	470 000	587.800	480.000
GR	588.000	490.000	588.000	500 000	587.900	510.000	587 900	540.000	588.000	550.000
GR	588 000	560 000	588.100	570.000	588.200	580.000	588.200	600.000	588.100	610.000
GR	587 400	620 000	587.400	630 000	588 000	640 000	587.900	650.000	587.800	651.000

NC	0.000	0.000	0 000	0.300	0.500	0.000	0 000	0 000	0 000	0.000

CROSS SECTION DOWNSTREAM OF RT 23 BRIDGE

X1	13975.000	17.000	149.900	265.000	795.000	795.000	795.000	0.000	0.000	0.000
X3	0.000	0.000	0.000	149.900	0.000	265 000	0.000	0.000	0.000	0.000
GR	591.600	0.000	592.000	130 000	582.700	149.900	578.200	150 000	576.700	165.000
GR	576.500	180.000	576.200	204.900	576 200	205.000	576.200	209.000	576.200	209.100
GR	575.300	225.000	575.700	240.000	576.600	250.000	577.700	264.900	582.700	265.000
GR	592.500	285.000	592.100	415 000	0.000	0.000	0.000	0.000	0.000	0.000

NC	0 040	0.040	0 030	0.000	0 000	0.000	0 000	0.000	0.000	0.000

DOWNSTREAM FACE OF RT 23 BRIDGE

X1	13976 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	149.900	0.000	265.000	0.000	0.000	0.000	0.000
BT	-12.000	0.000	591.600	0.000	130.000	592.000	0.000	149.900	592.600	582.700
BT	0.000	150.000	592.600	588.700	204 900	592 600	588.600	205 000	592.600	576.200
BT	0.000	209.000	592.600	576.200	209.100	592 600	588 600	264.900	592.500	588 400
BT	0.000	265 000	592.500	582.700	285.000	592.500	0.000	415.000	592.100	0.000

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          UPSTREAM FACE OF RT 23 BRIDGE
X1   14016.000      0.000      0.000      0.000     40.000     40.000     40.000      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    149.900      0.000    265.000      0.000      0.000      0.000      0.000

NC       0.040      0.040      0.035      0.000      0.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION UPSTREAM OF RT 23 BRIDGE
X1   14017.000      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    149.900      0.000    265.000      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 AT BRIDGE MOVED UPSTREAM
X1   14077.000      0.000      0.000      0.000     60.000     60.000     60.000      0.000      0.030      0.000

          CROSS SECTION AT BRIDGE MOVED UPSTREAM
X1   15000.000      0.000      0.000      0.000    923.000    923.000    923.000      0.000      0.720      0.000

NH       4.000      0.040    220.000      0.070    250.000      0.035    348.000      0.070   1000.000      0.000
ET       0.000      4.100      6.100    126.000      0.000      0.000    380.000      0.000      0.000      0.000
          CROSS SECTION J MOVED DOWNSTREAM
X1   16000.000     73.000    250.000    348.000   1000.000   1000.000   1000.000      0.000     -0.780      0.000
GR     587.600      0.000    587.700     10.000    587.700     40.000    587.600     50.000    587.600     60.000
GR     587.600     70.000    587.400     80.000    587.300     90.000    587.500     99.000    584.700    106.000
GR     587.700    111.000    588.200    114.000    588.500    126.000    588.300    136.000    587.700    140.000
GR     587.100    150.000    587.200    160.000    587.100    170.000    586.600    180.000    586.600    190.000
GR     586.500    200.000    586.500    210.000    586.500    220.000    586.600    230.000    586.400    240.000
GR     586.300    250.000    583.300    260.000    582.000    262.000    581.000    265.000    578.400    270.000
GR     578.300    275.000    578.100    280.000    578.300    285.000    578.500    290.000    578.200    295.000
GR     577.900    300.000    577.700    305.000    577.700    310.000    577.800    315.000    577.700    320.000
GR     577.900    325.000    578.100    330.000    578.000    335.000    577.800    340.000    581.000    345.000
GR     582.000    348.000    582.700    350.000    584.200    360.000    585.000    370.000    584.800    380.000
GR     585.600    390.000    585.700    400.000    585.600    410.000    585.600    420.000    585.500    430.000
GR     585.500    440.000    585.400    450.000    585.400    460.000    585.300    470.000    585.200    480.000
GR     585.300    490.000    585.200    500.000    585.300    510.000    585.200    520.000    584.800    530.000
GR     584.800    540.000    584.700    550.000    584.800    560.000    585.100    570.000    585.200    580.000
GR     585.200    590.000    585.300    600.000    588.000   1000.000      0.000      0.000      0.000      0.000

NH       4.000      0.040    220.000      0.070    250.000      0.035    348.000      0.070   1000.000      0.000
ET       0.000      4.100      1.400    126.000      0.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION J
X1   17050.000     73.000    250.000    348.000   1050.000   1050.000   1050.000      0.000      0.000      0.000
GR     587.600      0.000    587.700     10.000    587.700     40.000    587.600     50.000    587.600     60.000
GR     587.600     70.000    587.400     80.000    587.300     90.000    587.500     99.000    584.700    106.000
GR     587.700    111.000    588.200    114.000    588.500    126.000    588.300    136.000    587.700    140.000
GR     587.100    150.000    587.200    160.000    587.100    170.000    586.600    180.000    586.600    190.000
GR     586.500    200.000    586.500    210.000    586.500    220.000    586.600    230.000    586.400    240.000
GR     586.300    250.000    583.300    260.000    582.000    262.000    581.000    265.000    578.400    270.000
GR     578.300    275.000    578.100    280.000    578.300    285.000    578.500    290.000    578.200    295.000
GR     577.900    300.000    577.700    305.000    577.700    310.000    577.800    315.000    577.700    320.000
GR     577.900    325.000    578.100    330.000    578.000    335.000    577.800    340.000    581.000    345.000
GR     582.000    348.000    582.700    350.000    584.200    360.000    585.000    370.000    584.800    380.000
GR     585.600    390.000    585.700    400.000    585.600    410.000    585.600    420.000    585.500    430.000
GR     585.500    440.000    585.400    450.000    585.400    460.000    585.300    470.000    585.200    480.000
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GR    585.300    490.000    585.200    500.000    585.300    510.000    585.200    520.000    584.800    530.000
GR    584.800    540.000    584.700    550.000    584.800    560.000    585.100    570.000    585.200    580.000
GR    585 200    590.000    585.300    600.000    588.000   1000 000      0.000      0.000      0.000      0.000

NH      4 000      0 040   1220.000      0.070   1250.000      0.035   1348.000      0.070   2580.000      0.000
          CROSS SECTION J MOVED UPSTREAM
X1  18565.000     74.000   1250.000   1348.000   1515 000   1515.000   1515.000      0.000      0.090      0.000
GR    589.000      0.000    587.700   1010.000    587.700   1040.000    587.600   1050.000    587.600   1060.000
GR    587.600   1070.000    587.400   1080.000    587 300   1090.000    587.500   1099.000    584.700   1106 000
GR    587 700   1111.000    588.200   1114.000    588 500   1126.000    588.300   1136.000    587.700   1140.000
GR    587.100   1150 000    587.200   1160.000    587.100   1170.000    586.600   1180.000    586.600   1190.000
GR    586 500   1200.000    586.500   1210.000    586.500   1220.000    586 600   1230.000    586 400   1240.000
GR    586.300   1250.000    583.300   1260.000    582.000   1262.000    581 000   1265.000    578.400   1270.000
GR    578.300   1275.000    578.100   1280.000    578.300   1285.000    578 500   1290.000    578.200   1295.000
GR    577.900   1300.000    577.700   1305.000    577.700   1310.000    577 800   1315.000    577.700   1320.000
GR    577 900   1325.000    578.100   1330 000    578.000   1335.000    577 800   1340.000    581.000   1345.000
GR    582.000   1348.000    582.700   1350.000    584.200   1360.000    585 000   1370.000    584.800   1380.000
GR    585.600   1390.000    585 700   1400.000    585.600   1410 000    585.600   1420 000    585.500   1430.000
GR    585 500   1440.000    585.400   1450 000    585.400   1460.000    585.300   1470.000    585 200   1480.000
GR    585.300   1490.000    585.200   1500.000    585.300   1510.000    585.200   1520.000    584 800   1530.000
GR    584.800   1540.000    584.700   1550.000    584.800   1560.000    585 100   1570.000    585.200   1580.000
GR    585.200   1590.000    585.300   1600.000    588.000   2000.000    590.000   2580.000      0.000      0 000

NH      4 000      0 040   1720.000      0.070   1750.000      0.035   1848.000      0.070   2500 000      0.000
          CROSS SECTION J MOVED UPSTREAM
X1  20080 000     73.000   1750.000   1848.000   1515 000   1515.000   1515.000      0.000      0.190      0.000
GR    589.000      0.000    587.700   1510.000    587.700   1540.000    587.600   1550.000    587.600   1560.000
GR    587.600   1570.000    587.400   1580.000    587.300   1590 000    587.500   1599.000    584 700   1606.000
GR    587.700   1611 000    588.200   1614.000    588.500   1626 000    588.300   1636.000    587.700   1640.000
GR    587.100   1650 000    587.200   1660.000    587.100   1670.000    586.600   1680.000    586.600   1690.000
GR    586 500   1700.000    586.500   1710 000    586.500   1720.000    586.600   1730.000    586.400   1740.000
GR    586.300   1750.000    583.300   1760 000    582.000   1762.000    581.000   1765 000    578 400   1770.000
GR    578 300   1775.000    578.100   1780.000    578.300   1785.000    578 500   1790 000    578.200   1795 000
GR    577.900   1800.000    577.700   1805.000    577.700   1810.000    577.800   1815.000    577.700   1820.000
GR    577.900   1825.000    578 100   1830.000    578 000   1835.000    577.800   1840.000    581.000   1845.000
GR    582.000   1848 000    582.700   1850.000    584.200   1860.000    585.000   1870.000    584.800   1880.000
GR    585 600   1890.000    585.700   1900.000    585.600   1910.000    585.600   1920.000    585.500   1930.000
GR    585.500   1940.000    585.400   1950.000    585.400   1960.000    585.300   1970.000    585.200   1980.000
GR    585.300   1990.000    585.200   2000.000    585.300   2010.000    585.200   2020.000    584.800   2030.000
GR    584.800   2040.000    584 700   2050 000    584.800   2060.000    585.100   2070.000    585.200   2080.000
GR    585.200   2090.000    585.300   2100.000    590 000   2500.000      0.000      0.000      0.000      0.000

NH      6.000      0.035    230 000      0.070    264.000      0.035    325.000      0.070   1579.000      0 035
NH   1721.000      0.070   2987 000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION #7
x1  21940.000     63.000    264.000    325.000   1400 000    720.000   1860.000      0 000      0 000      0 000
GR    589.600      0.000    589.100     10.000    589.200     20.000    589.100     30 000    589.000     40.000
GR    589.100     50.000    588 900     60.000    588.900     70.000    588.900     80.000    588.900     90.000
GR    588.700    100.000    588.600    110.000    588.300    120 000    588.400    130.000    588.300    140 000
GR    588.300    150.000    588.200    160.000    588.000    170.000    588.000    180.000    587 800    190.000
GR    587.800    200 000    587.800    205.000    587.900    210.000    587.700    220 000    587 100    230.000
GR    588.600    240.000    584.400    250.000    583.000    260.000    582.800    264.000    579.400    270.000
GR    579.500    275.000    578.800    280 000    578.700    285.000    578.300    290 000    578.100    295.000
GR    578 000    300.000    578.200    305.000    578.400    310.000    578 800    315.000    579.200    320.000
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GR     582.800     325.000     584.400     350.000     585.000     360.000     586.000     370.000     585.800     380.000
GR     586 200     390.000     585.500     400.000     584.900     410.000     586 300     420.000     586.300     430.000
GR     586.300     440.000     586.400     450.000     585.000     600.000     585.000     700.000     586.300    1543.000
GR     588.800    1563.000     588.800    1579.000     581 900    1600.000     581.900    1700.000     588.800    1721.000
GR     588.800    1737.000     586.300    1757.000     590.000    2987 000       0.000       0.000       0 000       0.000

NH       6.000       0.035    1700.000       0.070    1755.000       0.035    1840.000       0.070    3425.000       0.035
NH    3575.000       0.070    4700.000       0.000       0 000       0 000       0 000       0.000       0.000       0.000
            CROSS SECTION #8
X1   24850 000      63.000    1755.000    1840.000    2700.000    1000.000    2910.000       0.000       0.000       0.000
GR     590 800       0.000     587 600    1510.000     587.700    1520.000     587.700    1530.000     587 600    1540.000
GR     587 700    1550 000     587.700    1560.000     587.600    1570.000     587 800    1580.000     588 100    1590.000
GR     588.100    1600.000     588.300    1610.000     588 500    1620.000     588.500    1630.000     589.500    1640.000
GR     584 700    1650.000     588 400    1660.000     589.000    1670.000     588.800    1680.000     588.300    1685.000
GR     588.100    1690.000     588 100    1700.000     587.300    1710 000     586.000    1720.000     584.800    1730.000
GR     583.800    1740.000     583 400    1750 000     583.000    1755 000     581.600    1760.000     581.000    1765.000
GR     580.600    1770.000     580.600    1775.000     580 600    1780.000     580.700    1785.000     580.600    1790.000
GR     580.600    1795.000     580.700    1800.000     580.800    1805.000     580.800    1820.000     580.700    1825.000
GR     580.600    1830.000     582.400    1835.000     584.000    1840.000     587.800    1850.000     588.000    1860.000
GR     588.100    1870.000     588.000    1880.000     587.900    1890.000     587.700    1900.000     587.700    1910.000
GR     587.500    1920.000     587.700    1930.000     587.200    1940.000     587.200    1950.000     588.300    3389.000
GR     590.800    3409 000     590.800    3425 000     582.400    3450.000     582.400    3550.000     590.800    3575.000
GR     590.800    3591.000     588.300    3611.000     592.000    4700.000       0.000       0.000       0.000       0.000

NC       0.035       0.035       0.035       0.000       0 000       0.000       0.000       0.000       0.000       0.000
ET       0.000       4.100       0.000     805.000    3180.000       0.000       0.000       0.000       0.000       0.000
            #8 CHANNEL CROSS SECTION MOVED UPSTREAM
X1   26560 000      47.000    1950.000    2035.000     800.000     330.000    1710.000       0.000      -0.510       0.000
GR     590.000       0.000     587.600    1705.000     587.700    1715.000     587.700    1725.000     587.600    1735.000
GR     587.700    1745 000     587.700    1755.000     587.600    1765.000     587.800    1775.000     588.100    1785.000
GR     588.100    1795.000     588.300    1805.000     588.500    1815.000     588.500    1825.000     589.500    1835.000
GR     584.700    1845 000     588.400    1855.000     589.000    1865 000     588 800    1875.000     588.300    1885.000
GR     588.100    1885.000     588.100    1895.000     587.300    1905.000     586.000    1915.000     584.800    1925.000
GR     583.800    1935.000     583.400    1945.000     583.000    1950.000     581.600    1955.000     581.000    1960.000
GR     580.600    1965 000     580.600    1970.000     580.600    1975.000     580.700    1980.000     580.600    1985.000
GR     580 600    1990.000     580 700    1995.000     580.800    2000.000     580.800    2015.000     580.700    2020 000
GR     580.600    2025.000     582.400    2030.000     584 000    2035.000     587.800    2045.000     588.000    2055.000
GR     588.100    2065.000     590.000    3435.000       0 000       0.000       0.000       0.000       0.000       0.000

ET       0.000       4.100       0.000     155.000       0.000       0 000       0.000       0.000       0.000       0.000
            #9 CHANNEL CROSS SECTION MOVED DOWNSTREAM
X1   28410.000      37.000    1690.000    1758.000    1400 000    1850.000    1850 000       0.000       0.240       0.000
GR     590.000       0.000     588.700    1160.000     588 700    1170.000     589.700    1190.000     588.600    1200.000
GR     588.500    1225 000     588.700    1250.000     588.400    1275 000     588 500    1300.000     588.700    1325.000
GR     588.500    1350 000     588.500    1550 000     587.800    1575.000     588.700    1600.000     588.100    1625.000
GR     587 500    1650.000     587.400    1660.000     587.500    1670 000     587 300    1680.000     587.000    1690.000
GR     584.700    1700.000     583.100    1705 000     583 400    1710.000     582.500    1715.000     580.500    1720.000
GR     579.800    1725 000     579.300    1730.000     579.500    1735 000     579.700    1740 000     580 100    1745.000
GR     581.100    1750.000     582.800    1755 000     588.100    1758 000     588.100    1760 000     587.700    1770.000
GR     588.700    1780 000     590.600    2560.000       0.000       0.000       0.000       0.000       0.000       0.000
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ET      0.000      4.100      0.000   1550.000   2995.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION #9
X1  29200.000     82 000   2240.000   2308.000    580.000    710.000    790.000      0.000      0.000      0.000
GR    590.000      0.000    588.300   1430.000    588 100   1440.000    588.500   1450 000    588.300   1460.000
GR    588.700   1470.000    588.500   1480.000    589.300   1490.000    588.400   1500.000    588 300   1510.000
GR    588.500   1520.000    591.600   1530.000    593.400   1540.000    592.600   1550.000    589.100   1560.000
GR    588 800   1570.000    587.400   1580.000    586.700   1582.000    585.700   1585.000    583.900   1590.000
GR    583.800   1595.000    583.800   1600 000    583.800   1605.000    584 000   1610.000    584.100   1615.000
GR    584.100   1620.000    584.100   1625 000    584.100   1630.000    584.800   1635.000    585.900   1640.000
GR    586.700   1642 000    588.100   1645 000    588.300   1650.000    590 000   1660.000    594.200   1670.000
GR    594.400   1675.000    593.200   1680.000    590.300   1690.000    589.100   1700.000    588.700   1710.000
GR    588.700   1720.000    588.700   1740.000    588.600   1750 000    588.500   1775.000    588.700   1800.000
GR    588.400   1825.000    588.500   1850.000    588.700   1875.000    588.500   1900.000    588.500   2100.000
GR    587.800   2125.000    588.700   2150.000    588.100   2175.000    587.500   2200.000    587.400   2210.000
GR    587 500   2220.000    587.300   2230 000    587.000   2240.000    584.700   2250.000    583.100   2255 000
GR    583 400   2260.000    582.500   2265.000    580.500   2270.000    579 800   2275.000    579.300   2280.000
GR    579.500   2285.000    579.700   2290.000    580.100   2295.000    581 100   2300.000    582.800   2305 000
GR    588.100   2308 000    588.100   2310.000    587.700   2320.000    588.700   2330.000    590.600   2340.000
GR    590.600   2350.000    590.600   2360.000    590.400   2370.000    589.000   2380.000    586.600   2390 000
GR    585.700   2392 000    590 000   2770.000      0.000      0.000      0.000      0.000      0.000      0.000

        #9 CHANNEL CROSS SECTION MOVED UPSTREAM
X1  30100.000     37 000    840.000    908 000    300.000    700 000    900.000      0.000      0.790      0.000
GR    590 000      0.000    588.700    310.000    588.700    320.000    588 700    340 000    588.600    350.000
GR    588.500    375 000    588.700    400 000    588 400    425.000    588.500    450 000    588.700    475.000
GR    588.500    500.000    588.500    700.000    587.800    725.000    588.700    750.000    588.100    775.000
GR    587.500    800.000    587.400    810 000    587.500    820 000    587.300    830.000    587.000    840.000
GR    584.700    850.000    583.100    855.000    583.400    860.000    582.500    865.000    580.500    870 000
GR    579.800    875.000    579.300    880.000    579 500    885.000    579.700    890.000    580.100    895.000
GR    581.100    900.000    582.800    905 000    588.100    908.000    588.100    910.000    587.700    920.000
GR    588.700    930.000    590.600   1630.000      0.000      0.000      0.000      0.000      0.000      0.000

        #9 CHANNEL CROSS SECTION MOVED UPSTREAM
X1  31620.000     37.000   1340.000   1408.000   1490 000   1450.000   1520.000      0 000      2.100      0.000
GR    590.000      0.000    588.700    810.000    588.700    820.000    588.700    840.000    588.600    850 000
GR    588.500    875.000    588.700    900.000    588 400    925 000    588.500    950.000    588 700    975.000
GR    588.500   1000.000    588.500   1200.000    587.800   1225.000    588.700   1250.000    588.100   1275 000
GR    587.500   1300 000    587.400   1310.000    587.500   1320.000    587.300   1330.000    587.000   1340.000
GR    584 700   1350 000    583.100   1355.000    583.400   1360.000    582.500   1365.000    580.500   1370.000
GR    579.800   1375.000    579.300   1380.000    579 500   1385 000    579.700   1390.000    580.100   1395.000
GR    581.100   1400 000    582.800   1405.000    588.100   1408.000    588.100   1410.000    587.700   1420.000
GR    588 700   1430 000    590.600   2108 000      0.000      0.000      0.000      0.000      0.000      0.000

NH      6.000      0.040   1740.000      0 035   1852.000      0.040   1901.000      0.070   2321.000      0.035
NH   2391.000      0.040   4100.000      0 000      0.000      0.000      0.000      0.000      0.000      0.000
ET      0 000      4.100      0.000   1233 000   3478.000      0.000      0.000      0.000      0.000      0 000
          MANUFACTURED CROSS SECTION FROM CHANNEL IMPROVEMENT PLANS,
          TOPO MAP, AND TYPICAL CHANNEL CROSS SECTIONS.
X1  32260.000     18.000   2321.000   2391.000    300.000    660 000    640.000      0.000      0.000      0.000
X4      1.000    590.000   1700.000      0.000      0 000      0.000      0.000      0.000      0.000      0.000
GR    592 000      0.000    593.000   1724.000    593.000   1740.000    590 000   1749.000    584 700   1765.500
GR    584.700   1835.500    590.000   1852.000    593.000   1861.000    593 000   1877.000    590.000   1901.000
GR    590.000   2321 000    585.000   2331.000    582.000   2346.000    582.000   2366.000    585.000   2381.000
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GR     590.000   2391.000    590.000   2460.000    594.000   4100.000      0.000      0.000      0.000      0.000

NC       0.035      0.035      0.035      0.000      0.000      0.000      0.000      0.000      0.000      0.000
ET       0.000      4.100      0.000    374.000   2263.000      0.000      0.000      0.000      0.000      0.000
          CROSS SECTION #10 MOVED DOWNSTREAM
X1   33000.000     71.000   1264.000   1370.000    460.000    850.000    740.000      0.000     -0.350      0.000
GR     593.000      0.000    591.400   1080.000    591.700   1090.000    591.500   1100.000    591.500   1110.000
GR     591.300   1120.000    590.900   1130.000    591.400   1140.000    591.200   1150.000    591.400   1160.000
GR     591.400   1170.000    591.500   1180.000    591.700   1190.000    591.800   1200.000    591.700   1210.000
GR     591.500   1220.000    591.500   1230.000    591.400   1240.000    591.200   1246.000    590.300   1250.000
GR     589.200   1260.000    588.800   1264.000    583.800   1270.000    583.800   1275.000    582.900   1280.000
GR     582.800   1285.000    582.700   1290.000    582.800   1295.000    582.700   1300.000    582.800   1305.000
GR     583.200   1310.000    584.500   1315.000    585.900   1320.000    586.000   1325.000    586.000   1330.000
GR     586.100   1335.000    586.200   1340.000    586.200   1345.000    586.300   1350.000    586.300   1355.000
GR     586.300   1360.000    587.200   1365.000    588.800   1370.000    591.100   1375.000    591.800   1380.000
GR     592.300   1390.000    592.700   1400.000    592.600   1410.000    592.000   1420.000    590.700   1430.000
GR     589.600   1440.000    589.200   1450.000    589.000   1460.000    588.900   1470.000    589.000   1480.000
GR     589.000   1490.000    589.100   1500.000    589.200   1510.000    589.200   1520.000    589.600   1530.000
GR     589.900   1540.000    589.900   1550.000    590.200   1560.000    590.400   1570.000    590.300   1580.000
GR     590.500   1590.000    590.400   1600.000    590.500   1610.000    590.600   1620.000    590.500   1630.000
GR     593.300   4050.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

          CROSS SECTION #10
X1   33750.000     71.000    314.000    420.000    750.000    750.000    750.000      0.000      0.000      0.000
GR     593.000      0.000    591.400    130.000    591.700    140.000    591.500    150.000    591.500    160.000
GR     591.300    170.000    590.900    180.000    591.400    190.000    591.200    200.000    591.400    210.000
GR     591.400    220.000    591.500    230.000    591.700    240.000    591.800    250.000    591.700    260.000
GR     591.500    270.000    591.500    280.000    591.400    290.000    591.200    296.000    590.300    300.000
GR     589.200    310.000    588.800    314.000    583.800    320.000    583.800    325.000    582.900    330.000
GR     582.800    335.000    582.700    340.000    582.800    345.000    582.700    350.000    582.800    355.000
GR     583.200    360.000    584.500    365.000    585.900    370.000    586.000    375.000    586.000    380.000
GR     586.100    385.000    586.200    390.000    586.200    395.000    586.300    400.000    586.300    405.000
GR     586.300    410.000    587.200    415.000    588.800    420.000    591.100    425.000    591.800    430.000
GR     592.300    440.000    592.700    450.000    592.600    460.000    592.000    470.000    590.700    480.000
GR     589.600    490.000    589.200    500.000    589.000    510.000    588.900    520.000    589.000    530.000
GR     589.000    540.000    589.100    550.000    589.200    560.000    589.200    570.000    589.600    580.000
GR     589.900    590.000    589.900    600.000    590.200    610.000    590.400    620.000    590.300    630.000
GR     590.500    640.000    590.400    650.000    590.500    660.000    590.600    670.000    590.500    680.000
GR     593.600   2200.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

          UPSTREAM TOWNSHIP LIMIT
X1   34000.000      0.000      0.000      0.000    250.000    250.000    250.000      0.000      0.100      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=   0.100 CEHV=   0.300
*SECNO 0.000
          VALLEY SECTION LOCATED AT LIGHT AT THE END OF THE EAST BREAKWATER
          ALL CROSS-SECTIONS IN THIS RUN WERE DERIVED FROM CORPS OF ENGINEERS
          1976 SOUNDINGS AND EXTENDED USING 2-FT. CONTOUR MAPS (1976).
          ALL ELEVATIONS CONVERTED FROM IGLD TO NGVD BY ADDING 1 2 FEET.
    0 00      8.40    579.50      0.00    579.50    579.58      0.08      0.00      0.00    590.00
   2000.        0.     2000.        0.        0.      904.        0.        0.        0.    582.90
    0.00      0.00      2.21      0 00     0 000     0.030     0.000     0.000    571.10     57.35
 0.000206       0.        0.        0.         0         0         0      0.00    162.65    220.00

*SECNO 500.000
   500.00     8.62    579.62      0.00      0 00    579.67      0.05      0.09      0.00    585 20
    2000        0.     2000.        0.        0.     1129.         0       12.        2.    581.20
     0.08     0.00      1.77      0 00     0 000     0.030     0.000     0 000    571.00     32.47
 0.000168      500       500.      500         1         0         0      0.00    243.90    276.38

*SECNO 1000.000
  1000.00     9.51    579.71      0.00      0.00    579.76      0.05      0.09      0.00    585.20
    2000.        0.     2000.        0.        0.     1067.        0.       24.        5.    581.20
     0.15     0 00      1.87      0.00     0.000     0.030     0.000     0.000    570.20     36.53
 0 000195     500.       500.      500.         0         0         0      0.00    236.85    273.37

*SECNO 1500.000
  1500.00     8.70    579.80      0.00      0.00    579.86      0.06      0.09      0 00    587 70
    2000.        0.     2000.        0         0     1047.        0.       36.         8     582.90
     0.23     0.00      1.91      0.00     0.000     0 030     0.000     0 000    571.10     45.82
 0.000180     500.       500.      500         0         0         0      0.00    212.87    258.69

*SECNO 2000.000
  2000.00     8.71    579.91      0 00      0.00    579 97      0.07      0.11      0.00    585.20
    2000.        0.     2000        0.        0.      964.        0       48.       10.    581.20
     0.29     0.00      2.07      0 00     0.000     0.030     0.000     0.000    571 20     34.64
 0.000294     500.       500.      500.         1         0         0      0.00    250.72    285.36
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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 2500 000
 2500.00     8.74       580.04     0.00       0.00       580.09     0.05       0.12       0.00       585.20
  2000.      0.         2000.      0.         0.         1081.      0.         60.        13.        582 80
   0.37      0.00       1 85       0 00       0.000      0.030      0 000      0.000      571.30     58.33
0.000199     500.       500.       500.       1          0          0          0.00       248.34     306.67

*SECNO 3000.000
 3000.00     9.63       580.13     0.00       0 00       580.20     0.06       0.10       0.00       586.80
  2000.      0.         2000.      0.         0.         989.       0.         72.        16.        582.90
   0.44      0.00       2.02       0 00       0 000      0.030      0.000      0.000      570.50     36.42
0.000194     500.       500.       500.       2          0          0          0.00       194 31     230.73

*SECNO 3500.000
 3500 00     9.04       580 24     0.00       0.00       580.29     0.05       0.09       0.00       585.20
  2000.      0.         2000.      0          0.         1149.      0.         84.        18.        582.60
   0 52      0.00       1 74       0.00       0.000      0 030      0.000      0.000      571.20     56 92
0.000167     500.       500.       500        0          0          0          0.00       254 61     311 54

*SECNO 4000.000
 4000.00     9 52       580.32     0.00       0.00       580.38     0.05       0.09       0.00       581.20
  2000.      0.         2000.      0.         0.         1072       0          97.        21.        581.20
   0.59      0.00       1.87       0.00       0 000      0.030      0.000      0.000      570 80     49.31
0 000183     500.       500.       500        0          0          0          0.00       227.65     276.96

1490 NH CARD USED
*SECNO 4500.000
 WATER EL=X5 CARD=    580 300
          VALLEY SECTIONS 10 TO 3 HAVE BEEN CONVERTED
          FROM IGLD DATUM TO NGVD DATUM BY ADDING 1.2 FT   THE REMAINING
          CROSS SECTIONS ARE REFERENCED TO NGVD
          COMBINATION OF SECTION 4500 IN AU GRES RIVER, OVERFLOW WEIR IN RIGHT
          OVERBANK OF AU GRES RIVER, AND IN UNNAMED SMALL CHANNEL
 4500.00     8.90       580.30     0.00       0 00       580.57     0 27       0.20       0.06       585.20
  3820.      0.         3820.      0          0.         921.       0.         108.       23       100001.20
   0.62      0.00       4.15       0.00       0.000      0.030      0 000      0.000      571.40     93.64
0.000734     500.       500        500.       0          0          0          0.00       166.36     260.00
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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 5560 000

3470 ENCROACHMENT STATIONS=      384.0      582.0  TYPE=      1  TARGET=      198.000
          VALLEY SECTION NO. 9 IN AU GRES RIVER - CHANNEL POINTS WERE TAKEN
          FROM CORPS OF ENGINEERS SOUNDINGS - POINTS ABOVE THE EXISTING WATER
          SURFACE WERE FIELD MEASURED - CROSS SECTION A
  5560.00     9.65    581 05      0.00      0 00    581.21      0.16      0.63      0.01    583.10
    3820        0.     3820.        0.        0.     1200.        0.      134.        28  100001 20
     0.72     0.00      3.18      0.00     0.000     0.035     0.000     0.000    571.40    384.00
 0.000496    1060.     1060.      800.         2         0         0      0.00    190.60    574.60

*SECNO 6820.000

3470 ENCROACHMENT STATIONS=      220.0      400.0  TYPE=      1  TARGET=      180 000
          VALLEY SECTION 8 - CROSS SECTION B
  6820.00    10.97    581.57      0.00      0 00    581.70      0.12      0.48      0.00    583.20
    3820        0     3820.        0.        0.     1348.        0       171.        33.  100001.20
     0.84     0.00      2.83      0.00     0 000     0.035     0.000     0 000    570 60    220.00
 0.000307    1260.     1260.     1260.         2         0         0      0.00    175.79    395.79

*SECNO 7780 000

3470 ENCROACHMENT STATIONS=     1000 0     1160.0  TYPE=      1  TARGET=      160.000
          VALLEY SECTION 7 - CROSS SECTION C
  7780.00    11.25    581.85      0.00      0.00    581.98      0 13      0.28      0.00    582.60
    3820.        0.     3820        0.        0.     1338.        0.      200.        37.  100001 20
     0.93     0 00      2 85      0.00     0.000     0 035     0 000     0 000    570 60   1000.19
 0.000277     940.      960.      990.         2         0         0      0.00    159.09   1159.27

*SECNO 8640 000

3470 ENCROACHMENT STATIONS=      813.0      970.0  TYPE=      1  TARGET=      157.000
          VALLEY SECTION 6 - CROSS SECTION D
  8640.00    11.88    582.08      0.00      0 00    582.20      0.11      0.22      0.00    582 70
    3820.        0.     3820.        0.        0     1423        0       228        40.  100001.20
     1.02     0.00      2.68      0.00     0.000     0.035     0.000     0.000    570 20    813.13
 0.000228     860.      860       860.         1         0         0      0.00    156.39    969.52
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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 9230.000

3470 ENCROACHMENT STATIONS=     1167.0     1321 0  TYPE=      1  TARGET=      154.000
          VALLEY SECTION 5 - CROSS SECTION E
  9230.00     12.02    582.22      0.00      0 00    582.33      0.12      0.14      0.00    583.50
    3820.        0.     3820.        0.         0     1389         0.      247.       42.  100001 20
     1 08      0 00      2.75      0.00     0 000     0.035     0.000     0.000    570 20   1167.25
 0 000233      520.      590.      675          1         0         0      0.00    152.37   1319.62

*SECNO 10430.000

3470 ENCROACHMENT STATIONS=      856.0     1000.0  TYPE=      1  TARGET=      144.000
          VALLEY SECTION 4  CROSS SECTION F
 10430 00     12.10    582 50      0.00      0.00    582.62      0.12      0.29      0.00    583.00
    3820.        0.     3820.        0.         0     1346.         0.      284        46.  100001 20
     1 20      0.00      2.84      0.00     0.000     0 035     0.000     0.000    570.40    856.09
 0.000243     1260      1200.     1120.         0         0         0      0.00    143 32    999.41

*SECNO 11940.000

3470 ENCROACHMENT STATIONS=      546.0      687 0  TYPE=      1  TARGET=      141.000
          VALLEY SECTION 3 - CROSS SECTION G
 11940 00     12.19    582.89      0.00      0.00    583.03      0 14      0.40      0.00    583.90
    3820.        0.     3820.        0.         0.    1268.         0.      330.       51  100001.20
     1.34      0 00      3.01      0.00     0.000     0.035     0.000     0.000    570 70    546.48
 0.000291     1410      1510.     1610.         2         0         0      0.00    140.34    686.82

*SECNO 12400 000
          MICHIGAN AVENUE (#1) - CROSS SECTION H
 12400.00     11.59    582.99      0 00      0.00    583.22      0.23      0.17      0.03    590.60
    3820.        0.     3820.        0.         0     1000.         0.      342.       52     590.10
     1.37      0 00      3.82      0 00     0.000     0.035     0 000     0 000    571 40    256.65
 0.000474      510.      460.      410.         1         0         0      0.00    111.06    367.70

*SECNO 13180.000
          CROSS SECTION I
 13180.00     11.98    583.38      0.00      0.00    583.61      0.23      0.39      0.00    583.30
    3820.        0.     3820.        0.         0      985.         0.      359.       54.     584.00
     1.43      0.01      3.88      0.00     0.040     0.035     0 000     0.000    571.40    269 49
 0.000521      780.      780.      780.         2         0         0      0.00    119.16    388.64
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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=   0 300 CEHV=   0. 500
*SECNO 13975. 000

3470 ENCROACHMENT STATIONS=      149. 9      265. 0  TYPE=      1  TARGET=      115. 100
          CROSS SECTION DOWNSTREAM OF RT 23 BRIDGE
 13975 00      8. 56    583 86      0. 00      0. 00    584. 17      0. 31      0. 52      0 04    582. 70
    3820.         0.     3820.         0.         0      857.         0       376.        56.  100000. 00
     1. 48      0. 00     4. 46      0. 00    0. 000    0. 035    0. 000    0. 000    575. 30    149. 90
 0 000864       795       795.       795.          2         0         0      0. 00    115. 10    265. 00


*SECNO 13976. 000

3370 NORMAL BRIDGE, NRD= 12 MIN ELTRD=  591 60 MAX ELLC=  588. 70


3470 ENCROACHMENT STATIONS=      149. 9      265 0  TYPE=      1  TARGET=      115 100
          DOWNSTREAM FACE OF RT 23 BRIDGE
 13976. 00      8. 55    583. 85      0. 00      0. 00    584. 19      0. 33      0. 00      0 01    582. 70
    3820.         0      3820.         0          0       825         0.       376.        56  100000. 00
     1. 48      0. 00     4. 63      0 00    0. 000    0. 030    0. 000    0. 000    575. 30    149. 90
 0. 000807        1.        1.        1.          1         0         0    -31. 13    115 10    265. 00


*SECNO 14016. 000

3370 NORMAL BRIDGE, NRD= 12 MIN ELTRD=  591. 60 MAX ELLC=  588. 70


3470 ENCROACHMENT STATIONS=      149. 9      265. 0  TYPE=      1  TARGET=      115 100
          UPSTREAM FACE OF RT 23 BRIDGE
 14016. 00      8 59    583. 89      0. 00      0 00    584. 22      0 33      0. 03      0 00    582 70
    3820.         0.     3820.         0.         0.      828.         0.       377.        57.  100000. 00
     1. 48      0. 00     4. 61      0 00    0. 000    0. 030    0. 000    0. 000    575 30    149. 90
 0. 000798       40.       40.       40.          0         0         0    -31. 24    115. 10    265. 00


*SECNO 14017. 000

3470 ENCROACHMENT STATIONS=      149. 9      265. 0  TYPE=      1  TARGET=      115 100
          CROSS SECTION UPSTREAM OF RT 23 BRIDGE
 14017. 00      8. 62    583. 92      0. 00      0. 00    584. 23      0 30      0. 00      0. 01    582 70
    3820.         0      3820.         0          0.      864         0.       377        57.  100000. 00
     1. 48      0 00      4 42      0 00    0. 000    0. 035    0. 000    0. 000    575. 30    149. 90
 0. 000843        1.        1.        1.          2         0         0      0. 00    115. 10    265. 00
```

```
  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

CCHV=   0.100 CEHV=   0.300
*SECNO 14077.000
          CROSS SECTION AT BRIDGE MOVED UPSTREAM
 14077.00     8.65    583.98      0.00      0.00    584.28      0.30      0.05      0.00    582.73
    3820.       1.      3818        1.         2      866.        2.      378.       57.     582.73
     1 48     0 72      4.41      0.72     0.040     0.035     0.040     0.000    575 33    147.24
 0.000813      60.       60.       60.         0         0         0      0.00    120.29    267.54

*SECNO 15000.000
          CROSS SECTION AT BRIDGE MOVED UPSTREAM
 15000.00     8 67    584.72      0.00      0.00    585.02      0 30      0 74      0.00    583.45
    3820        1.      3818.       1.        2.      970.        2.      397.       59.     583 45
     1.54     0.73      4.39      0.73     0.040     0.035     0.040     0 000    576.05    147.16
 0.000799     923.      923.      923.         1         0         0      0.00    120.45    267.61

1490 NH CARD USED
*SECNO 16000 000

3470 ENCROACHMENT STATIONS=      126.0     1000.0  TYPE=      1  TARGET=     -126.000
          CROSS SECTION J MOVED DOWNSTREAM
 16000.00     8.67    585.59      0.00      0.00    585.94      0.36      0.90      0.02    585.52
    3820.       0.      3512.     308.         0      705.      400       419.       67      581.22
     1.60     0.07      4 98      0 77     0 070     0.035     0 070     0.000    576 92    243.30
 0 001030    1000.     1000.     1000.         2         0         0      0.00    514 78    758.08

1490 NH CARD USED
*SECNO 17050.000

3470 ENCROACHMENT STATIONS=      126.0     1000.0  TYPE=      1  TARGET=     -126 000
          CROSS SECTION J
 17050.00     8.93    586.63      0 00      0.00    586.94      0.31      0.99      0.00    586.30
    3820.       2.      3422.     396.         9.      731.      514       448.       80      582.00
     1.67     0 23      4.68      0 77     0 056     0.035     0.070     0.000    577.70    179.37
 0 000867    1050.     1050.     1050.         2         0         0      0.00    617.92    797.29

1490 NH CARD USED
*SECND 18565.000
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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


3265 DIVIDED FLOW

          CROSS SECTION J MOVED UPSTREAM
 18565 00     9. 91    587. 70     0. 00     0. 00    587. 87     0. 16     0. 92     0 01    586. 39
    3820.      81      3013.      726.      120.      827.      1026      504.      106.     582. 09
     1. 81    0. 67     3. 64     0. 71    0. 046    0. 035    0. 070    0. 000   577. 79  1048. 67
 0 000445    1515.     1515.     1515.         2         0         0     0. 00   863. 46  1942. 72


1490 NH CARD USED
*SECNO 20080. 000

3265 DIVIDED FLOW

          CROSS SECTION J MOVED UPSTREAM
 20080 00    10 43    588. 32     0. 00     0. 00    588. 45     0 12     0. 57     0. 00    586. 49
    3820      186      2851.      783.      337.      878.      1102.      578.      144.     582. 19
     1. 97    0. 55     3. 25     0. 71    0. 044    0. 035    0. 070    0. 000   577. 89  1006. 77
 0. 000326   1515.     1515.     1515.         2         0         0     0. 00  1310. 84  2341. 13


1490 NH CARD USED
*SECNO 21940. 000

3265 DIVIDED FLOW

          CROSS SECTION #7
 21940. 00    10. 63    588. 63     0 00     0. 00    588. 65     0. 01     0. 19     0. 01    582. 80
    3820.      71       989.      2760      172       585.      5490.      672.      183.     582. 80
     2. 42    0 41      1. 69     0. 50    0 059    0. 035    0. 057    0. 000   578. 00   106 69
 0 000082    1400.     1860.      720.         2         0         0     0. 00  2390 24  2532. 61


1490 NH CARD USED
*SECNO 24850. 000

3265 DIVIDED FLOW

          CROSS SECTION #8
 24850. 00     8. 22    588. 82     0. 00     0 00    588. 86     0. 04     0. 20     0. 01    583 00
    3820.      393.      1487.      1940.      709.      663.      2487.      833.      264.     584. 00
     2. 78    0. 55     2. 24     0. 78    0. 048    0. 035    0. 044    0. 000   580. 60   933. 79
 0. 000183   2700.     2910.      1000.         2         0         0     0. 00  2735. 02  3764. 38
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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 26560.000

3470 ENCROACHMENT STATIONS=      805.0     3180.0  TYPE=      1  TARGET=     2375.000
          #8 CHANNEL CROSS SECTION MOVED UPSTREAM
 26560.00      8.93    589.02      0.00      0.00    589.07      0.06      0.21      0.01    582.49
    3820.      1520     1860.      440      1686.      723.      799.      894.      296.     583.49
     2.96      0.90      2.57      0.55     0.035     0.035     0.035     0.000    580.09    805.00
 0.000215      800.     1710.      330          2         0         0      0.00   2287.52   3092.52

*SECNO 28410.000

3470 ENCROACHMENT STATIONS=      155.0     2560.0  TYPE=      1  TARGET=     -155.000
          #9 CHANNEL CROSS SECTION MOVED DOWNSTREAM
 28410.00     10.01    589.55      0.00      0.00    589.92      0.37      0.75      0.09    587.24
    3820.      919.     2794.      107.      665.      495.      105.      977.      363.     588.34
     3.06      1.38      5.65      1.01     0.035     0.035     0.035     0.000    579.54    611.41
 0.001368     1400.     1850.     1850          2         0         0      0.00   1420.98   2032.39

*SECNO 29200.000

3265 DIVIDED FLOW

3280 CROSS SECTION  29200.00 EXTENDED      0.19 FEET

3470 ENCROACHMENT STATIONS=     1550.0     2995.0  TYPE=      1  TARGET=     1445.000
          CROSS SECTION #9
 29200.00     10.89    590.19      0.00      0.00    590.23      0.04      0.28      0.03    587.00
    3820.      1576.     1250      994.      1399.      555.      976.      1009      382.     588.10
     3.20      1.13      2.25      1.02     0.035     0.035     0.035     0.000    579.30   1556.87
 0.000187      580       790.      710.          2         0         0      0.00   1149.10   2770.00

*SECNO 30100.000
          #9 CHANNEL CROSS SECTION MOVED UPSTREAM
 30100.00     10.16    590.25      0.00      0.00    590.57      0.32      0.26      0.08    587.79
    3820.      989.     2691.      140.      645.      505.      139.      1036.     394.     588.89
     3.24      1.53      5.33      1.01     0.035     0.035     0.035     0.000    580.09    127.82
 0.001185      300.      900       700.          3         0         0      0.00   1083.64   1211.46
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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 31620 000
        #9 CHANNEL CROSS SECTION MOVED UPSTREAM
 31620.00    10.42   591.82     0 00      0.00    592.02      0.19      1.43      0.01    589.10
    3820.    1312.    2305.     203.     1041.     523.      224.     1089.      440.     590.20
     3.38     1 26     4.41     0 91     0.035    0.035     0.035    0 000    581.40    171.42
 0.000775    1490.    1520.    1450.         2         0         0     0.00   1624 30   1795 72


1490 NH CARD USED
*SECNO 32260.000

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=    1233.0    3478 0  TYPE=     1  TARGET=    2245.000
          MANUFACTURED CROSS SECTION FROM CHANNEL IMPROVEMENT PLANS,
          TOPO MAP, AND TYPICAL CHANNEL CROSS SECTIONS.
 32260.00    10.14   592.14     0.00      0.00    592.17      0.02      0.13      0.02    590.00
    3820.    2198.    1080.     542.     2502      555.     1089.     1119.      459.     590.00
     3.50     0.88     1 95     0.50     0.042    0.035     0.040    0.000    582.00   1233.00
 0.000140     300.     640.     660.         2         0         0     0.00   2054.52   3338.39


*SECNO 33000.000

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=     374.0    2263.0  TYPE=     1  TARGET=    1889.000
         CROSS SECTION #10 MOVED DOWNSTREAM
 33000.00     9.89   592.24     0.00      0 00    592.28      0.04      0.11      0 01    588.45
    3820.     389.    1810.    1621       709.     812.     1698.     1175       488.     588.45
     3 62     0.55     2.23     0.95     0.035    0.035     0.035    0.000    582 35    374.00
 0.000189     460.     740.     850.         2         0         0     0.00   1876.05   2263.00


*SECNO 33750.000

3265 DIVIDED FLOW

          CROSS SECTION #10
 33750.00     9.69   592.39     0.00      0.00    592.47      0.08      0.18      0.01    588 80
    3820.     198.    2200.    1423.      242.     791.     1439.     1224       518.     588.80
     3 72     0.82     2.78     0 99     0 035    0.035     0.035    0.000    582.70     49.28
 0 000304     750.     750.     750.         2         0         0     0.00   1538.06   1608.44
```

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 34000.000

3265 DIVIDED FLOW

UPSTREAM TOWNSHIP LIMIT

34000.00	9.67	592.47	0.00	0.00	592.55	0.08	0.08	0.00	588.90
3820.	192.	2224.	1404.	234	788.	1402.	1238.	526	588.90
3.76	0.82	2.82	1.00	0.035	0.035	0.035	0.000	582.80	51.85
0.000315	250.	250.	250	1	0	0	0.00	1518.64	1592.91

00BREAK00

1) COUNTY: ARENAC

2) STUDY NAME: Au Gres City / Twp

3) WATERCOURSE: Au Gres River

4) DOCUMENT TYPE: Encroached

00BREAK00

THIS RUN EXECUTED 16 APR 87 15:16:14

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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 CITY OF AU GRES, MI - FIS
T2 100-YEAR FLOOD ENCROACHED RUN
T3 AU GRES RIVER

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0.	3.	0.	0.	0.000000	0.00	0.0	0	579.600	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=   0.100 CEHV=   0.300
*SECNO 0.000
 2800 NAT Q1=   1394.59  WSEL=    579.50  ENC Q1=   1412 92  WSEL=    579.60  RATIO= -0 0131
 NAT Q1=   1413.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0 0000  WSEL=    579.60
          VALLEY SECTION LOCATED AT LIGHT AT THE END OF THE EAST BREAKWATER.
          ALL CROSS-SECTIONS IN THIS RUN WERE DERIVED FROM CORPS OF ENGINEERS
          1976 SOUNDINGS AND EXTENDED USING 2-FT. CONTOUR MAPS (1976).
          ALL ELEVATIONS CONVERTED FROM IGLD TO NGVD BY ADDING 1 2 FEET.
    0 00      8 50   579.60     0.00   579.50   579.67     0.07     0.00     0.00   590.00
   2000.        0.    2000.       0.        0      921        0.       0.        0    582 90
    0 00     0.00     2.17     0.00    0.000    0.030    0.000    0.000   571.10    56.33
 0.000200       0.       0.       0.        0        0        0     0.00   166.91   223 24


*SECND 500.000
 2800 NAT Q1=   1543.96  WSEL=    579.62  ENC Q1=   1590.57  WSEL=    579.72  RATIO= -0.0302
 NAT Q1=   1591.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    579.72

3470 ENCROACHMENT STATIONS=      15 0      285.0  TYPE=     4  TARGET=       0.000
   500.00     8.72   579.72     0.00   579.62   579.76     0.05     0 09     0.00   585.20
    2000.       0.    2000.       0.        0.     1155.       0       12.       2.    581.20
     0.08     0.00     1 73     0.00    0.000    0 030    0.000    0.000   571.00    31 08
 0.000158     500.     500.     500.        2        0        0     0.00   247.34   278.42


*SECNO 1000.000
 2800 NAT Q1=   1433 02  WSEL=    579.71  ENC Q1=   1469.74  WSEL=    579.81  RATIO= -0.0256
 NAT Q1=   1470.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    579.81

3470 ENCROACHMENT STATIONS=      20.0      280.0  TYPE=     4  TARGET=       0.000
  1000 00     9 60   579.80     0.00   579.71   579.85     0.05     0.09     0 00   585.20
    2000.       0.    2000        0.        0.     1088.       0.       25.       5.    581.20
     0.16     0.00     1.84     0.00    0.000    0.030    0.000    0.000   570.20    34.99
 0.000186     500.     500.     500.        0        0        0     0.00   240.03   275.01


*SECND 1500.000
 2800 NAT Q1=   1490 89  WSEL=    579.80  ENC Q1=   1528.39  WSEL=    579.90  RATIO= -0.0252
 NAT Q1=   1528.  RATIOS LOB,CH,ROB=  0.0000  1 0000  0 0000  WSEL=    579.90
  1500.00     8.79   579.89     0.00   579 80   579.94     0.05     0 09     0.00   587.70
    2000.       0.    2000.       0.        0.     1066.       0.       37.       8.    582 90
     0.23     0 00     1.88     0.00    0.000    0.030    0.000    0.000   571.10    44.49
 0 000172     500.     500.     500.        0        0        0     0.00   215.56   260.05
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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 2000.000
 2800 NAT Q1=    1167.40  WSEL=     579.91  ENC Q1=    1219.16  WSEL=     580 01  RATIO= -0.0443
 NAT Q1=    1219.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.01

3470 ENCROACHMENT STATIONS=       20.0      290.0  TYPE=      4  TARGET=        0.000
  2000 00      8.79    579.99      0 00    579.91    580 05      0 06      0.11      0.00    585 20
    2000         0.      2000         0.        0.       989         0.       49.       10.     581 20
     0 30      0.00      2.02      0.00     0.000     0.030     0.000     0.000    571.20     34.29
 0.000271      500.      500.      500.         0         0         0      0.00    251.41    285.71


*SECNO 2500.000
 2800 NAT Q1=    1419.44  WSEL=     580.04  ENC Q1=    1472.72  WSEL=     580.14  RATIO= -0.0375
 NAT Q1=    1473.   RATIOS LOB,CH,ROB=  0.0000  1 0000  0.0000  WSEL=     580.14

3470 ENCROACHMENT STATIONS=       40.0      330.0  TYPE=      4  TARGET=        0.000
  2500.00      8.81    580.11      0.00    580.04    580.16      0 05      0.11      0.00    585.20
    2000.         0.      2000.         0.        0     1100.         0.       61.       13.     582.80
     0.37      0 00      1.82      0.00     0.000     0.030     0.000     0.000    571.30     57.80
 0.000189      500.      500.      500.         1         0         0      0.00    249.40    307.20


*SECNO 3000 000
 2800 NAT Q1=    1435.16  WSEL=     580 13  ENC Q1=    1453.11  WSEL=     580.23  RATIO= -0.0125
 NAT Q1=    1453.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=     580.23
  3000.00      9.70    580.20      0.00    580.13    580.26      0.06      0.09      0.00    586.80
    2000.         0.      2000.         0.        0     1003         0       73.       16.     582.90
     0.44      0 00      1.99      0.00     0 000     0.030     0.000     0.000    570.50     35.26
 0.000191      500.      500.      500.         0         0         0      0.00    198.96    234.22


*SECNO 3500.000
 2800 NAT Q1=    1547 10  WSEL=     580.24  ENC Q1=    1605.57  WSEL=     580.34  RATIO= -0.0378
 NAT Q1=    1606.   RATIOS LOB,CH,ROB=  0.0000  1 0000  0.0000  WSEL=     580.34

3470 ENCROACHMENT STATIONS=       40 0      320.0  TYPE=      4  TARGET=        0.000
  3500.00      9.11    580.31      0.00    580.24    580.35      0.05      0.09      0.00    585.20
    2000.         0.      2000.         0.        0.    1166         0.       85.       19.     582.60
     0.53      0.00      1 72      0 00     0.000     0.030     0.000     0 000    571.20     56.45
 0 000160      500       500.      500.         1         0         0      0.00    255.32    311.77
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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

*SECND 4000.000
 2800 NAT Q1=   1480.05  WSEL=    580.32  ENC Q1=   1518.43  WSEL=    580 42  RATIO= -0.0259
 NAT Q1=   1518.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    580.42

3470 ENCROACHMENT STATIONS=      40.0     290.0  TYPE=     4  TARGET=       0.000
  4000.00     9.58   580.38     0.00   580.32   580.44     0.05     0.08     0.00   581.20
    2000.       0.    2000.       0.        0    1085.       0.      98.      21.    581 20
     0.60     0.00     1.84     0.00    0 000    0.030    0.000    0 000   570.80    48.69
 0.000177     500.     500.     500.        0        0        0     0 00   229.15   277.84

1490 NH CARD USED
*SECND 4500.000
 WATER EL=X5 CARD=   580.400
          VALLEY SECTIONS 10 TO 3 HAVE BEEN CONVERTED
          FROM IGLD DATUM TO NGVD DATUM BY ADDING 1.2 FT   THE REMAINING
          CROSS SECTIONS ARE REFERENCED TO NGVD.
          COMBINATION OF SECTION 4500 IN AU GRES RIVER, OVERFLOW WEIR IN RIGHT
          OVERBANK OF AU GRES RIVER, AND IN UNNAMED SMALL CHANNEL
  4500.00     9.00   580.40     0.00   580.30   580.66     0 26     0.19     0.06   585.20
    3820.       0.    3820.       0.        0.     937.       0.      110      24.  100001.20
     0.63     0.00     4.08     0.00    0.000    0.030    0.000    0.000   571.40    92.12
 0.000699     500.     500.     500.        0        0        0     0 00   167.88   260.00

*SECND 5560.000
 2800 NAT Q1=   1715.67  WSEL=    581.05  ENC Q1=   1759.10  WSEL=    581.15  RATIO= -0 0253
 NAT Q1=   1766   RATIOS LOB,CH,ROB=  0.0038  0.9962  0.0000  WSEL=    581.15

3470 ENCROACHMENT STATIONS=     384.0     582.0  TYPE=     4  TARGET=       0.004
          VALLEY SECTION NO. 9 IN AU GRES RIVER - CHANNEL POINTS WERE TAKEN
          FROM CORPS OF ENGINEERS SOUNDINGS - POINTS ABOVE THE EXISTING WATER
          SURFACE WERE FIELD MEASURED - CROSS SECTION A
  5560.00     9.72   581 12     0 00   581.05   581.28     0.15     0.61     0.01   583.10
    3820.       0.    3820.       0        0.     1213       0.      136.      28.    583.50
     0.73     0.00     3.15     0.00    0 000    0 035    0.000    0.000   571 40   384.00
 0 000479    1060.    1060.     800.        2        0        0     0.00   190.81   574.81

*SECND 6820.000
 2800 NAT Q1=   2180.82  WSEL=    581.57  ENC Q1=   2225.58  WSEL=    581.67  RATIO= -0.0205
 NAT Q1=   2243.   RATIOS LOB,CH,ROB=  0.0000  0.9921  0.0079  WSEL=    581.67
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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


3470 ENCROACHMENT STATIONS=      220.0      400.0  TYPE=      4  TARGET=        0 008
          VALLEY SECTION 8 - CROSS SECTION B
  6820.00     11.03    581 63      0 00    581.57    581.75      0.12      0.47      0.00    583.20
    3820.        0.     3820.        0.        0.     1357.        0.      173.       33.     583.30
     0.85      0.00      2.81      0 00     0 000     0.035     0 000     0.000    570.60    220.00
 0.000300     1260.     1260.     1260.         2         0         0      0.00    175.92    395.92


*SECNO 7780 000
 2800 NAT Q1=    2297.27  WSEL=     581.85  ENC Q1=    2340 06  WSEL=     581.95  RATIO= -0.0186
 NAT Q1=    2363.   RATIOS LOB,CH,ROB=  0.0003  0.9902  0.0095  WSEL=     581 95

3470 ENCROACHMENT STATIONS=     1000 0     1160.0  TYPE=      4  TARGET=        0.010
          VALLEY SECTION 7 - CROSS SECTION C
  7780.00     11.30    581.90      0.00    581.85    582.03      0.13      0.27      0.00    582.60
    3820.        0.     3820.        0.        0.     1346.        0.      203        37     582.20
     0 95      0.00      2.84      0.00     0.000     0.035     0 000     0.000    570.60   1000.18
 0 000272      940.      960.      990.         0         0         0      0 00    159.20   1159.37


*SECNO 8640.000
 2800 NAT Q1=    2532.15  WSEL=     582.08  ENC Q1=    2570.88  WSEL=     582.18  RATIO= -0.0153
 NAT Q1=    2973.   RATIOS LOB,CH,ROB=  0 0000  0 8647  0.1352  WSEL=     582.18

3470 ENCROACHMENT STATIONS=      813.0      970.0  TYPE=      4  TARGET=        0.135
          VALLEY SECTION 6 - CROSS SECTION D
  8640.00     11.93    582.13      0.00    582.08    582.24      0.11      0.21      0.00    582.70
    3820.        0.     3820.        0.        0.     1429        0.      230        40.     582.30
     1.04      0.00      2.67      0 00     0.000     0.035     0 000     0.000    570.20    813.12
 0.000225      860.      860.      860         2         0         0      0.00    156 47    969.60


*SECNO 9230 000
 2800 NAT Q1=    2504 46  WSEL=     582.22  ENC Q1=    2543.08  WSEL=     582.32  RATIO= -0.0154
 NAT Q1=    2543.   RATIOS LOB,CH,ROB=  0.0000  1 0000  0.0000  WSEL=     582.32

3470 ENCROACHMENT STATIONS=     1167.0     1321.0  TYPE=      4  TARGET=        0.000
          VALLEY SECTION 5 - CROSS SECTION E
  9230.00     12.06    582.26      0.00    582.22    582.38      0.12      0.13      0.00    583.50
    3820         0     3820.        0.        0.     1395.        0.      250        42.     582.90
     1.10      0.00      2 74      0.00     0.000     0.035     0 000     0.000    570.20   1167.24
 0.000230      520.      590.      675         0         0         0      0.00    152.46   1319.70
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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 10430.000
 2800 NAT Q1=   2450 63  WSEL=    582.50  ENC Q1=   2493.98  WSEL=    582.60  RATIO= -0.0177
 NAT Q1=   2494   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    582.60

3470 ENCROACHMENT STATIONS=     856.0    1000.0  TYPE=     4  TARGET=       0.000
          VALLEY SECTION 4  CROSS SECTION F
 10430.00     12 13    582.53     0 00    582.50    582.66     0.12      0.28      0 00    583.00
    3820.        0.     3820        0.        0.     1353.        0       287.       46.     583.20
     1.21     0 00      2.82     0.00     0.000     0.035    0.000     0.000    570 40    856.08
 0.000239     1260      1200.    1120.         0         0        0      0 00    143 36    999.45


*SECNO 11940.000
 2800 NAT Q1=   2239.75  WSEL=    582.89  ENC Q1=   2279 03  WSEL=    582.99  RATIO= -0.0175
 NAT Q1=   2279.   RATIOS LOB,CH,ROB=  0.0000  0.9999  0 0001  WSEL=    582.99

3470 ENCROACHMENT STATIONS=     546.0     687.0  TYPE=     4  TARGET=       0.000
          VALLEY SECTION 3 - CROSS SECTION G
 11940 00     12.22    582.92     0 00    582.89    583.06     0.14      0.39      0.00    583.90
    3820.        0      3820.        0.        0      1274.       0.       333.       51.     583.40
     1 35     0.00      3 00     0.00     0 000     0.035    0.000     0.000    570.70    546 46
 0.000287     1410.     1510.    1610         0         0        0      0.00    140.37    686.84


*SECNO 12400 000
 2800 NAT Q1=   1753 87  WSEL=    582 99  ENC Q1=   1782 16  WSEL=    583.09  RATIO= -0.0161
 NAT Q1=   1782.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0.0000  WSEL=    583.09

3470 ENCROACHMENT STATIONS=     240.0     380 0  TYPE=     4  TARGET=       0.000
          MICHIGAN AVENUE (#1) - CROSS SECTION H
 12400.00     11.62    583.02     0 00    582.99    583.25     0.23      0.17      0.03    590.60
    3820.        0      3820.        0.        0.     1003.       0.       345.       52.     590.10
     1.39     0.00      3.81     0 00     0 000     0.035    0.000     0.000    571.40    256.64
 0.000471      510       460.     410.         2         0        0      0.00    111.07    367 71


*SECNO 13180.000
 2800 NAT Q1=   1673.73  WSEL=    583.38  ENC Q1=   1705.26  WSEL=    583.48  RATIO= -0 0188
 NAT Q1=   1705.   RATIOS LOB,CH,ROB=  0.0000  1.0000  0 0000  WSEL=    583.48

3470 ENCROACHMENT STATIONS=     270.0     390.0  TYPE=     4  TARGET=       0.000
          CROSS SECTION I
 13180.00     12 00    583.40     0.00    583 38    583.64     0.23      0 38      0.00    583.30
    3820.        0.     3820.        0.        0.      989.       0.       363        55.     584.00
     1.44     0.00      3.86     0 00     0.000     0.035    0.000     0 000    571.40    270.00
 0.000516      780.      780.     780.         0         0        0      0.00    118.70    388.70
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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=   0.300 CEHV=   0.500
*SECNO 13975.000

3470 ENCROACHMENT STATIONS=     149.9     265.0  TYPE=     1  TARGET=     115.100
          CROSS SECTION DOWNSTREAM OF RT 23 BRIDGE
 13975.00     8.59   583.89     0.00   583.86   584.19     0.31     0.52     0.04   582.70
    3820.       0.    3820.       0.       0.     859.       0      380       57  100000.00
     1.49     0.00     4.44     0.00    0.000    0.035    0.000    0.000   575.30   149.90
 0.000856     795.     795.     795.        2        0        0     0.00   115.10   265.00


*SECNO 13976.000

3370 NORMAL BRIDGE.NRD= 12 MIN ELTRD=  591.60 MAX ELLC=  588.70


3470 ENCROACHMENT STATIONS=     149.9     265.0  TYPE=     1  TARGET=     115 100
          DOWNSTREAM FACE OF RT 23 BRIDGE
 13976.00     8.58   583.88     0.00   583 85   584.21     0.33     0.00     0.01   582.70
    3820.       0.    3820.       0.       0.     828.       0.     380.       57.  100000.00
     1.49     0.00     4.62     0.00    0.000    0.030    0.000    0.000   575.30   149.90
 0 000799       1.        1       1.        1        0        0   -31.23   115.10   265.00


*SECNO 14016.000

3370 NORMAL BRIDGE.NRD= 12 MIN ELTRD=  591.60 MAX ELLC=  588.70


3470 ENCROACHMENT STATIONS=     149.9     265.0  TYPE=     1  TARGET=     115.100
          UPSTREAM FACE OF RT 23 BRIDGE
 14016.00     8 61   583.91     0.00   583 89   584.24     0.33     0.03     0.00   582.70
    3820.       0.    3820       0.       0.     831.       0      380.       57.  100000.00
     1.50     0.00     4 60     0.00    0.000    0.030    0.000    0.000   575.30   149.90
 0.000790      40.      40.      40.        0        0        0   -31.34   115.10   265.00


*SECNO 14017.000

3470 ENCROACHMENT STATIONS=     149 9     265.0  TYPE=     1  TARGET=     115.100
          CROSS SECTION UPSTREAM OF RT 23 BRIDGE
 14017.00     8 65   583.95     0.00   583.92   584.25     0.30     0.00     0 01   582.70
    3820.       0.    3820       0       0.     866.       0.     380       57.  100000.00
     1.50     0.00     4.41     0.00    0 000    0.035    0.000    0.000   575.30   149.90
 0 000835       1        1.       1.        2        0        0     0.00   115.10   265.00
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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

CCHV=   0.100 CEHV=   0.300
*SECNO 14077.000
 2800 NAT Q1=   1339.64  WSEL=    583.98  ENC Q1=   1369.45  WSEL=    584.08  RATIO= -0.0222
 NAT Q1=   1370.   RATIOS LOB,CH,ROB=  0.0004  0.9993  0.0004  WSEL=    584.08

3470 ENCROACHMENT STATIONS=     149.9     265.0  TYPE=     4  TARGET=       0.001
          CROSS SECTION AT BRIDGE MOVED UPSTREAM
 14077.00     8.67   584.00     0.00   583.98   584.30     0.30     0.05     0.00   582.73
    3820.       0.    3820.       0.        0     868.       0.      382       57    582.73
     1.50     0.00     4.40     0.00    0.000    0.035    0.000    0.000   575.33   149.90
 0.000828      60.      60.      60.        0        0        0     0.00   115.10   265.00


*SECNO 15000.000
 2800 NAT Q1=   1351.07  WSEL=    584.72  ENC Q1=   1377.70  WSEL=    584.82  RATIO= -0.0197
 NAT Q1=   1379.   RATIOS LOB,CH,ROB=  0.0004  0.9992  0.0004  WSEL=    584.82

3470 ENCROACHMENT STATIONS=     149.9     265.0  TYPE=     4  TARGET=       0.001
          CROSS SECTION AT BRIDGE MOVED UPSTREAM
 15000.00     8.71   584.76     0.00   584.72   585.06     0.30     0.76     0.00   583.45
    3820.       0.    3820.       0.        0.    873.       0.     400.       59.   583.45
     1.56     0.00     4.37     0.00    0.000    0.035    0.000    0.000   576.05   149.90
 0.000813     923.     923.     923.        2        0        0     0.00   115.10   265.00


1490 NH CARD USED
*SECNO 16000.000

3265 DIVIDED FLOW

          CROSS SECTION J MOVED DOWNSTREAM
 16000.00     8.71   585.63     0.00   585.59   586.05     0.42     0.96     0.04   585.52
    3820.       6.    3738       75.        7.    709.       56      419.       62.   581.22
     1.61     0.97     5.27     1.35    0.040    0.035    0.070    0.000   576.92   101.73
 0.001145    1000     1000.    1000.        2        0        0     0.00   137.52   370.00


1490 NH CARD USED
*SECNO 17050.000
 2800 NAT Q1=   1297.20  WSEL=    586.63  ENC Q1=   1297.20  WSEL=    586.73  RATIO=  0.0000
 NAT Q1=   1344.   RATIOS LOB,CH,ROB=  0.0035  0.8842  0.1123  WSEL=    586.73

3470 ENCROACHMENT STATIONS=     250.0     565.1  TYPE=     4  TARGET=       0.035
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          CROSS SECTION J
 17050 00      9 08    586.78      0.00    586.63    587.09      0.31      1.03      0 01    586.30
    3820.        0.     3487.      333.        0.      745.      364       442.       68.     582.00
     1 68      0.00      4 68      0.91     0.000     0.035    0.070     0.000    577.70    250.00
 0.000849     1050.     1050.     1050.         2         0         0      0.00    315.13    565.13


1490 NH CARD USED
*SECNO 18565 000
 2800 NAT Q1=    1810.37  WSEL=     587.70  ENC Q1=    1810.37  WSEL=     587.80  RATIO=  0.0000
 NAT Q1=    1874.   RATIOS LOB,CH,ROB=  0.0243  0.7774  0.1983  WSEL=     587.80

3470 ENCROACHMENT STATIONS=     1210.0     1706.0  TYPE=      4  TARGET=        0.034
          CROSS SECTION J MOVED UPSTREAM
 18565.00     10.05    587 84      0.00    587.70    588.00      0.17      0.90      0.01    586 39
    3820.       30.     3061.      729.       51.      840.      885.      492.       82.     582.09
     1 82      0.60      3.64      0.82     0.060     0.035    0 070     0.000    577 79   1210.04
 0 000436     1515.     1515.     1515.         2         0         0      0.00    496.00   1706.04


1490 NH CARD USED
*SECNO 20080.000
 2800 NAT Q1=    2114.16  WSEL=     588.32  ENC Q1=    2114.16  WSEL=     588.42  RATIO=  0.0000
 NAT Q1=    2193.   RATIOS LOB,CH,ROB=  0.0575  0.7325  0.2100  WSEL=     588.42

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=     1590.7     2162.1  TYPE=      4  TARGET=        0.036
          CROSS SECTION J MOVED UPSTREAM
 20080.00     10.55    588.44      0 00    588.32    588.57      0 13      0.56      0.00    586.49
    3820       159.     2894.      767.      201.      890.      952.      558.      100.     582.19
     1.97      0.79      3.25      0.81     0.046     0 035    0.070     0.000    577.89   1590.66
 0.000322     1515.     1515.     1515.         2         0         0      0 00    551.30   2162.09


1490 NH CARD USED
*SECNO 21940.000
 2800 NAT Q1=    4224.64  WSEL=     588.63  ENC Q1=    4224.64  WSEL=     588.73  RATIO=  0.0000
 NAT Q1=    4402.   RATIOS LOB,CH,ROB=  0.0198  0.2529  0.7274  WSEL=     588.73

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=      264 0     1963.9  TYPE=      4  TARGET=        0.040
          CROSS SECTION #7
 21940.00     10.76    588.76      0.00    588.63    588 77      0 01      0.19      0.01    582 80
    3820.        0.      957.     2863.        0.      592.     5206.      644.      122.     582.80
     2.42      0.00      1.62      0.55     0.000     0.035    0.057     0.000    578.00    264.00
 0 000083     1400.     1860.      720.         2         0         0      0 00   1667.01   1963.91
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  SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

1490 NH CARD USED
*SECNO 24850.000
 2800 NAT Q1=   2825.17  WSEL=    588 82  ENC Q1=   2825 17  WSEL=    588.92  RATIO=  0.0000
 NAT Q1=   2980.   RATIOS LOB,CH,ROB=  0.1112  0.3769  0.5119  WSEL=    588.92

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=    1411.3    3552 5  TYPE=     4  TARGET=       0.052
          CROSS SECTION #8
 24850.00     8 34   588 94     0 00   588.82   588.98     0.04     0.20     0.01   583.00
    3820.     347.    1496.    1977.     506.     673.    2600.     792.     174.    584 00
     2.77     0.69     2.22     0.76    0.050    0.035    0.046    0.000   580.60  1411.25
 0.000176    2700.    2910.    1000.        2        0        0     0 00  2094 13  3552.51


*SECNO 26560.000
 2800 NAT Q1=   2607 73  WSEL=    589.02  ENC Q1=   2607 73  WSEL=    589.12  RATIO=  0 0000
 NAT Q1=   2752   RATIOS LOB,CH,ROB=  0 4011  0.4706  0.1283  WSEL=    589.12

3470 ENCROACHMENT STATIONS=    1106.3    2428.8  TYPE=     4  TARGET=       0.052
          #8 CHANNEL CROSS SECTION MOVED UPSTREAM
 26560.00     9 04   589.13     0.00   589.02   589.19     0.06     0.20     0.01   582.49
    3820.    1517.    1884      419.    1514.     732.     536.     850      196.    583.49
     2 94     1.00     2.57     0.78    0.035    0.035    0.035    0.000   580.09  1106.29
 0.000211     800.    1710.     330.        1        0        0     0.00  1322.52  2428.80


*SECNO 28410 000
 2800 NAT Q1=   1032.97  WSEL=    589 55  ENC Q1=   1032.97  WSEL=    589.65  RATIO=  0.0000
 NAT Q1=   1106.   RATIOS LOB,CH,ROB=  0.2685  0.6978  0 0337  WSEL=    589.65

3470 ENCROACHMENT STATIONS=    1107.3    1760.0  TYPE=     4  TARGET=       0.066
          #9 CHANNEL CROSS SECTION MOVED DOWNSTREAM
 28410.00    10.10   589.64     0 00   589.55   590 03     0.39     0.74     0.10   587.24
    3820      959.    2857        3.     577      501.       3      921      231.    588 34
     3.04     1 66     5.71     1 34    0.035    0.035    0.035    0.000   579.54  1107.31
 0.001375    1400     1850     1850.        3        0        0     0 00   652.66  1759.97


*SECNO 29200.000
 2800 NAT Q1=   2792.70  WSEL=    590.19  ENC Q1=   2792.70  WSEL=    590.29  RATIO=  0.0000
 NAT Q1=   3815.   RATIOS LOB,CH,ROB=  0.5512  0.2445  0.2043  WSEL=    590 29
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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


3265 DIVIDED FLOW

3280 CROSS SECTION  29200.00 EXTENDED      0.30 FEET


3470 ENCROACHMENT STATIONS=    1214.3    2435.4  TYPE=     4  TARGET=       0.268
          CROSS SECTION #9
 29200.00     11 00    590.30      0.00    590.19    590.34      0.04      0.28      0.04    587 00
    3820.     2184      1269.      367.     2050.      562.      285.      950.      243.     588 10
     3.17      1.07      2 26      1.29     0.035     0.035     0.035     0.000    579.30   1214.29
 0.000185      580.      790.      710.         2         0         0      0.00   1128 82   2435.44


*SECNO 30100.000
 2800 NAT Q1=   1109.47  WSEL=    590.25  ENC Q1=   1109 47  WSEL=    590 35  RATIO=  0.0000
 NAT Q1=   1184.  RATIOS LOB,CH,ROB=  0 2815  0.6747  0 0438  WSEL=    590.35

3470 ENCROACHMENT STATIONS=     354.7     923.6  TYPE=     4  TARGET=       0.063
         #9 CHANNEL CROSS SECTION MOVED UPSTREAM
 30100.00     10.24    590.33      0.00    590.25    590.67      0.34      0.24      0.09    587 79
    3820.     1010.     2761        49       582.      511.       25.      973       251.     588.89
     3.21      1.73      5.41      1.94     0.035     0.035     0 035     0.000    580.09    354.73
 0.001201      300.      900.      700         2         0         0      0.00    568.85    923.57


*SECNO 31620 000
 2800 NAT Q1=   1372.07  WSEL=    591.82  ENC Q1=   1372 07  WSEL=    591.92  RATIO=  0.0000
 NAT Q1=   1478.  RATIOS LOB,CH,ROB=  0.3672  0.5723  0 0606  WSEL=    591.92

3470 ENCROACHMENT STATIONS=     661.0    1457.1  TYPE=     4  TARGET=       0.072
         #9 CHANNEL CROSS SECTION MOVED UPSTREAM
 31620.00     10 52    591 92      0.00    591 82    592.12      0.20      1 44      0.01    589.10
    3820.     1366.     2351.      103.      915.      529.       68.     1018.      274.     590.20
     3.34      1.49      4 44      1.51     0.035     0 035     0.035     0.000    581.40    661 00
 0 000773     1490.     1520.     1450.         2         0         0      0.00    796.08   1457 08


1490 NH CARD USED
*SECNO 32260.000
 2800 NAT Q1=   3224.12  WSEL=    592.14  ENC Q1=   3224.12  WSEL=    592.24  RATIO=  0.0000
 NAT Q1=   3768.  RATIOS LOB,CH,ROB=  0.6171  0.2470  0.1359  WSEL=    592.24
```

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  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


3265 DIVIDED FLOW

3280 CROSS SECTION  32260.00 EXTENDED      0.25 FEET


3470 ENCROACHMENT STATIONS=    1097 5    2577.4  TYPE=     4  TARGET=       0.144
          MANUFACTURED CROSS SECTION FROM CHANNEL IMPROVEMENT PLANS,
          TOPO MAP, AND TYPICAL CHANNEL CROSS SECTIONS.
 32260 00     10.25   592.25     0.00   592 14   592.27     0.02     0.13     0.02   590.00
    3820.     2432.    1096.     291.    2829.     562.     402.    1043.     283.    590.00
     3.45      0.86     1 95     0.73    0 042    0.035    0.040    0.000   582.00  1097 49
 0.000138      300.     640.     660.        2        0        0     0.00  1431.31  2577.38


*SECNO 33000 000
 2800 NAT Q1=   2780.05  WSEL=    592.24  ENC Q1=   2780.05  WSEL=    592.34  RATIO=  0.0000
 NAT Q1=   3150.   RATIOS LOB,CH,ROB=  0.1029  0.4273  0.4698  WSEL=    592 34

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=    1093 9    2308.2  TYPE=     4  TARGET=       0 117
          CROSS SECTION #10 MOVED DOWNSTREAM
 33000.00     9.99   592.34     0 00   592.24   592.38     0.04     0.11     0.01   588.45
    3820.      191.    1837.    1793.     242.     823    1856.    1093.     303.    588.45
     3.57      0.79     2.23     0.97    0 035    0.035    0 035    0.000   582.35  1093.93
 0.000186      460.     740.     850.        0        0        0     0 00  1213.54  2308.19


*SECNO 33750.000
 2800 NAT Q1=   2191.23  WSEL=    592.39  ENC Q1=   2191 23  WSEL=    592 49  RATIO=  0.0000
 NAT Q1=   2319.   RATIOS LOB,CH,ROB=  0.0563  0.5563  0.3875  WSEL=    592.49

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=     225.8    1059.2  TYPE=     4  TARGET=       0 055
          CROSS SECTION #10
 33750.00     9.79   592 49     0.00   592.39   592.57     0.08     0.18     0.01   588.80
    3820.      115.    2245.    1459.     113.     801.    1191.    1136      320.    588.80
     3.67      1.03     2.80     1.22    0.035    0.035    0.035    0.000   582.70   225 82
 0 000303      750.     750.     750.        2        0        0     0.00   816.28  1059.18
```

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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 34000.000
 2800 NAT Q1=   2152.22  WSEL=    592.47  ENC Q1=   2152.22  WSEL=    592.57  RATIO=  0.0000
 NAT Q1=   2287.  RATIOS LOB,CH,ROB=  0.0551  0.5611  0 3838  WSEL=    592 57

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=     243.8    1045.4  TYPE=     4  TARGET=       0.059
          UPSTREAM TOWNSHIP LIMIT
 34000.00     9 77   592 57     0.00   592.47   592 65     0.08     0.08     0.00   588.90
    3820.     104.    2275.    1442.      95.     798.    1158.    1148.     325.    588.90
     3.70     1.10     2.85     1.25    0.035    0.035   0 035    0.000   582.80   243.82
 0 000315     250.     250      250.        0        0       0     0.00   783.33  1045.36
```

```
33750 00 33800   C                    I                          L     .          . WE M              .          .
         33900.  C          .          I                  .    L                 .  E M    .                    .
34000.00 34000   C          .          I                  .    .  L     .            E M    .                    .
```


THIS RUN EXECUTED 16 APR 87 15:16:26

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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

GRES RIVER

SUMMARY PRINTOUT TABLE 110

	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
	0.000	579.50	0.00	579.58	162.65	0.00	2000.00	0.00	0.00	0.00	0.00	290.00	0.00
	0.000	579.60	0.10	579.67	166.91	0.00	2000.00	0.00	0.00	0.00	0.00	290.00	290.00
	500.000	579.62	0.00	579.67	243.90	0.00	2000.00	0.00	0.00	0.00	15.00	285.00	0.00
	500.000	579.72	0.10	579.76	247.34	0.00	2000.00	0.00	0.00	15.00	15.00	285.00	285.00
	1000.000	579.71	0.00	579.76	236.85	0.00	2000.00	0.00	0.00	0.00	20.00	280.00	0.00
	1000.000	579.80	0.09	579.85	240.03	0.00	2000.00	0.00	0.00	20.00	20.00	280.00	280.00
	1500.000	579.80	0.00	579.86	212.87	0.00	2000.00	0.00	0.00	0.00	0.00	290.00	0.00
	1500.000	579.89	0.09	579.94	215.56	0.00	2000.00	0.00	0.00	0.00	0.00	290.00	290.00
	2000.000	579.91	0.00	579.97	250.72	0.00	2000.00	0.00	0.00	0.00	20.00	290.00	0.00
	2000.000	579.99	0.08	580.05	251.41	0.00	2000.00	0.00	0.00	20.00	20.00	290.00	290.00
	2500.000	580.04	0.00	580.09	248.34	0.00	2000.00	0.00	0.00	0.00	40.00	330.00	0.00
	2500.000	580.11	0.07	580.16	249.40	0.00	2000.00	0.00	0.00	40.00	40.00	330.00	330.00
	3000.000	580.13	0.00	580.20	194.31	0.00	2000.00	0.00	0.00	0.00	0.00	290.00	0.00
	3000.000	580.20	0.07	580.26	198.96	0.00	2000.00	0.00	0.00	0.00	0.00	290.00	290.00
	3500.000	580.24	0.00	580.29	254.61	0.00	2000.00	0.00	0.00	0.00	40.00	320.00	0.00
	3500.000	580.31	0.07	580.35	255.32	0.00	2000.00	0.00	0.00	40.00	40.00	320.00	320.00
	4000.000	580.32	0.00	580.38	227.65	0.00	2000.00	0.00	0.00	0.00	40.00	290.00	0.00
	4000.000	580.38	0.06	580.44	229.15	0.00	2000.00	0.00	0.00	40.00	40.00	290.00	290.00
*	4500.000	580.30	0.00	580.57	166.36	0.00	3820.00	0.00	320.00	0.00	60.00	320.00	320.00
*	4500.000	580.40	0.10	580.66	167.88	0.00	3820.00	0.00	320.00	0.00	60.00	320.00	320.00
	5560.000	581.05	0.00	581.21	190.60	0.00	3820.00	0.00	198.00	384.00	384.00	582.00	582.00
	5560.000	581.12	0.07	581.28	190.81	0.00	3820.00	0.00	0.00	384.00	384.00	582.00	582.00

SECND	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
6820.000	581.57	0.00	581.70	175.79	0.00	3820.00	0.00	180.00	220.00	220.00	400.00	400.00
6820.000	581.63	0.05	581.75	175.92	0.00	3820.00	0.00	0.01	220.00	220.00	400.00	400.00
7780.000	581.85	0.00	581.98	159.09	0.00	3820.00	0.00	160.00	1000.00	1000.00	1160.00	1160.00
7780.000	581.90	0.05	582.03	159.20	0.00	3820.00	0.00	0.01	1000.00	1000.00	1160.00	1160.00
8640.000	582.08	0.00	582.20	156.39	0.00	3820.00	0.00	157.00	813.00	813.00	970.00	970.00
8640.000	582.13	0.04	582.24	156.47	0.00	3820.00	0.00	0.14	813.00	813.00	970.00	970.00
9230.000	582.22	0.00	582.33	152.37	0.00	3820.00	0.00	154.00	1167.00	1167.00	1321.00	1321.00
9230.000	582.26	0.04	582.38	152.46	0.00	3820.00	0.00	0.00	1167.00	1167.00	1321.00	1321.00
10430.000	582.50	0.00	582.62	143.32	0.00	3820.00	0.00	144.00	856.00	856.00	1000.00	1000.00
10430.000	582.53	0.04	582.66	143.36	0.00	3820.00	0.00	0.00	856.00	856.00	1000.00	1000.00
11940.000	582.89	0.00	583.03	140.34	0.00	3820.00	0.00	141.00	546.00	546.00	687.00	687.00
11940.000	582.92	0.03	583.06	140.37	0.00	3820.00	0.00	0.00	546.00	546.00	687.00	687.00
12400.000	582.99	0.00	583.22	111.06	0.00	3820.00	0.00	0.00	0.00	240.00	380.00	0.00
12400.000	583.02	0.03	583.25	111.07	0.00	3820.00	0.00	0.00	240.00	240.00	380.00	380.00
13180.000	583.38	0.00	583.61	119.16	0.00	3820.00	0.00	0.00	0.00	270.00	390.00	0.00
13180.000	583.40	0.03	583.64	118.70	0.00	3820.00	0.00	0.00	270.00	270.00	390.00	390.00
13975.000	583.86	0.00	584.17	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
13975.000	583.89	0.02	584.19	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
13976.000	583.85	0.00	584.19	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
13976.000	583.88	0.02	584.21	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
14016.000	583.89	0.00	584.22	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
14016.000	583.91	0.02	584.24	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
14017.000	583.92	0.00	584.23	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
14017.000	583.95	0.02	584.25	115.10	0.00	3820.00	0.00	115.10	149.90	149.90	265.00	265.00
14077.000	583.98	0.00	584.28	120.29	1.19	3817.68	1.13	0.00	0.00	149.90	265.00	0.00
14077.000	584.00	0.02	584.30	115.10	0.00	3820.00	0.00	0.00	149.90	149.90	265.00	265.00
15000.000	584.72	0.00	585.02	120.45	1.28	3817.50	1.22	0.00	0.00	149.90	265.00	0.00
15000.000	584.76	0.04	585.06	115.10	0.00	3820.00	0.00	0.00	149.90	149.90	265.00	265.00
16000.000	585.59	0.00	585.94	514.78	0.02	3511.71	308.27	-126.00	126.00	250.00	348.00	1000.00
16000.000	585.63	0.04	586.05	137.52	6.47	3738.16	75.37	380.00	0.00	250.00	348.00	380.00
17050.000	586.63	0.00	586.94	617.92	2.02	3422.02	395.97	-126.00	126.00	250.00	348.00	1000.00
17050.000	586.78	0.15	587.09	315.13	0.00	3487.32	332.68	0.03	250.00	250.00	348.00	565.13
18565.000	587.70	0.00	587.87	863.46	80.87	3013.40	725.73	0.00	0.00	1250.00	1348.00	0.00
18565.000	587.84	0.13	588.00	496.00	30.39	3060.53	729.08	0.03	1210.04	1250.00	1348.00	1706.04

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
20080.000	588.32	0.00	588.45	1310.84	186.00	2850.83	783.17	0.00	0.00	1750.00	1848.00	0.00
20080.000	588.44	0.12	588.57	551.30	158.74	2894.23	767.03	0.04	1590.66	1750.00	1848.00	2162.09
21940.000	588.63	0.00	588.65	2390.24	70.83	989.13	2760.04	0.00	0.00	264.00	325.00	0.00
21940.000	588.76	0.13	588.77	1667.01	0.00	956.52	2863.48	0.04	264.00	264.00	325.00	1963.91
24850.000	588.82	0.00	588.86	2735.02	392.99	1486.82	1940.19	0.00	0.00	1755.00	1840.00	0.00
24850.000	588.94	0.12	588.98	2094.13	346.81	1496.26	1976.93	0.05	1411.25	1755.00	1840.00	3552.51
26560.000	589.02	0.00	589.07	2287.52	1519.67	1860.37	439.96	2375.00	805.00	1950.00	2035.00	3180.00
26560.000	589.13	0.11	589.19	1322.52	1516.58	1884.02	419.39	0.05	1106.29	1950.00	2035.00	2428.81
28410.000	589.55	0.00	589.92	1420.98	919.34	2794.10	106.56	-155.00	155.00	1690.00	1758.00	2560.00
28410.000	589.64	0.09	590.03	652.66	959.34	2857.24	3.42	0.07	1107.31	1690.00	1758.00	1759.97
29200.000	590.19	0.00	590.23	1149.10	1576.34	1249.94	993.72	1445.00	1550.00	2240.00	2308.00	2995.00
29200.000	590.30	0.11	590.34	1128.82	2184.18	1269.24	366.58	0.27	1214.29	2240.00	2308.00	2435.44
30100.000	590.25	0.00	590.57	1083.64	989.11	2690.92	139.96	0.00	0.00	840.00	908.00	0.00
30100.000	590.33	0.08	590.67	568.85	1009.50	2761.33	49.17	0.06	354.73	840.00	908.00	923.57
31620.000	591.82	0.00	592.02	1624.30	1312.02	2304.82	203.16	0.00	0.00	1340.00	1408.00	0.00
31620.000	591.92	0.10	592.12	796.08	1365.94	2351.05	103.01	0.07	661.00	1340.00	1408.00	1457.08
32260.000	592.14	0.00	592.17	2054.52	2198.38	1079.89	541.73	2245.00	1233.00	2321.00	2391.00	3478.00
32260.000	592.25	0.10	592.27	1431.31	2432.50	1096.02	291.48	0.14	1097.49	2321.00	2391.00	2577.38
33000.000	592.24	0.00	592.28	1876.05	389.12	1810.15	1620.73	1889.00	374.00	1264.00	1370.00	2263.00
33000.000	592.34	0.10	592.38	1213.54	190.67	1836.80	1792.53	0.12	1093.93	1264.00	1370.00	2308.19
33750.000	592.39	0.00	592.47	1538.06	197.60	2199.57	1422.83	0.00	0.00	314.00	420.00	0.00
33750.000	592.49	0.10	592.57	816.28	115.49	2246.32	1459.19	0.06	225.82	314.00	420.00	1059.18
34000.000	592.47	0.00	592.55	1518.64	192.07	2223.63	1404.31	0.00	0.00	314.00	420.00	0.00
34000.000	592.57	0.10	592.65	783.33	103.83	2274.55	1441.62	0.06	243.82	314.00	420.00	1045.36

GRES RIVER

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	QIK
	0.000	0.00	0.00	0.00	571.10	2000.00	579.50	0.00	579.58	2.06	2.21	904.24	1394.59
	0.000	0.00	0.00	0.00	571.10	2000.00	579.60	0.00	579.67	2.00	2.17	920.72	1412.92
	500.000	500.00	0.00	0.00	571.00	2000.00	579.62	0.00	579.67	1.68	1.77	1129.26	1543.96
	500.000	500.00	0.00	0.00	571.00	2000.00	579.72	0.00	579.76	1.58	1.73	1155.16	1588.67
	1000.000	500.00	0.00	0.00	570.20	2000.00	579.71	0.00	579.76	1.95	1.87	1066.97	1433.02
	1000.000	500.00	0.00	0.00	570.20	2000.00	579.80	0.00	579.85	1.86	1.84	1087.98	1467.34
	1500.000	500.00	0.00	0.00	571.10	2000.00	579.80	0.00	579.86	1.80	1.91	1046.61	1490.89
	1500.000	500.00	0.00	0.00	571.10	2000.00	579.89	0.00	579.94	1.72	1.88	1065.78	1523.94
	2000.000	500.00	0.00	0.00	571.20	2000.00	579.91	0.00	579.97	2.94	2.07	964.25	1167.40
	2000.000	500.00	0.00	0.00	571.20	2000.00	579.99	0.00	580.05	2.71	2.02	988.61	1214.67
	2500.000	500.00	0.00	0.00	571.30	2000.00	580.04	0.00	580.09	1.99	1.85	1081.11	1419.44
	2500.000	500.00	0.00	0.00	571.30	2000.00	580.11	0.00	580.16	1.89	1.82	1099.58	1455.95
	3000.000	500.00	0.00	0.00	570.50	2000.00	580.13	0.00	580.20	1.94	2.02	988.51	1435.16
	3000.000	500.00	0.00	0.00	570.50	2000.00	580.20	0.00	580.26	1.91	1.99	1003.38	1448.58
	3500.000	500.00	0.00	0.00	571.20	2000.00	580.24	0.00	580.29	1.67	1.74	1149.16	1547.10
	3500.000	500.00	0.00	0.00	571.20	2000.00	580.31	0.00	580.35	1.60	1.72	1166.02	1582.16
	4000.000	500.00	0.00	0.00	570.80	2000.00	580.32	0.00	580.38	1.83	1.87	1071.94	1480.05
	4000.000	500.00	0.00	0.00	570.80	2000.00	580.38	0.00	580.44	1.77	1.84	1085.25	1504.27
*	4500.000	500.00	0.00	0.00	571.40	3820.00	580.30	0.00	580.57	7.34	4.15	920.64	1410.09
*	4500.000	500.00	0.00	0.00	571.40	3820.00	580.40	0.00	580.66	6.99	4.08	937.35	1444.38
	5560.000	1060.00	0.00	0.00	571.40	3820.00	581.05	0.00	581.21	4.96	3.18	1200.07	1715.67
	5560.000	1060.00	0.00	0.00	571.40	3820.00	581.12	0.00	581.28	4.79	3.15	1213.17	1745.26
	6820.000	1260.00	0.00	0.00	570.60	3820.00	581.57	0.00	581.70	3.07	2.83	1348.01	2180.82
	6820.000	1260.00	0.00	0.00	570.60	3820.00	581.63	0.00	581.75	3.00	2.81	1357.44	2204.71
	7780.000	960.00	0.00	0.00	570.60	3820.00	581.85	0.00	581.98	2.77	2.85	1338.29	2297.27
	7780.000	960.00	0.00	0.00	570.60	3820.00	581.90	0.00	582.03	2.72	2.84	1345.65	2316.88
	8640.000	860.00	0.00	0.00	570.20	3820.00	582.08	0.00	582.20	2.28	2.68	1423.16	2532.15
	8640.000	860.00	0.00	0.00	570.20	3820.00	582.13	0.00	582.24	2.25	2.67	1428.55	2546.90
	9230.000	590.00	0.00	0.00	570.20	3820.00	582.22	0.00	582.33	2.33	2.75	1388.81	2504.46
	9230.000	590.00	0.00	0.00	570.20	3820.00	582.26	0.00	582.38	2.30	2.74	1394.50	2520.27
	10430.000	1200.00	0.00	0.00	570.40	3820.00	582.50	0.00	582.62	2.43	2.84	1346.41	2450.63
	10430.000	1200.00	0.00	0.00	570.40	3820.00	582.53	0.00	582.66	2.39	2.82	1352.87	2469.11

SECNO	XLCH	ELTRO	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
11940.000	1510.00	0.00	0.00	570.70	3820.00	582.89	0.00	583.03	2.91	3.01	1268.18	2239.75
11940.000	1510.00	0.00	0.00	570.70	3820.00	582.92	0.00	583.06	2.87	3.00	1274.09	2256.25
12400.000	460.00	0.00	0.00	571.40	3820.00	582.99	0.00	583.22	4.74	3.82	1000.05	1753.87
12400.000	460.00	0.00	0.00	571.40	3820.00	583.02	0.00	583.25	4.71	3.81	1002.69	1761.09
13180.000	780.00	0.00	0.00	571.40	3820.00	583.38	0.00	583.61	5.21	3.88	985.39	1673.73
13180.000	780.00	0.00	0.00	571.40	3820.00	583.40	0.00	583.64	5.16	3.86	988.61	1681.38
13975.000	795.00	0.00	0.00	575.30	3820.00	583.86	0.00	584.17	8.64	4.46	856.80	1299.44
13975.000	795.00	0.00	0.00	575.30	3820.00	583.89	0.00	584.19	8.56	4.44	859.46	1305.85
13976.000	1.00	591.60	588.70	575.30	3820.00	583.85	0.00	584.19	8.07	4.63	825.07	1044.87
13976.000	1.00	591.60	588.70	575.30	3820.00	583.88	0.00	584.21	7.99	4.62	827.64	1351.25
14016.000	40.00	591.60	588.70	575.30	3820.00	583.89	0.00	584.22	7.98	4.61	828.10	1352.40
14016.000	40.00	591.60	588.70	575.30	3820.00	583.91	0.00	584.24	7.90	4.60	830.64	1358.71
14017.000	1.00	0.00	0.00	575.30	3820.00	583.92	0.00	584.23	8.43	4.42	863.64	1315.96
14017.000	1.00	0.00	0.00	575.30	3820.00	583.95	0.00	584.25	8.35	4.41	866.24	1322.25
14077.000	60.00	0.00	0.00	575.33	3820.00	583.98	0.00	584.28	8.13	4.41	869.08	1339.64
14077.000	60.00	0.00	0.00	575.33	3820.00	584.00	0.00	584.30	8.28	4.40	868.35	1327.37
15000.000	923.00	0.00	0.00	576.05	3820.00	584.72	0.00	585.02	7.99	4.39	873.68	1351.07
15000.000	923.00	0.00	0.00	576.05	3820.00	584.76	0.00	585.06	8.13	4.37	873.46	1339.78
16000.000	1000.00	0.00	0.00	576.92	3820.00	585.59	0.00	585.94	10.30	4.98	1105.01	1190.15
16000.000	1000.00	0.00	0.00	576.92	3820.00	585.63	0.00	586.05	11.45	5.27	771.12	1128.70
17050.000	1050.00	0.00	0.00	577.70	3820.00	586.63	0.00	586.94	8.67	4.68	1253.20	1297.20
17050.000	1050.00	0.00	0.00	577.70	3820.00	586.78	0.00	587.09	8.49	4.68	1109.17	1311.33
18565.000	1515.00	0.00	0.00	577.79	3820.00	587.70	0.00	587.87	4.45	3.64	1973.24	1810.37
18565.000	1515.00	0.00	0.00	577.79	3820.00	587.84	0.00	588.00	4.36	3.64	1775.09	1829.29
20080.000	1515.00	0.00	0.00	577.89	3820.00	588.32	0.00	588.45	3.26	3.25	2317.23	2114.16
20080.000	1515.00	0.00	0.00	577.89	3820.00	588.44	0.00	588.57	3.22	3.25	2043.15	2129.56
21940.000	1860.00	0.00	0.00	578.00	3820.00	588.63	0.00	588.65	0.82	1.69	6246.60	4224.64
21940.000	1860.00	0.00	0.00	578.00	3820.00	588.76	0.00	588.77	0.83	1.62	5797.95	4204.47
24850.000	2910.00	0.00	0.00	580.60	3820.00	588.82	0.00	588.86	1.83	2.24	3857.98	2825.17
24850.000	2910.00	0.00	0.00	580.60	3820.00	588.94	0.00	588.98	1.76	2.22	3778.81	2879.47
26560.000	1710.00	0.00	0.00	580.09	3820.00	589.02	0.00	589.07	2.15	2.57	3208.06	2607.73
26560.000	1710.00	0.00	0.00	580.09	3820.00	589.13	0.00	589.19	2.11	2.57	2781.56	2629.10
28410.000	1850.00	0.00	0.00	579.54	3820.00	589.55	0.00	589.92	13.68	5.65	1264.84	1032.97
28410.000	1850.00	0.00	0.00	579.54	3820.00	589.64	0.00	590.03	13.75	5.71	1079.97	1030.01

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
29200.000	790.00	0.00	0.00	579.30	3820.00	590.19	0.00	590.23	1.87	2.25	2930.07	2792.70
29200.000	790.00	0.00	0.00	579.30	3820.00	590.30	0.00	590.34	1.85	2.26	2896.41	2810.27
30100.000	900.00	0.00	0.00	580.09	3820.00	590.25	0.00	590.57	11.85	5.33	1288.22	1109.47
30100.000	900.00	0.00	0.00	580.09	3820.00	590.33	0.00	590.67	12.01	5.41	1118.41	1102.37
31620.000	1520.00	0.00	0.00	581.40	3820.00	591.82	0.00	592.02	7.75	4.41	1787.52	1372.07
31620.000	1520.00	0.00	0.00	581.40	3820.00	591.92	0.00	592.12	7.73	4.44	1512.47	1373.78
32260.000	640.00	0.00	0.00	582.00	3820.00	592.14	0.00	592.17	1.40	1.95	4145.36	3224.12
32260.000	640.00	0.00	0.00	582.00	3820.00	592.25	0.00	592.27	1.38	1.95	3793.22	3246.55
33000.000	740.00	0.00	0.00	582.35	3820.00	592.24	0.00	592.28	1.89	2.23	3218.30	2780.05
33000.000	740.00	0.00	0.00	582.35	3820.00	592.34	0.00	592.38	1.86	2.23	2920.76	2802.63
33750.000	750.00	0.00	0.00	582.70	3820.00	592.39	0.00	592.47	3.04	2.78	2472.04	2191.23
33750.000	750.00	0.00	0.00	582.70	3820.00	592.49	0.00	592.57	3.03	2.80	2105.03	2193.16
34000.000	250.00	0.00	0.00	582.80	3820.00	592.47	0.00	592.55	3.15	2.82	2423.64	2152.22
34000.000	250.00	0.00	0.00	582.80	3820.00	592.57	0.00	592.65	3.15	2.85	2050.61	2152.01

GRES RIVER

SUMMARY PRINTOUT TABLE 150

	SECND	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	0.000	2000.00	579.50	0.00	0.00	0.00	162.65	0.00
	0.000	2000.00	579.60	0.10	0.00	0.10	166.91	0.00
	500.000	2000.00	579.62	0.00	0.12	0.00	243.90	500.00
	500.000	2000.00	579.72	0.10	0.12	0.10	247.34	500.00
	1000.000	2000.00	579.71	0.00	0.09	0.00	236.85	500.00
	1000.000	2000.00	579.80	0.09	0.08	0.09	240.03	500.00
	1500.000	2000.00	579.80	0.00	0.09	0.00	212.87	500.00
	1500.000	2000.00	579.89	0.09	0.09	0.09	215.56	500.00
	2000.000	2000.00	579.91	0.00	0.11	0.00	250.72	500.00
	2000.000	2000.00	579.99	0.08	0.10	0.08	251.41	500.00
	2500.000	2000.00	580.04	0.00	0.13	0.00	248.34	500.00
	2500.000	2000.00	580.11	0.07	0.13	0.07	249.40	500.00
	3000.000	2000.00	580.13	0.00	0.09	0.00	194.31	500.00
	3000.000	2000.00	580.20	0.07	0.09	0.07	198.96	500.00
	3500.000	2000.00	580.24	0.00	0.11	0.00	254.61	500.00
	3500.000	2000.00	580.31	0.07	0.10	0.07	255.32	500.00
	4000.000	2000.00	580.32	0.00	0.08	0.00	227.65	500.00
	4000.000	2000.00	580.38	0.06	0.08	0.06	229.15	500.00
*	4500.000	3820.00	580.30	0.00	-0.02	0.00	166.36	500.00
*	4500.000	3820.00	580.40	0.10	0.02	0.10	167.88	500.00
	5560.000	3820.00	581.05	0.00	0.75	0.00	190.60	1060.00
	5560.000	3820.00	581.12	0.07	0.72	0.07	190.81	1060.00
	6820.000	3820.00	581.57	0.00	0.52	0.00	175.79	1260.00
	6820.000	3820.00	581.63	0.05	0.51	0.05	175.92	1260.00
	7780.000	3820.00	581.85	0.00	0.28	0.00	159.09	960.00
	7780.000	3820.00	581.90	0.05	0.27	0.05	159.20	960.00
	8640.000	3820.00	582.08	0.00	0.23	0.00	156.39	860.00
	8640.000	3820.00	582.13	0.04	0.23	0.04	156.47	860.00
	9230.000	3820.00	582.22	0.00	0.13	0.00	152.37	590.00
	9230.000	3820.00	582.26	0.04	0.13	0.04	152.46	590.00
	10430.000	3820.00	582.50	0.00	0.28	0.00	143.32	1200.00
	10430.000	3820.00	582.53	0.04	0.28	0.04	143.36	1200.00

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
11940.000	3820.00	582.89	0.00	0.39	0.00	140.34	1510 00
11940.000	3820.00	582.92	0 03	0.38	0.03	140 37	1510 00
12400.000	3820.00	582.99	0 00	0.11	0.00	111.06	460.00
12400.000	3820.00	583.02	0.03	0.11	0.03	111.07	460.00
13180.000	3820.00	583.38	0.00	0.38	0.00	119.16	780 00
13180.000	3820.00	583.40	0.03	0 38	0 03	118.70	780.00
13975 000	3820 00	583.86	0.00	0.49	0.00	115 10	795.00
13975 000	3820.00	583.89	0.02	0.48	0 02	115.10	795.00
13976.000	3820 00	583.85	0.00	-0.01	0.00	115.10	1.00
13976.000	3820 00	583.88	0.02	-0.01	0.02	115.10	1.00
14016.000	3820.00	583.89	0 00	0.04	0.00	115.10	40.00
14016.000	3820 00	583.91	0.02	0.03	0.02	115.10	40.00
14017 000	3820.00	583.92	0.00	0.04	0.00	115.10	1 00
14017.000	3820.00	583.95	0.02	0.04	0.02	115.10	1.00
14077.000	3820 00	583.98	0.00	0.05	0.00	120.29	60.00
14077.000	3820.00	584 00	0.02	0.05	0.02	115.10	60.00
15000.000	3820 00	584.72	0.00	0 75	0.00	120.45	923.00
15000.000	3820.00	584 76	0.04	0.76	0.04	115.10	923.00
16000.000	3820.00	585 59	0 00	0.86	0 00	514.78	1000.00
16000.000	3820.00	585.63	0.04	0.87	0.04	137.52	1000.00
17050.000	3820 00	586.63	0.00	1.04	0.00	617 92	1050.00
17050.000	3820 00	586.78	0.15	1.15	0.15	315.13	1050 00
18565 000	3820 00	587.70	0.00	1.07	0.00	863.46	1515.00
18565 000	3820.00	587 84	0 13	1 06	0 13	496 00	1515 00
20080.000	3820 00	588 32	0.00	0.62	0.00	1310.84	1515.00
20080 000	3820.00	588.44	0.12	0.61	0 12	551 30	1515.00
21940.000	3820.00	588 63	0.00	0.31	0.00	2390 24	1860.00
21940.000	3820.00	588.76	0.13	0.32	0.13	1667.01	1860.00
24850.000	3820.00	588.82	0 00	0 19	0.00	2735 02	2910.00
24850 000	3820.00	588 94	0.12	0.18	0.12	2094 13	2910.00
26560 000	3820.00	589.02	0.00	0 19	0.00	2287.52	1710 00
26560.000	3820.00	589.13	0.11	0.19	0.11	1322.52	1710.00
28410.000	3820.00	589 55	0.00	0.53	0.00	1420.98	1850 00
28410.000	3820.00	589 64	0.09	0.51	0.09	652.66	1850.00

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
29200.000	3820.00	590.19	0.00	0.65	0.00	1149.10	790.00
29200.000	3820.00	590.30	0.11	0.66	0.11	1128.82	790.00
30100.000	3820.00	590.25	0.00	0.06	0.00	1083.64	900.00
30100.000	3820.00	590.33	0.08	0.03	0.08	568.85	900.00
31620.000	3820.00	591.82	0.00	1.57	0.00	1624.30	1520.00
31620.000	3820.00	591.92	0.10	1.59	0.10	796.08	1520.00
32260.000	3820.00	592.14	0.00	0.32	0.00	2054.52	640.00
32260.000	3820.00	592.25	0.10	0.32	0.10	1431.31	640.00
33000.000	3820.00	592.24	0.00	0.10	0.00	1876.05	740.00
33000.000	3820.00	592.34	0.10	0.09	0.10	1213.54	740.00
33750.000	3820.00	592.39	0.00	0.15	0.00	1538.06	750.00
33750.000	3820.00	592.49	0.10	0.15	0.10	816.28	750.00
34000.000	3820.00	592.47	0.00	0.08	0.00	1518.64	250.00
34000.000	3820.00	592.57	0.10	0.07	0.10	783.33	250.00

SUMMARY OF ERRORS AND SPECIAL NOTES

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NOTE     SECNO=  4500.000  PROFILE= 1  WSEL BASED ON X5 CARD
NOTE     SECNO=  4500.000  PROFILE= 2  WSEL BASED ON X5 CARD
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FLOODWAY DATA, GRES RIVER
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WATER SURFACE ELEVATION WITHOUT FLOODWAY	DIFFERENCE
0.000	167	921.	2.2	579.6	579.5	0.1
500.000	247.	1155.	1.7	579.7	579.6	0.1
1000.000	240.	1088.	1.8	579.8	579.7	0.1
1500.000	216.	1066.	1.9	579.9	579.8	0.1
2000.000	251.	989.	2.0	580.0	579.9	0.1
2500.000	249.	1100.	1.8	580.1	580.0	0.1
3000.000	199.	1003.	2.0	580.2	580.1	0.1
3500.000	255	1166.	1.7	580.3	580.2	0.1
4000.000	229.	1085.	1.8	580.4	580.3	0.1
4500.000	168.	937.	4.1	580.4	580.3	0.1
5560.000	191	1213.	3.1	581.2	581.1	0.1
6820.000	176.	1357.	2.8	581.7	581.6	0.1
7780.000	159.	1346.	2.8	581.9	581.9	0.0
8640.000	156	1429.	2.7	582.1	582.1	0.0
9230.000	152.	1395.	2.7	582.2	582.2	0.0
10430.000	143.	1353.	2.8	582.5	582.5	0.0
11940.000	140.	1274.	3.0	582.9	582.9	0.0
12400.000	111.	1003.	3.8	583.0	583.0	0.0
13180.000	119.	989.	3.9	583.4	583.4	0.0
13975.000	115.	859.	4.4	583.9	583.9	0.0
13976.000	115.	828.	4.6	583.9	583.9	0.0
14016.000	115.	831.	4.6	583.9	583.9	0.0
14017.000	115.	866.	4.4	583.9	583.9	0.0
14077.000	115.	868.	4.4	584.0	584.0	0.0
15000.000	115.	873	4.4	584.7	584.7	0.0
16000.000	268.	771.	5.0	585.6	585.6	0.0
17050.000	315	1109.	3.4	586.7	586.6	0.1
18565.000	496	1775.	2.2	587.8	587.7	0.1
20080.000	571.	2043.	1.9	588.4	588.3	0.1
21940.000	1700.	5798	0.7	588.7	588.6	0.1
24850.000	2141.	3779.	1.0	588.9	588.8	0.1
26560.000	1323.	2782.	1.4	589.1	589.0	0.1
28410.000	653.	1080.	3.5	589.6	589.5	0.1
29200.000	1221.	2896	1.3	590.3	590.2	0.1
30100.000	569.	1118.	3.4	590.4	590.3	0.1
31620.000	796	1512.	2.5	591.9	591.8	0.1
32260.000	1480	3793.	1.0	592.2	592.1	0.1
33000.000	1214.	2921.	1.3	592.3	592.2	0.1
33750.000	833.	2105.	1.8	592.5	592.4	0.1
34000.000	802	2051.	1.9	592.6	592.5	0.1

00BREAK00

1) COUNTY: Arenac

2) STUDY NAME: Au Gres City/Twp

3) WATERCOURSE: Au Gres River

4) DOCUMENT TYPE: Report

00BREAK00

City of Au Gres, Michigan
Township of Au Gres, Michigan
Limited Detail Flood Insurance Studies
Hydraulic Computation Background Information

The City of Au Gres and the Township of Au Gres Flood Insurance Studies are limited detail studies. Included in the City of Au Gres study are the segments of the Au Gres River, Sager Creek, and Saginaw Bay shoreline that are within the city's corporate boundaries. The segments of the Au Gres River and the Saginaw Bay shoreline that are included in the Township of Au Gres study are those within the township, but exclusive of those segments within the city's corporate boundaries.

The hydrology for the City of Au Gres and Township of Au Gres was approved previously.

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

The starting water surface elevation at Sager Creek's mouth was determined by the slope-area method. The water surface elevation was also specified at the upstream face of the Court Street Bridge. The water surface elevation was calculated based on inlet control through the bridge culverts and weir flow over the bridge. The inlet control of flow is the result of the sharp drop in channel invert immediately downstream of the bridge. This change in bottom elevation is due to the dredging of Sager Creek from its mouth to the bridge.

The segment of the HEC-2 program input data for the Au Gres River from the eastern end of the breakwater to Michigan Avenue was provided by the Michigan Department of Natural Resources. However, it was found that stationings of all cross sections were off by 4000 feet. Cross section geometry for the segment of the Au Gres River upstream of Michigan Avenue to the corporate limit were developed by field survey and used as a part of the HEC-2 input. The starting water surface elevation for the Au Gres River was determined from the annual long term mean lake level (1900 - 1986) and is proposed to be 579.5 feet NGVD (578.3 IGLD).

Both streams were treated as separate runs. For the encroached runs on the two streams, the computations were begun using the results from 100 - year profile runs.

The 100 - year flood elevation for the Saginaw Bay shoreline is proposed to be 583.5 feet NGVD. This value is the 100 - year water surface elevation for Reach G from the 1977 Report on Great Lakes Open - Coast Flood Levels.

00BREAK00

1) COUNTY: Arenac

2) STUDY NAME: City of Au Gres

3) WATERCOURSE: Au Gres River Channel

4) DOCUMENT TYPE: Summary

00BREAK00

City of Au Gres, MI - FIS
Unnamed channel

```
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                     3 APR 87 12:30:43

TERMINAL: 105
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THIS RUN EXECUTED 16 MAR 87 10:59:04

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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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C
T1      CITY OF AU GRES, MI - FIS
T2      500 CFS DISCHARGE
T3      CHANNEL

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0.        2.        0.        0.   0.000000    0.00      0.0       0.     579.100    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   201.000    0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC     0.040     0.040     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
QT     6.000   500.000  1000.000  1500.000  2000.000  2500.000  3000.000     0.000     0.000     0.000
          VALLEY CROSS SECTION A
X1     0.000    10.000  1590.000  1760.000     0.000     0.000     0.000     0.000     1.200     0 000
GR   579.000  1550.000   580.000  1590.000   579.000  1615.000   575.000  1625.000   572.500  1635.000
GR   572.300  1655 000   572.200  1700.000   572.300  1750.000   575.000  1755.000   581.000  1760.000

          VALLEY CROSS SECTION B
X1   183.000    10.000  1590.000  1760 000   183.000   183.000   183.000     0.000     1.200     0.000
GR   579 000  1550.000   580.000  1590.000   579.000  1615.000   575.000  1625.000   572.500  1635.000
GR   572.300  1655.000   572.200  1700.000   572.300  1750.000   575.000  1755.000   581.000  1760.000

          VALLEY CROSS SECTION C
X1   228.000    10.000  1590.000  1760.000    45.000    45.000    45.000     0.000     1 200     0.000
GR   579.000  1550.000   580 000  1590.000   579.000  1615.000   575.000  1625.000   572.500  1635 000
GR   572.300  1655.000   572.200  1700.000   572.300  1750.000   575.000  1755.000   581.000  1760.000

NC     0.000     0.000     0.000     0.500     1.000     0.000     0.000     0.000     0.000     0.000
X1   278 000    10.000  1590.000  1760.000    50.000    50.000    50.000     0.840     1.200     0.000
GR   579.000  1550.000   580.000  1590.000   579.000  1615.000   575.000  1625.000   572.800  1635.000
GR   572.600  1655.000   572.500  1700.000   572.600  1750.000   575.000  1755.000   581.000  1760.000

X1   353.000    10 000  1590.000  1760.000    75 000    75.000    75.000     0.600     1.200     0.000
GR   579.000  1550.000   580.000  1590.000   579.000  1615 000   575.000  1625.000   573.300  1635.000
GR   573.100  1655 000   573.000  1700.000   573.100  1750.000   575.000  1755.000   581.000  1760 000
```

VALLEY CROSS SECTION D

X1	413.000	11.000	1615.000	1701.000	60.000	60.000	60.000	0.000	1.200	0.000
GR	580.300	1573.000	582.000	1615.000	581.900	1615.000	580.800	1640.000	576.100	1650.000
GR	573.800	1660.000	573.500	1670.000	573.300	1680.000	573.300	1690.000	573.300	1700.000
GR	583.000	1701.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

VALLEY CROSS SECTION E

X1	465.000	11.000	1615.000	1701.000	52.000	52.000	52.000	0.000	1.200	0.000
GR	580.300	1573.000	582.000	1615 000	581.900	1615.000	580.800	1640.000	576.100	1650.000
GR	573.800	1660.000	573.500	1670.000	573.300	1680.000	573.300	1690.000	573.300	1700.000
GR	583.000	1701.000	0.000	0.000	0.000	0 000	0.000	0.000	0.000	0.000

VALLEY CROSS SECTION F

X1	514.000	11.000	1615.000	1701.000	49.000	49.000	49 000	0.000	1.200	0.000
GR	580.300	1573.000	582.000	1615.000	581.900	1615.000	580.800	1640.000	576.100	1650.000
GR	573.800	1660.000	573.500	1670.000	573.300	1680.000	573.300	1690.000	573.300	1700.000
GR	583.000	1701.000	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

THIS RUN EXECUTED 16 MAR 87 10:59:11

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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

CHANNEL

SUMMARY PRINTOUT TABLE 110

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
0.000	579.10	0.00	579.11	139.67	0.00	500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
0.000	579.10	0.00	579.13	139.67	0.00	1000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
0.000	579.10	0.00	579.17	139.67	0.00	1500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
0.000	579.10	0.00	579.22	139.67	0.00	2000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
0.000	579.10	0.00	579.29	139.67	0.00	2500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
0.000	579.10	0.00	579.37	139.67	0.00	3000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
183.000	579.11	0.00	579.11	139.69	0.00	500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
183.000	579.12	0.00	579.15	139.74	0.00	1000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
183.000	579.15	0.00	579.22	139.83	0.00	1500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
183.000	579.19	0.00	579.31	139.96	0.00	2000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
183.000	579.24	0.00	579.42	140.13	0.00	2500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
183.000	579.31	0.00	579.56	140.33	0.00	3000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
228.000	579.11	0.00	579.11	139.69	0.00	500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
228.000	579.13	0.00	579.16	139.76	0.00	1000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
228.000	579.16	0.00	579.23	139.88	0.00	1500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
228.000	579.21	0.00	579.33	140.04	0.00	2000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
228.000	579.28	0.00	579.45	140.26	0.00	2500.00	0.00	0.00	0.00	1590.00	1760.00	0.00
228.000	579.36	0.00	579.60	140.52	0.00	3000.00	0.00	0.00	0.00	1590.00	1760.00	0.00
278.000	579.11	0.00	579.12	117.34	0.00	500.00	0.00	0.00	0.00	1583.60	1726.40	0.00
278.000	579.14	0.00	579.18	117.41	0.00	1000.00	0.00	0.00	0.00	1583.60	1726.40	0.00
278.000	579.18	0.00	579.28	117.53	0.00	1500.00	0.00	0.00	0.00	1583.60	1726.40	0.00
278.000	579.24	0.00	579.42	117.70	0.00	2000.00	0.00	0.00	0.00	1583.60	1726.40	0.00
278.000	579.32	0.00	579.59	117.91	0.00	2500.00	0.00	0.00	0.00	1583.60	1726.40	0.00
278.000	579.42	0.00	579.79	118.19	0.00	3000.00	0.00	0.00	0.00	1583.60	1726.40	0.00
353.000	579.11	0.00	579.14	83.82	0.00	500.00	0.00	0.00	0.00	1574.00	1676.00	0.00
353.000	579.16	0.00	579.27	83.91	0.00	1000.00	0.00	0.00	0.00	1574.00	1676.00	0.00
353.000	579.23	0.00	579.46	84.06	0.00	1500.00	0.00	0.00	0.00	1574.00	1676.00	0.00
353.000	579.33	0.00	579.73	84.25	0.00	2000.00	0.00	0.00	0.00	1574.00	1676.00	0.00
353.000	579.45	0.00	580.04	84.49	0.00	2500.00	0.00	0.00	0.00	1574.00	1676.00	0.00
353.000	579.59	0.00	580.39	84.77	0.00	3000.00	0.00	0.00	0.00	1574.00	1676.00	0.00

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
413 000	579. 13	0 00	579. 21	54. 35	0. 00	500. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0 00
413. 000	579. 22	0. 00	579. 54	54. 56	0. 00	1000. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0 00
413. 000	579. 35	0 00	580. 03	54. 86	0. 00	1500. 00	0. 00	0. 00	0 00	1615. 00	1701. 00	0 00
413. 000	579. 52	0. 00	580. 63	55. 24	0. 00	2000. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0 00
413. 000	579. 72	0. 00	581. 30	55 69	0. 00	2500. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0. 00
413. 000	579. 94	0. 00	582. 01	56. 18	0. 00	3000. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0. 00
465. 000	579. 16	0. 00	579. 24	54. 42	0. 00	500. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0. 00
465 000	579. 34	0. 00	579. 65	54. 85	0. 00	1000. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0 00
465. 000	579 69	0. 00	580. 26	55. 62	0 00	1500. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0 00
465. 000	580. 22	0. 00	581. 04	56. 80	0. 00	2000 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0 00
465 000	580. 96	0. 00	581. 92	58. 44	0 00	2500. 00	0 00	0. 00	0. 00	1615. 00	1701. 00	0. 00
465. 000	581 83	0. 00	582. 85	68. 47	0. 89	2999. 11	0. 00	0 00	0. 00	1615. 00	1701. 00	0. 00
514. 000	579. 19	0. 00	579. 27	54. 49	0. 00	500. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0. 00
514. 000	579. 45	0. 00	579. 74	55. 07	0. 00	1000. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0. 00
514. 000	579. 92	0. 00	580 44	56. 12	0. 00	1500. 00	0 00	0 00	0. 00	1615. 00	1701. 00	0. 00
514. 000	580. 56	0. 00	581 27	57. 56	0. 00	2000. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0. 00
514. 000	581 32	0. 00	582. 16	59. 25	0. 00	2500. 00	0. 00	0. 00	0. 00	1615. 00	1701. 00	0 00
514. 000	582 18	0. 00	583. 08	82. 06	6 10	2993. 90	0. 00	0. 00	0. 00	1615. 00	1701. 00	0. 00

CHANNEL

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	573.40	500.00	579.10	0.00	579.11	0.30	0.69	723.52	907.18
0.000	0.00	0.00	0.00	573.40	1000.00	579.10	0.00	579.13	1.22	1.38	723.52	907.18
0.000	0.00	0.00	0.00	573.40	1500.00	579.10	0.00	579.17	2.73	2.07	723.52	907.18
0.000	0.00	0.00	0.00	573.40	2000.00	579.10	0.00	579.22	4.86	2.76	723.52	907.18
0.000	0.00	0.00	0.00	573.40	2500.00	579.10	0.00	579.29	7.59	3.46	723.52	907.18
0.000	0.00	0.00	0.00	573.40	3000.00	579.10	0.00	579.37	10.94	4.15	723.52	907.18
183.000	183.00	0.00	0.00	573.40	500.00	579.11	0.00	579.11	0.30	0.69	724.29	908.71
183.000	183.00	0.00	0.00	573.40	1000.00	579.12	0.00	579.15	1.20	1.38	726.62	913.30
183.000	183.00	0.00	0.00	573.40	1500.00	579.15	0.00	579.22	2.65	2.05	730.51	920.98
183.000	183.00	0.00	0.00	573.40	2000.00	579.19	0.00	579.31	4.61	2.72	735.95	931.77
183.000	183.00	0.00	0.00	573.40	2500.00	579.24	0.00	579.42	6.99	3.36	742.96	945.72
183.000	183.00	0.00	0.00	573.40	3000.00	579.31	0.00	579.56	9.71	3.99	751.53	962.88
228.000	45.00	0.00	0.00	573.40	500.00	579.11	0.00	579.11	0.30	0.69	724.48	909.09
228.000	45.00	0.00	0.00	573.40	1000.00	579.13	0.00	579.16	1.19	1.37	727.40	914.83
228.000	45.00	0.00	0.00	573.40	1500.00	579.16	0.00	579.23	2.63	2.05	732.29	924.51
228.000	45.00	0.00	0.00	573.40	2000.00	579.21	0.00	579.33	4.54	2.71	739.22	938.26
228.000	45.00	0.00	0.00	573.40	2500.00	579.28	0.00	579.45	6.83	3.34	748.23	956.27
228.000	45.00	0.00	0.00	573.40	3000.00	579.36	0.00	579.60	9.39	3.95	759.42	978.77
278.000	50.00	0.00	0.00	573.70	500.00	579.11	0.00	579.12	0.51	0.87	577.88	698.00
278.000	50.00	0.00	0.00	573.70	1000.00	579.14	0.00	579.18	2.02	1.72	580.85	703.65
278.000	50.00	0.00	0.00	573.70	1500.00	579.18	0.00	579.28	4.42	2.56	585.82	713.13
278.000	50.00	0.00	0.00	573.70	2000.00	579.24	0.00	579.42	7.58	3.37	592.81	726.52
278.000	50.00	0.00	0.00	573.70	2500.00	579.32	0.00	579.59	11.29	4.15	601.84	743.93
278.000	50.00	0.00	0.00	573.70	3000.00	579.42	0.00	579.79	15.30	4.89	613.61	766.86
353.000	75.00	0.00	0.00	574.20	500.00	579.11	0.00	579.14	1.40	1.33	376.31	423.21
353.000	75.00	0.00	0.00	574.20	1000.00	579.16	0.00	579.27	5.43	2.63	379.77	429.32
353.000	75.00	0.00	0.00	574.20	1500.00	579.23	0.00	579.46	11.58	3.88	386.25	440.85
353.000	75.00	0.00	0.00	574.20	2000.00	579.33	0.00	579.73	19.28	5.07	394.42	455.51
353.000	75.00	0.00	0.00	574.20	2500.00	579.45	0.00	580.04	27.83	6.18	404.53	473.88
353.000	75.00	0.00	0.00	574.20	3000.00	579.59	0.00	580.39	36.63	7.21	416.35	495.66
413.000	60.00	0.00	0.00	574.50	500.00	579.13	0.00	579.21	5.40	2.33	214.65	215.13
413.000	60.00	0.00	0.00	574.50	1000.00	579.22	0.00	579.54	20.11	4.55	219.81	223.01
413.000	60.00	0.00	0.00	574.50	1500.00	579.35	0.00	580.03	40.98	6.60	227.12	234.33
413.000	60.00	0.00	0.00	574.50	2000.00	579.52	0.00	580.63	64.40	8.45	236.58	249.22
413.000	60.00	0.00	0.00	574.50	2500.00	579.72	0.00	581.30	87.66	10.09	247.66	267.01
413.000	60.00	0.00	0.00	574.50	3000.00	579.94	0.00	582.01	109.20	11.54	259.90	287.08

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
465.000	52.00	0.00	0.00	574.50	500.00	579.16	0.00	579.24	5.27	2.31	216.43	217.83
465.000	52.00	0.00	0.00	574.50	1000.00	579.34	0.00	579.65	18.27	4.41	226.89	233.97
465.000	52.00	0.00	0.00	574.50	1500.00	579.69	0.00	580.26	32.21	6.10	246.00	264.32
465.000	52.00	0.00	0.00	574.50	2000.00	580.22	0.00	581.04	40.68	7.25	275.69	313.57
465.000	52.00	0.00	0.00	574.50	2500.00	580.96	0.00	581.92	41.52	7.86	318.12	387.98
465.000	52.00	0.00	0.00	574.50	3000.00	581.83	0.00	582.85	38.31	8.11	371.25	484.68
514.000	49.00	0.00	0.00	574.50	500.00	579.19	0.00	579.27	5.14	2.29	218.19	220.52
514.000	49.00	0.00	0.00	574.50	1000.00	579.45	0.00	579.74	16.99	4.30	232.39	242.59
514.000	49.00	0.00	0.00	574.50	1500.00	579.92	0.00	580.44	27.73	5.80	258.57	284.87
514.000	49.00	0.00	0.00	574.50	2000.00	580.56	0.00	581.27	33.21	6.78	295.10	347.04
514.000	49.00	0.00	0.00	574.50	2500.00	581.32	0.00	582.16	34.26	7.36	339.50	427.10
514.000	49.00	0.00	0.00	574.50	3000.00	582.18	0.00	583.08	34.54	7.63	398.08	510.43

CHANNEL

SUMMARY PRINTOUT TABLE 150

SECND	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
0.000	500.00	579.10	0.00	0.00	0.00	139.67	0.00
0.000	1000.00	579.10	0.00	0.00	0.00	139.67	0.00
0.000	1500.00	579.10	0.00	0.00	0.00	139.67	0.00
0.000	2000.00	579.10	0.00	0.00	0.00	139.67	0.00
0.000	2500.00	579.10	0.00	0.00	0.00	139.67	0.00
0.000	3000.00	579.10	0.00	0.00	0.00	139.67	0.00
183.000	500.00	579.11	0.00	0.01	0.00	139.69	183.00
183.000	1000.00	579.12	0.02	0.02	0.00	139.74	183.00
183.000	1500.00	579.15	0.03	0.05	0.00	139.83	183.00
183.000	2000.00	579.19	0.04	0.09	0.00	139.96	183.00
183.000	2500.00	579.24	0.05	0.14	0.00	140.13	183.00
183.000	3000.00	579.31	0.07	0.21	0.00	140.33	183.00
228.000	500.00	579.11	0.00	0.00	0.00	139.69	45.00
228.000	1000.00	579.13	0.02	0.01	0.00	139.76	45.00
228.000	1500.00	579.16	0.04	0.01	0.00	139.88	45.00
228.000	2000.00	579.21	0.05	0.02	0.00	140.04	45.00
228.000	2500.00	579.28	0.06	0.03	0.00	140.26	45.00
228.000	3000.00	579.36	0.08	0.05	0.00	140.52	45.00
278.000	500.00	579.11	0.00	0.00	0.00	117.34	50.00
278.000	1000.00	579.14	0.03	0.01	0.00	117.41	50.00
278.000	1500.00	579.18	0.04	0.02	0.00	117.53	50.00
278.000	2000.00	579.24	0.06	0.03	0.00	117.70	50.00
278.000	2500.00	579.32	0.08	0.04	0.00	117.91	50.00
278.000	3000.00	579.42	0.10	0.06	0.00	118.19	50.00
353.000	500.00	579.11	0.00	0.01	0.00	83.82	75.00
353.000	1000.00	579.16	0.04	0.02	0.00	83.91	75.00
353.000	1500.00	579.23	0.07	0.05	0.00	84.06	75.00
353.000	2000.00	579.33	0.10	0.09	0.00	84.25	75.00
353.000	2500.00	579.45	0.12	0.13	0.00	84.49	75.00
353.000	3000.00	579.59	0.14	0.17	0.00	84.77	75.00
413.000	500.00	579.13	0.00	0.01	0.00	54.35	60.00
413.000	1000.00	579.22	0.09	0.06	0.00	54.56	60.00
413.000	1500.00	579.35	0.13	0.12	0.00	54.86	60.00
413.000	2000.00	579.52	0.17	0.19	0.00	55.24	60.00
413.000	2500.00	579.72	0.20	0.27	0.00	55.69	60.00
413.000	3000.00	579.94	0.22	0.35	0.00	56.18	60.00

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
465.000	500.00	579.16	0.00	0.03	0.00	54.42	52.00
465.000	1000.00	579.34	0.19	0.13	0.00	54.85	52.00
465.000	1500.00	579.69	0.34	0.34	0.00	55.62	52.00
465.000	2000.00	580.22	0.54	0.70	0.00	56.80	52.00
465.000	2500.00	580.96	0.74	1.24	0.00	58.44	52.00
465.000	3000.00	581.83	0.87	1.89	0.00	68.47	52.00
514.000	500.00	579.19	0.00	0.03	0.00	54.49	49.00
514.000	1000.00	579.45	0.27	0.11	0.00	55.07	49.00
514.000	1500.00	579.92	0.46	0.23	0.00	56.12	49.00
514.000	2000.00	580.56	0.64	0.34	0.00	57.56	49.00
514.000	2500.00	581.32	0.76	0.36	0.00	59.25	49.00
514.000	3000.00	582.18	0.86	0.35	0.00	82.06	49.00

00BREAK00

1) COUNTY: ARENAC

2) STUDY NAME: ~~City of~~ Au Gres City

3) WATERCOURSE: Sager Creek

4) DOCUMENT TYPE: 100-YEAR NATURAL

00BREAK00

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*****************************************************
*  WATER SURFACE PROFILES                           *
*  VERSION OF NOVEMBER 1976                         *
*  UPDATED MAY 1984                                 *
*                                                   *
*  RUN DATE  17 APR 87 TIME    9:52:19              *
*****************************************************
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*************************************
*  U.S. ARMY CORPS OF ENGINEERS
*  THE HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616
*  (916) 440-2105 (FTS) 448-2105
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X         X     X            X     X
X     X  X         X                  X
XXXXXXX  XXXX      X          XXXXX    XXXXX
X     X  X         X                  X
X     X  X         X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
```

~~Tuppel~~ City of Au Gres, MI - FIS
100-year flood encroached run
Sager Creek
Input: SAGER.EN
Output: DSAGER2

Note: 100-yr Sag. Bay Flood Elev. = 584.1

THIS RUN EXECUTED 17 APR 87 9.52:19

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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      AU GRES, MI - FIS
T2      100 YEAR FLOOD
T3      SAGER CREEK

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0.        2.        0.        0    0.000000    0.00      0.0       0.    573 250    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

    150.000   110 000   200.000   0 000     0.000     0.000     0.000     0.000     0.000     0.000

NC      0.060     0.060     0.035     0.100     0.300     0.000     0.000     0.000     0 000     0 000
QT      2.000   280.000   280.000     0.000     0.000     0.000     0.000     0.000     0 000     0.000
ET      0.000     0.000     1 400     0 000     0.000     0.000     0.000     0.000     0.000     0.000
          CONFLUENCE OF SAGER CREEK WITH AU GRES RIVER
X1      0.000    71 000   267.000   349 000     0.000     0 000     0 000     0.000    -1.200     0.000
GR    582 100     0.000   582.200    10.000   582.000    20.000   582.000    30 000   581 900    40.000
GR    582.000    50.000   582 000    60.000   582.100    70.000   582.100    80.000   582.100    90 000
GR    582.300   100 000   582.400   110 000   582.200   120.000   582.300   130 000   582.300   140.000
GR    582 100   150.000   582.000   160.000   582 200   170.000   582 000   180.000   582.200   190.000
GR    582.100   200 000   582.300   210.000   582.200   220.000   581.800   230.000   582.100   240 000
GR    582.000   250.000   582.200   260.000   582 600   265.000   581.600   267.000   579.800   270.000
GR    577.600   275.000   576.200   280.000   574.600   285.000   572.800   290.000   572.100   295.000
GR    571 900   300.000   571.800   305.000   571.800   310.000   571.700   315.000   571.400   320.000
GR    571.500   325 000   571.600   330 000   573.300   335.000   574.600   340.000   576 600   345.000
GR    580 800   349.000   583.800   350.000   583.800   360.000   583 800   370.000   583 900   380.000
GR    583.900   390 000   583.800   400.000   583.900   410.000   583 900   420.000   583 900   430.000
GR    583.800   440.000   583.900   450 000   584.100   460.000   584.000   470.000   583.900   480.000
GR    583 800   490.000   583.800   500.000   583.700   510.000   583.600   520.000   583 600   530.000
GR    583.500   540 000   583.900   550.000   584.600   554.000   584.900   565.000   584 900   576.000
GR    584.400   580.000     0.000     0.000     0.000     0.000     0.000     0 000     0.000     0.000

          CROSS SECTION A
          SAGER CREEK HAS BEEN DREDGED FROM DOWNSTREAM TO THIS SECTION.
X1   1195.000    71.000   267.000   349 000  1195.000  1195 000  1195.000     0.000     0.000     0.000
GR    582.100     0.000   582.200    10.000   582.000    20.000   582.000    30.000   581.900    40.000
GR    582 000    50.000   582.000    60.000   582.100    70 000   582.100    80.000   582.100    90 000
GR    582.300   100.000   582.400   110.000   582.200   120.000   582.300   130.000   582 300   140.000
GR    582 100   150 000   582.000   160.000   582 200   170 000   582.000   180.000   582 200   190 000
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GR    582.100    200.000    582.300    210.000    582.200    220.000    581.800    230 000    582.100    240.000
GR    582.000    250.000    582.200    260.000    582.600    265.000    581.600    267 000    579 800    270.000
GR    577 600    275.000    576.200    280 000    574.600    285.000    572.800    290.000    572.100    295.000
GR    571 900    300.000    571.800    305.000    571 800    310.000    571.700    315.000    571 400    320.000
GR    571.500    325 000    571.600    330.000    573 300    335.000    574 600    340.000    576.600    345 000
GR    580.800    349.000    583.800    350.000    583 800    360.000    583.800    370.000    583.900    380 000
GR    583.900    390.000    583.800    400.000    583.900    410.000    583.900    420.000    583.900    430.000
GR    583.800    440 000    583.900    450 000    584.100    460 000    584.000    470.000    583.900    480.000
GR    583 800    490.000    583.800    500 000    583.700    510.000    583.600    520.000    583.600    530.000
GR    583.500    540.000    583 900    550 000    584.600    554.000    584.900    565.000    584.900    576.000
GR    584.400    580.000      0.000      0.000      0.000      0 000      0.000      0.000      0.000      0.000

          CROSS SECTION A MOVED UPSTREAM
X1   1279.000      0 000      0.000      0.000     84.000     84.000     84.000      0.000      3.810      0 000

          CROSS SECTION A MOVED UPSTREAM
X1   1312.000      0.000      0.000      0.000     33 000     33 000     33 000      0.000      1.490      0 000

NC      0 060      0.060      0.035      0.000      0 000      0.000      0.000      0.000      0 000      0.000
ET      0.000      4.100      4.100    248.000    259.000      0 000      0.000      0.000      0.000      0.000
          CROSS SECTION IMMEDIATELY DOWNSTREAM FROM COURT STREET BRIDGE
X1   1345 000     35.000    240.000    260 000     33 000     33.000     33.000      0.000      0.000      0.000
GR    585.000      0.000    585.000     20.000    585.100     30.000    585.100    120.000    585.000    130.000
GR    585 000    160 000    585.100    170 000    585.100    240 000    580.700    248.000    579.200    248.500
GR    578.700    250.000    579.200    251.500    580.700    252.000    580.200    255 000    578 700    255.500
GR    578.200    257.000    578 700    258 500    580.200    259.000    585.300    260.000    585.200    270.000
GR    585.100    280.000    585 000    290.000    585.000    420.000    584.900    430.000    584.900    450.000
GR    585.000    460.000    585.000    470.000    585.100    480.000    585.100    520.000    585.000    530.000
GR    585 000    560 000    584 500    570.000    584 000    580.000    583.900    590.000    583.700    600 000

NC      0.070      0 070      0.024      0.300      0.500      0.000      0 000      0.000      0 000      0 000
ET      0 000      4.100      4.100    248.000    259.000      0.000      0 000      0.000      0.000      0 000
          DOWNSTREAM FACE OF COURT STREET BRIDGE
X1   1346.000      0.000      0.000      0.000      1.000      1.000      1.000      0.000      0.000      0.000
BT    -13.000    240.000    585.100      0 000    248 000    585.300    580 700    248.500    585 300    582 200
BT      0.000    250.000    585 400    582.700    251 500    585.400    582.200    252.000    585.400    580.700
BT      0 000    255.000    585.400    580.200    255.500    585 300    581.700    257.000    585.300    582.200
BT      0.000    258.500    585.300    581.700    259.000    585.300    580 200    260.000    585.300    581 700
BT      0.000    270.000    585.200      0 000      0 000      0.000      0.000      0 000      0.000      0.000

ET      0.000      4.100      4.100    240.000    270.000      0 000      0.000      0.000      0 000      0 000
          UPSTREAM FACE OF COURT STREET BRIDGE
          INLET CONTROL OCCURS AT THE COURT STREET CULVERTS   WEIR FLOW
          ALSO OCCURS   THE WATER SURFACE ELEVATION AT THE BRIDGE'S
          UPSTREAM FACE WAS CALCULATED AND IS INPUT USING AN X5 CARD.
X1   1384.000      0.000      0.000      0 000     38.000     38.000     38.000      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
X5      2 000    585.900    586.000      0.000      0 000      0.000      0.000      0.000      0.000      0.000
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NC      0.070      0 070      0.042      0.000      0.000      0.000      0.000      0.000      0.000      0.000
ET      0.000      4.100      4.100    240.000    270 000      0 000      0.000      0.000      0.000      0.000
            CROSS SECTION IMMEDIATELY UPSTREAM FROM COURT STREET BRIDGE
X1   1385.000      0.000      0 000      0.000      1.000      1.000      1.000      0.000      0.000      0.000

ET      0.000      0.000      4.100    200.000    430 000      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION AT COURT ST.  BRIDGE MOVED UPSTREAM
X1   2000.000      0 000      0.000      0.000    615.000    615.000    615.000      0.000      0.270      0.000

NC      0 050      0.070      0.042      0 100      0.300      0.000      0.000      0.000      0.000      0.000
ET      0 000      0.000      4.100     90.000    420.000      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION B MOVED DOWNSTREAM
X1   2633 000     57 000    266.000    288.000    632 000    632.000    632.000      0.000     -0.270      0 000
GR    583.900      0 000    583.900     10.000    583.800     20.000    583.900     30 000    584.000     40.000
GR    583.900     50.000    584.100     60.000    584.000     70 000    583.800     80.000    583 900     90 000
GR    583 900    100.000    584 100    110.000    584 000    120.000    584.000    130.000    584 100    140.000
GR    583 900    150.000    584.000    160.000    584 100    170.000    584.000    180.000    583.900    190.000
GR    583.900    200.000    584.000    210.000    583.900    220 000    584.000    230.000    583.900    240.000
GR    583.900    250.000    583.400    260.000    583.000    266.000    582.100    270 000    579.700    275.000
GR    579.000    280 000    581.700    285.000    582.800    288.000    583.800    290 000    584.600    300.000
GR    584 300    310.000    584.100    320 000    584.200    330.000    584.100    340.000    583.800    350.000
GR    583.800    360.000    583.800    370.000    583.700    380.000    583.700    390.000    583.500    400.000
GR    583.500    410.000    583.400    420.000    583.500    430.000    583.300    440.000    583.100    450.000
GR    583 200    460.000    583.000    470.000    582.900    480.000    583.100    490 000    583 000    500.000
GR    583.100    510 000    582 000    520.000      0 000      0.000      0.000      0.000      0.000      0.000

ET      0.000      0 000      4.100     90 000    420.000      0.000      0.000      0.000      0.000      0.000
            CROSS SECTION B
X1   3265.000     57 000    266.000    288.000    632.000    632.000    632.000      0.000      0 000      0.000
GR    583.900      0 000    583.900     10.000    583.800     20.000    583.900     30.000    584 000     40.000
GR    583.900     50.000    584.100     60.000    584.000     70.000    583.800     80.000    583 900     90.000
GR    583.900    100.000    584.100    110.000    584.000    120 000    584.000    130 000    584 100    140.000
GR    583.900    150 000    584 000    160.000    584.100    170.000    584 000    180.000    583.900    190.000
GR    583 900    200.000    584.000    210.000    583.900    220.000    584.000    230.000    583 900    240.000
GR    583.900    250 000    583 400    260.000    583.000    266 000    582.100    270.000    579.700    275.000
GR    579 000    280.000    581.700    285.000    582.800    288.000    583.800    290.000    584.600    300 000
GR    584.300    310.000    584.100    320 000    584.200    330.000    584.100    340.000    583.800    350.000
GR    583.800    360 000    583.800    370.000    583.700    380.000    583.700    390.000    583.500    400.000
GR    583 500    410.000    583.400    420.000    583.500    430.000    583.300    440.000    583.100    450.000
GR    583.200    460.000    583.000    470.000    582.900    480 000    583.100    490.000    583.000    500.000
GR    583 100    510.000    582 000    520 000      0 000      0.000      0.000      0.000      0.000      0.000

ET      0.000      0.000      4.100    100 000    410.000      0.000      0.000      0.000      0.000      0.000
            UPSTREAM STUDY LIMIT - CROSS SECTION B REPEATED UPSTREAM
X1   4000.000      0.000      0 000      0.000    735.000    735 000    735.000      0.000      0.310      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=   0.100 CEHV=   0.300
*SECNO 0.000
          CONFLUENCE OF SAGER CREEK WITH AU GRES RIVER
     0.00      3.05    573.25      0.00    573.25    573.33      0.08      0.00      0.00    580.40
     280.        0.      280.        0.        0.      122.        0.         0         0.    579.60
     0.00      0.00      2.29      0.00     0.000     0.035     0.000     0.000    570.20    285.42
 0.000996         0        0.        0.         0         0         0      0.00     54.01    339.42

*SECNO 1195.000
          CROSS SECTION A
          SAGER CREEK HAS BEEN DREDGED FROM DOWNSTREAM TO THIS SECTION
  1195.00      3.05    574.45      0.00      0.00    574.53      0.08      1.20      0.00    581.60
     280.        0       280.        0         0      122.        0         3         1      580.80
     0.14      0.00      2.30      0.00     0.000     0.035     0.000     0.000    571.40    285.44
 0.001009     1195.     1195.     1195.         0         0         0      0.00     53.94    339.39

*SECNO 1279.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
          CROSS SECTION A MOVED UPSTREAM
  1279.00      1.52    576.73    576.73      0.00    577.27      0.54      0.22      0.14    585.41
     280.        0.      280.        0.        0.       47.        0.        4.         2      584.61
     0.15      0.00      5.92      0.00     0.000     0.035     0.000     0.000    575.21    289.67
 0.017943       84.       84.       84.        20         8         0      0.00     44.20    333.88

*SECNO 1312.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
          CROSS SECTION A MOVED UPSTREAM
  1312.00      1.52    578.22    578.22      0.00    578.76      0.54      0.59      0.00    586.90
     280.        0.      280.        0         0.       47        0.        4.         2.      586.10
     0.15      0.00      5.91      0.00     0.000     0.035     0.000     0.000    576.70    289.67
 0.017858       33.       33.       33.        20         5         0      0.00     44.21    333.88
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579.5

100yr on
Bay = 584.1
This Elev. controls

```
  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 1345 000

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS=     248.0     259 0  TYPE=     1  TARGET=     11.000
           CROSS SECTION IMMEDIATELY DOWNSTREAM FROM COURT STREET BRIDGE
  1345.00     3 86    582.06    582.06     0 00    583.44     1.38     0.72     0 25100000.00
     280.       0.      280.       0.        0        30       0.       4.        2.  100000.00
     0.15     0.00     9 43     0.00     0.000     0 035    0.000    0 000    578 20    248.00
 0.027051      33.       33        33        20        20        0     0.00     11.00    259.00

CCHV=   0.300 CEHV=   0 500
*SECNO 1346 000

4575 CRITICAL DEPTH ASSUMED BELOW ELLC OF   582.700 EGLC=   584.814 EGC=   587.255 WSEL=   585 961

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  585.10 MAX ELLC=  582 70

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

3470 ENCROACHMENT STATIONS=     248 0     259.0  TYPE=     1  TARGET=     11.000
           DOWNSTREAM FACE OF COURT STREET BRIDGE
  1346.00     3 76    581.96    581.96     0.00    584 40     2 44     0.03     0.53100000 00
     280.       0      280.       0.        0        22.       0.       4         2.  100000.00
     0 15     0.00     12.55     0.00     0.000     0.024    0.000    0.000    578.20    248.00
 0.035651       1        1.        1.        20        18        0    -6.25     11.00    259.00

*SECNO 1384 000
 WATER EL=X5 CARD=   585.900

4575 CRITICAL DEPTH ASSUMED BELOW ELLC OF   582.700 EGLC=   584.813 EGC=   586.701 WSEL=   585.934
```

Use 584.1 as controlling F.P. elev.

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

3280 CROSS SECTION   1384.00 EXTENDED      2 20 FEET

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 13 MIN ELTRD=  585.10 MAX ELLC=  582.70

3470 ENCROACHMENT STATIONS=     240.0     270.0  TYPE=     1  TARGET=      30.000
           UPSTREAM FACE OF COURT STREET BRIDGE
           INLET CONTROL OCCURS AT THE COURT STREET CULVERTS.  WEIR FLOW
           ALSO OCCURS.  THE WATER SURFACE ELEVATION AT THE BRIDGE'S
           UPSTREAM FACE WAS CALCULATED AND IS INPUT USING AN X5 CARD.
  1384.00     7 70   585.90   581.96     0.00   586.70     0.80     0.98     0.49   585.10
     280.       0.     266.      14.        0      36.       6.       4.       2.   585.30
     0.15     0.00     7 35     2.12    0.000    0.024    0.070    0.000   578.20   240.00
 0.019477      38.      38.      38.        0       18        0   -62.90    30.00   270.00

*SECNO 1385.000
3280 CROSS SECTION   1385.00 EXTENDED      3.15 FEET

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     240.0     270.0  TYPE=     1  TARGET=      30.000
           CROSS SECTION IMMEDIATELY UPSTREAM FROM COURT STREET BRIDGE
  1385.00     8.64   586.84     0.00     0.00   586.92     0.08     0.00     0 22   585.10
     280        0.     269.       11        0.     118.      16.       4.        2   585.30
     0.15     0.00     2.28     0.70    0.000    0 042    0.070    0.000   578.20   240.00
 0 000718       1.       1.       1.        2        0        0     0 00    30.00   270.00

*SECNO 2000.000
3280 CROSS SECTION   2000.00 EXTENDED      3.05 FEET

           CROSS SECTION AT COURT ST.  BRIDGE MOVED UPSTREAM
  2000.00     8.54   587.01     0.00     0.00   587.01     0.00     0 07     0.02   585.37
     280.      80.       68      132.     402.     116.     620.      13.       6.   585.57
     0 72     0 20     0.58     0 21    0.070    0.042    0.070    0.000   578.47     0.00
 0 000045     615.      615     615.        3        0        0     0.00   600.00   600.00
```

Stage is about 1 to 1½ feet high

```
  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 2633.000
3280 CROSS SECTION   2633.00 EXTENDED      5.29 FEET

          CROSS SECTION B MOVED DOWNSTREAM
  2633.00     8.29    587.02     0.00      0.00    587.02     0.00      0.01      0.00    582.73
     280      139.       38.     103.      895.      140.     869.       35.       14.     582.53
    1.84      0.15      0.27     0.12     0.050     0.042    0.070     0.000    578.73      0.00
 0.000005     632       632.     632.         2         0        0      0.00    520.00    520.00


*SECNO 3265.000
3280 CROSS SECTION   3265.00 EXTENDED      5.03 FEET

          CROSS SECTION B
  3265.00     8.03    587.03     0.00      0.00    587.03     0.00      0.00      0.00    583.00
     280      137.       40.     103.      826.      135.     809.       61        22.     582.80
    2.87      0.17      0.30     0.13     0.050     0.042    0.070     0.000    579.00      0.00
 0.000007     632.      632.     632.         1         0        0      0.00    520.00    520.00


*SECNO 4000.000
3280 CROSS SECTION   4000.00 EXTENDED      4.72 FEET

          UPSTREAM STUDY LIMIT - CROSS SECTION B REPEATED UPSTREAM
  4000.00     7.72    587.03     0.00      0.00    587.03     0.00      0.01      0.00    583.31
     280.     134        43     103.      743       128.     736        90        31.     583.11
    3.95      0.18      0.34     0.14     0.050     0.042    0.070     0.000    579.31      0.00
 0.000009     735.      735.     735.         0         0        0      0.00    520.00    520.00
```

Stage is about 1-1½ ft high, no impact on existing structures

00BREAK00

1) COUNTY: Arenac

2) STUDY NAME: City of Au Gres

3) WATERCOURSE: Sager Creek

4) DOCUMENT TYPE: Encroached

00BREAK00

THIS RUN EXECUTED 17 APR 87 9.52.23

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

T1 AU GRES, MI - FIS
T2 100YEAR FLOOD - ENCROACHED RUN
T3 SAGER CREEK

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	3.	0.	0.	0.000000	0.00	0.0	0.	573.350	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=   0.100 CEHV=   0 300
*SECNO 0.000
 2800 NAT Q1=      88 72  WSEL=     573.25  ENC Q1=      94.59  WSEL=     573 35  RATIO= -0.0662
 NAT Q1=      95.  RATIOS LOB,CH,ROB=  0.0000  1.0000  0 0000  WSEL=     573.35

3470 ENCROACHMENT STATIONS=     267.0     349.0  TYPE=     4  TARGET=       0.000
          CONFLUENCE OF SAGER CREEK WITH AU GRES RIVER
     0.00      3 15    573.35     0.00    573.25    573.42     0 07      0.00      0.00    580.40
     280.        0.      280.       0.         0      128.        0        0.        0.     579 60
     0.00      0.00     2 19     0.00     0.000     0.035    0.000     0.000    570 20    285.14
 0.000876        0.        0.       0.         0         0        0     0 00     54.67    339 81


*SECNO 1195.000
 2800 NAT Q1=      88.15  WSEL=     574.45  ENC Q1=      94.44  WSEL=     574.55  RATIO= -0 0713
 NAT Q1=      94.  RATIOS LOB,CH,ROB=  0.0000  1 0000  0.0000  WSEL=     574 55

3470 ENCROACHMENT STATIONS=     267 0     349.0  TYPE=     4  TARGET=       0.000
           CROSS SECTION A
           SAGER CREEK HAS BEEN DREDGED FROM DOWNSTREAM TO THIS SECTION.
  1195.00      3.06    574 46     0.00    574.45    574.54     0.08      1 11      0.00    581.60
     280.        0.      280.       0.         0      123        0.        3.        1.     580.80
     0.15      0 00     2.28     0.00     0 000     0.035    0.000     0 000    571.40    285.40
 0.000988     1195.    1195.    1195.         2         0        0     0 00     54.05    339.45


*SECNO 1279.000
 2800 NAT Q1=      20.90  WSEL=     576 73  ENC Q1=      24.06  WSEL=     576.83  RATIO= -0.1513
 NAT Q1=      24.  RATIOS LOB,CH,ROB=  0 0000  1.0000  0.0000  WSEL=     576.83
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     267 0     349.0  TYPE=     4  TARGET=       0.000
          CROSS SECTION A MOVED UPSTREAM
  1279.00      1.52    576.73   576.73    576 73    577.27     0.55      0.22      0 14    585.41
     280.        0.      280        0.         0.      47.        0.        4.        2.     584 61
     0.15      0 00     5 93     0 00     0.000     0 035    0.000     0.000    575.21    289.68
 0 018013       84.      84.      84.        20         8        0     0 00     44.20    333.87
```

```
  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 1312.000
 2800 NAT Q1=     20.95  WSEL=    578.22  ENC Q1=     24 12  WSEL=    578.32  RATIO= -0.1510
 NAT Q1=     24.  RATIOS LOB,CH,ROB=  0 0000  1.0000  0.0000  WSEL=    578.32
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     267.0     349.0  TYPE=     4  TARGET=       0.000
          CROSS SECTION A MOVED UPSTREAM
  1312.00     1 52   578.22   578 22   578 22   578.76     0.54     0.59     0.00   586 90
     280        0     280.       0.       0.      47.        0        4.       2.    586.10
     0 15     0.00    5.91     0.00    0.000    0.035    0.000    0.000   576.70   289.67
 0 017841     33.     33.      33        20        5        0     0.00    44.21   333.88

*SECNO 1345 000

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS=     248.0     259.0  TYPE=     1  TARGET=      11.000
          CROSS SECTION IMMEDIATELY DOWNSTREAM FROM COURT STREET BRIDGE
  1345.00     3 86   582.06   582.06   582 06   583.44     1 38     0.72     0.25100000 00
     280        0.     280.       0.       0       30.        0        4.       2.  100000 00
     0.15     0.00    9.43     0.00    0.000    0.035    0 000    0.000   578 20   248.00
 0.027051     33      33.      33        20        20        0     0.00    11.00   259.00

CCHV=   0.300 CEHV=   0 500
*SECNO 1346.000

4575 CRITICAL DEPTH ASSUMED BELOW ELLC OF   582 700 EGLC=   584.814 EGC=   587.255 WSEL=   595.961

3301 HV CHANGED MORE THAN HVINS


3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  585 10 MAX ELLC=  582.70

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
```

```
  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

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     248.0     259.0  TYPE=     1  TARGET=     11.000
           DOWNSTREAM FACE OF COURT STREET BRIDGE
  1346.00     3.76   581.96   581 96   581 96   584.40     2 44     0 03     0.53100000.00
     280.        0     280.       0.       0.      22.        0        4        2.  100000.00
     0.15     0 00    12 55     0.00    0 000    0.024    0.000    0 000   578.20   248 00
 0.035651        1       1.        1       20       18        0    -6.25    11.00   259.00

*SECNO 1384.000
 WATER EL=X5 CARD=   586.000
3280 CROSS SECTION   1384 00 EXTENDED      2 30 FEET

3370 NORMAL BRIDGE,NRD= 13 MIN ELTRD=  585 10 MAX ELLC=  582.70

3470 ENCROACHMENT STATIONS=     240.0     270.0  TYPE=     1  TARGET=     30.000
           UPSTREAM FACE OF COURT STREET BRIDGE
           INLET CONTROL OCCURS AT THE COURT STREET CULVERTS   WEIR FLOW
           ALSO OCCURS   THE WATER SURFACE ELEVATION AT THE BRIDGE'S
           UPSTREAM FACE WAS CALCULATED AND IS INPUT USING AN X5 CARD.
  1384.00     7 80   586.00     0.00   585.90   586.70     0 70     0.87     0 52   585.10
     280.        0     264.      16.        0       38       7.       4.        2.   585.30
     0 15     0 00     6.92     2.11    0.000    0.024    0 070    0.000   578.20   240.00
 0 016081       38.      38.      38.        0        0        0   -62.90    30 00   270.00

*SECNO 1385.000
3280 CROSS SECTION   1385.00 EXTENDED      3.12 FEET

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     240.0     270.0  TYPE=     1  TARGET=     30 000
           CROSS SECTION IMMEDIATELY UPSTREAM FROM COURT STREET BRIDGE
  1385.00     8.62   586.82     0 00   586.84   586.89     0 08     0.00     0.19   585.10
     280        0.     269.      11.        0.     118.      16.       4.        2.   585 30
     0.15     0.00     2.29     0.70    0.000    0.042    0.070    0.000   578.20   240.00
 0.000730       1.       1.       1.        2        0        0     0.00    30 00   270.00
```

```
  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 2000 000
3280 CROSS SECTION   2000.00 EXTENDED      3 12 FEET

3470 ENCROACHMENT STATIONS=     200.0     430.0  TYPE=     1  TARGET=     230.000
          CROSS SECTION AT COURT ST. BRIDGE MOVED UPSTREAM
  2000.00     8.62   587 09     0.00   587.01   587 10     0.01     0 19     0.02   585.37
     280       26      132.      122      69.      117      305.       8        3.    585 57
     0.38     0.38    1 12     0.40    0.070    0 042    0 070    0 000   578 47   200.00
 0.000164     615.     615.     615        4        0        0     0.00   230.00   430.00

CCHV=   0.100 CEHV=   0.300
*SECNO 2633 000
3280 CROSS SECTION   2633.00 EXTENDED      5 39 FEET

3470 ENCROACHMENT STATIONS=      90.0     420 0  TYPE=     1  TARGET=     330.000
          CROSS SECTION B MOVED DOWNSTREAM
  2633.00     8.39   587.12     0.00   587 02   587.12     0.00     0.02     0.00   582.73
     280.     144       59.      78.     609.      143     462.      20.       8.    582.53
     1 08     0.24     0.41     0.17    0.050    0 042    0.070    0.000   578.73    90.00
 0.000012     632      632      632        2        0        0     0.00   330.00   420.00

*SECNO 3265 000
3280 CROSS SECTION   3265.00 EXTENDED      5.13 FEET

3470 ENCROACHMENT STATIONS=      90.0     420.0  TYPE=     1  TARGET=     330.000
          CROSS SECTION B
  3265 00     8 13   587 13     0.00   587.03   587 13     0 00     0.01     0.00   583.00
     280.     142.      62       77      563      137.     427.      37.      12.    582 80
     1.71     0.25     0 45     0 18    0 050    0.042    0.070    0.000   579.00    90.00
 0.000015     632.     632      632        2        0        0     0 00   330.00   420.00

*SECNO 4000.000
3280 CROSS SECTION   4000.00 EXTENDED      4.83 FEET

3470 ENCROACHMENT STATIONS=     100.0     410.0  TYPE=     1  TARGET=     310.000
          UPSTREAM STUDY LIMIT - CROSS SECTION B REPEATED UPSTREAM
```

Stage ~1-1½ Ft high however no impact on existing structures

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
4000 00	7.83	587.14	0.00	587.03	587 14	0.00	0.01	0.00	583 31
280.	138.	69	72.	481.	130.	354.	55.	18.	583.11
2.34	0.29	0.53	0.20	0 050	0.042	0.070	0.000	579.31	100.00
0 000023	735.	735.	735.	0	0	0	0.00	310 00	410.00

THIS RUN EXECUTED 17 APR 87 9:52:25

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

SAGER CREEK

SUMMARY PRINTOUT TABLE 110

	SECND	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
	0.000	573.25	0.00	573.33	54.01	0.00	280.00	0.00	0.00	0.00	267.00	349.00	0.00
	0.000	573.35	0.10	573.42	54.67	0.00	280.00	0.00	0.00	267.00	267.00	349.00	349.00
	1195.000	574.45	0.00	574.53	53.94	0.00	280.00	0.00	0.00	0.00	267.00	349.00	0.00
	1195.000	574.46	0.01	574.54	54.05	0.00	280.00	0.00	0.00	267.00	267.00	349.00	349.00
*	1279.000	576.73	0.00	577.27	44.20	0.00	280.00	0.00	0.00	0.00	267.00	349.00	0.00
*	1279.000	576.73	0.00	577.27	44.20	0.00	280.00	0.00	0.00	267.00	267.00	349.00	349.00
*	1312.000	578.22	0.00	578.76	44.21	0.00	280.00	0.00	0.00	0.00	267.00	349.00	0.00
*	1312.000	578.22	0.00	578.76	44.21	0.00	280.00	0.00	0.00	267.00	267.00	349.00	349.00
*	1345.000	582.06	0.00	583.44	11.00	0.00	280.00	0.00	11.00	248.00	240.00	260.00	259.00
*	1345.000	582.06	0.00	583.44	11.00	0.00	280.00	0.00	11.00	248.00	240.00	260.00	259.00
*	1346.000	581.96	0.00	584.40	11.00	0.00	280.00	0.00	11.00	248.00	240.00	260.00	259.00
*	1346.000	581.96	0.00	584.40	11.00	0.00	280.00	0.00	11.00	248.00	240.00	260.00	259.00
*	1384.000	585.90	0.00	586.70	30.00	0.00	266.19	13.81	30.00	240.00	240.00	260.00	270.00
*	1384.000	586.00	0.10	586.70	30.00	0.00	264.17	15.83	30.00	240.00	240.00	260.00	270.00
	1385.000	586.84	0.00	586.92	30.00	0.00	268.75	11.25	30.00	240.00	240.00	260.00	270.00
	1385.000	586.82	-0.03	586.89	30.00	0.00	268.98	11.02	30.00	240.00	240.00	260.00	270.00
	2000.000	587.01	0.00	587.01	600.00	80.17	67.74	132.09	0.00	0.00	240.00	260.00	0.00
	2000.000	587.09	0.08	587.10	230.00	26.08	132.11	121.81	230.00	200.00	240.00	260.00	430.00
	2633.000	587.02	0.00	587.02	520.00	138.66	38.16	103.18	0.00	0.00	266.00	288.00	0.00
	2633.000	587.12	0.10	587.12	330.00	143.52	58.65	77.82	330.00	90.00	266.00	288.00	420.00
	3265.000	587.03	0.00	587.03	520.00	136.66	40.10	103.24	0.00	0.00	266.00	288.00	0.00
	3265.000	587.13	0.10	587.13	330.00	141.56	61.52	76.92	330.00	90.00	266.00	288.00	420.00

SECND	CWSEL	DIFKWS	EG	TOPWID	GLOB	GCH	GROB	PERENC	STENCL	STCHL	STCHR	STENCR
4000.000	587.03	0 00	587 03	520.00	133.79	42.90	103.31	0.00	0.00	266.00	288.00	0.00
4000.000	587.14	0 11	587.14	310.00	138.43	69.21	72 36	310.00	100.00	266.00	288.00	410.00

SAGER CREEK

SUMMARY PRINTOUT TABLE 150

	SECND	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
	0.000	0.00	0.00	0.00	570.20	280.00	573.25	0.00	573.33	9.96	2.29	122.32	88.72
	0.000	0.00	0.00	0.00	570.20	280.00	573.35	0.00	573.42	8.76	2.19	127.76	94.59
	1195.000	1195.00	0.00	0.00	571.40	280.00	574.45	0.00	574.53	10.09	2.30	121.79	88.15
	1195.000	1195.00	0.00	0.00	571.40	280.00	574.46	0.00	574.54	9.88	2.28	122.66	89.08
*	1279.000	84.00	0.00	0.00	575.21	280.00	576.73	576.73	577.27	179.43	5.92	47.29	20.90
*	1279.000	84.00	0.00	0.00	575.21	280.00	576.73	576.73	577.27	180.13	5.93	47.23	20.86
*	1312.000	33.00	0.00	0.00	576.70	280.00	578.22	578.22	578.76	178.58	5.91	47.36	20.95
*	1312.000	33.00	0.00	0.00	576.70	280.00	578.22	578.22	578.76	178.41	5.91	47.37	20.96
*	1345.000	33.00	0.00	0.00	578.20	280.00	582.06	582.06	583.44	270.51	9.43	29.68	17.02
*	1345.000	33.00	0.00	0.00	578.20	280.00	582.06	582.06	583.44	270.51	9.43	29.68	17.02
*	1346.000	1.00	585.10	582.70	578.20	280.00	581.96	581.96	584.40	356.51	12.55	22.32	14.83
*	1346.000	1.00	585.10	582.70	578.20	280.00	581.96	581.96	584.40	356.51	12.55	22.32	14.83
*	1384.000	38.00	585.10	582.70	578.20	280.00	585.90	581.96	586.70	194.77	7.35	42.70	20.06
*	1384.000	38.00	585.10	582.70	578.20	280.00	586.00	0.00	586.70	160.81	6.92	45.70	22.08
	1385.000	1.00	0.00	0.00	578.20	280.00	586.84	0.00	586.92	7.18	2.28	134.13	104.51
	1385.000	1.00	0.00	0.00	578.20	280.00	586.82	0.00	586.89	7.30	2.29	133.24	103.61
	2000.000	615.00	0.00	0.00	578.47	280.00	587.01	0.00	587.01	0.45	0.58	1137.61	417.97
	2000.000	615.00	0.00	0.00	578.47	280.00	587.09	0.00	587.10	1.64	1.12	491.63	218.83
	2633.000	632.00	0.00	0.00	578.73	280.00	587.02	0.00	587.02	0.05	0.27	1904.35	1198.62
	2633.000	632.00	0.00	0.00	578.73	280.00	587.12	0.00	587.12	0.12	0.41	1213.11	799.76
	3265.000	632.00	0.00	0.00	579.00	280.00	587.03	0.00	587.03	0.07	0.30	1769.10	1064.17
	3265.000	632.00	0.00	0.00	579.00	280.00	587.13	0.00	587.13	0.15	0.45	1126.87	711.92
	4000.000	735.00	0.00	0.00	579.31	280.00	587.03	0.00	587.03	0.09	0.34	1607.12	911.99
	4000.000	735.00	0.00	0.00	579.31	280.00	587.14	0.00	587.14	0.23	0.53	964.88	582.80

SAGER CREEK

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	0.000	280.00	573.25	0.00	0.00	0.00	54.01	0.00
	0.000	280.00	573.35	0.10	0.00	0.10	54.67	0.00
	1195.000	280.00	574.45	0.00	1.20	0.00	53.94	1195.00
	1195.000	280.00	574.46	0.01	1.11	0.01	54.05	1195.00
*	1279.000	280.00	576.73	0.00	2.28	0.00	44.20	84.00
*	1279.000	280.00	576.73	0.00	2.27	0.00	44.20	84.00
*	1312.000	280.00	578.22	0.00	1.49	0.00	44.21	33.00
*	1312.000	280.00	578.22	0.00	1.49	0.00	44.21	33.00
*	1345.000	280.00	582.06	0.00	3.84	0.00	11.00	33.00
*	1345.000	280.00	582.06	0.00	3.84	0.00	11.00	33.00
*	1346.000	280.00	581.96	0.00	-0.10	0.00	11.00	1.00
*	1346.000	280.00	581.96	0.00	-0.10	0.00	11.00	1.00
*	1384.000	280.00	585.90	0.00	3.94	0.00	30.00	38.00
*	1384.000	280.00	586.00	0.10	4.04	0.10	30.00	38.00
	1385.000	280.00	586.84	0.00	0.94	0.00	30.00	1.00
	1385.000	280.00	586.82	-0.03	0.82	-0.03	30.00	1.00
	2000.000	280.00	587.01	0.00	0.17	0.00	600.00	615.00
	2000.000	280.00	587.09	0.08	0.27	0.08	230.00	615.00
	2633.000	280.00	587.02	0.00	0.01	0.00	520.00	632.00
	2633.000	280.00	587.12	0.10	0.03	0.10	330.00	632.00
	3265.000	280.00	587.03	0.00	0.00	0.00	520.00	632.00
	3265.000	280.00	587.13	0.10	0.01	0.10	330.00	632.00
	4000.000	280.00	587.03	0.00	0.01	0.00	520.00	735.00
	4000.000	280.00	587.14	0.11	0.01	0.11	310.00	735.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=  1279.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1279.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1279.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION  SECNO=  1279.000  PROFILE= 2  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1279 000  PROFILE= 2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1279.000  PROFILE= 2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=  1312.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1312.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1312.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION  SECNO=  1312.000  PROFILE= 2  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1312.000  PROFILE= 2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1312.000  PROFILE= 2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=  1345.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1345 000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1345 000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION  SECNO=  1345.000  PROFILE= 2  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1345 000  PROFILE= 2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1345.000  PROFILE= 2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=  1346.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1346 000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1346.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION  SECNO=  1346 000  PROFILE= 2  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=  1346.000  PROFILE= 2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=  1346.000  PROFILE= 2  20 TRIALS ATTEMPTED TO BALANCE WSEL

NOTE     SECNO=  1384.000  PROFILE= 1  WSEL BASED ON X5 CARD
NOTE     SECNO=  1384.000  PROFILE= 2  WSEL BASED ON X5 CARD
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FLOODWAY DATA, SAGER CREEK
PROFILE NO 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
0 000	55.	128.	2.2	573.4	573.2	0.1
1195 000	54	123.	2.3	574 4	574.4	0.0
1279 000	44.	47.	5 9	576 7	576 7	0 0
1312.000	44.	47.	5.9	578.2	578 2	0 0
1345 000	11.	30	9.4	582.1	582 1	0 0
1346.000	11.	22	12.5	582 0	582.0	0.0
1384.000	30	46.	6.1	586.0	585.9	0.1
1385.000	30	133.	2.1	586.8	586.8	0 0
2000.000	230.	492	0 6	587.1	587.0	0.1
2633.000	330.	1213.	0.2	587 1	587.0	0.1
3265.000	330.	1127.	0 2	587.1	587.0	0.1
4000.000	310.	965	0.3	587.1	587.0	0.1

00BREAK00

1) COUNTY: Arenac

2) STUDY NAME: Au Gres City / Twp

3) WATERCOURSE: Au Gres River

4) DOCUMENT TYPE: Summary

00BREAK00

City of Au Gres, MI - FIS
Au Gres River
1000, 2000, 4,000, 5130 cfs.
discharges

```
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 3 APR 87 12:32:18

TERMINAL.105

THIS RUN EXECUTED 18 MAR 87 14:20:23

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

GRES RIVER

SUMMARY PRINTOUT TABLE 110

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
0.000	579.10	0.00	579.11	156.35	0.00	560.00	0.00	0.00	0.00	0.00	290.00	0.00
0.000	579.10	0.00	579.13	156.35	0.00	1160.00	0.00	0.00	0.00	0.00	290.00	0.00
0.000	579.10	0.00	579.19	156.35	0.00	2075.00	0.00	0.00	0.00	0.00	290.00	0.00
0.000	579.10	0.00	579.23	156.35	0.00	2400.00	0.00	0.00	0.00	0.00	290.00	0.00
500.000	579.11	0.00	579.12	227.52	0.00	560.00	0.00	0.00	0.00	15.00	285.00	0.00
500.000	579.15	0.00	579.17	228.57	0.00	1160.00	0.00	0.00	0.00	15.00	285.00	0.00
500.000	579.26	0.00	579.32	232.34	0.00	2075.00	0.00	0.00	0.00	15.00	285.00	0.00
500.000	579.31	0.00	579.39	234.06	0.00	2400.00	0.00	0.00	0.00	15.00	285.00	0.00
1000.000	579.12	0.00	579.13	214.50	0.00	560.00	0.00	0.00	0.00	20.00	280.00	0.00
1000.000	579.19	0.00	579.21	217.05	0.00	1160.00	0.00	0.00	0.00	20.00	280.00	0.00
1000.000	579.37	0.00	579.44	224.22	0.00	2075.00	0.00	0.00	0.00	20.00	280.00	0.00
1000.000	579.46	0.00	579.54	227.38	0.00	2400.00	0.00	0.00	0.00	20.00	280.00	0.00
1500.000	579.13	0.00	579.14	192.73	0.00	560.00	0.00	0.00	0.00	0.00	290.00	0.00
1500.000	579.23	0.00	579.25	195.65	0.00	1160.00	0.00	0.00	0.00	0.00	290.00	0.00
1500.000	579.49	0.00	579.56	203.49	0.00	2075.00	0.00	0.00	0.00	0.00	290.00	0.00
1500.000	579.61	0.00	579.70	207.10	0.00	2400.00	0.00	0.00	0.00	0.00	290.00	0.00
2000.000	579.14	0.00	579.15	198.05	0.00	560.00	0.00	0.00	0.00	20.00	290.00	0.00
2000.000	579.27	0.00	579.31	208.24	0.00	1160.00	0.00	0.00	0.00	20.00	290.00	0.00
2000.000	579.62	0.00	579.70	235.36	0.00	2075.00	0.00	0.00	0.00	20.00	290.00	0.00
2000.000	579.78	0.00	579.88	247.41	0.00	2400.00	0.00	0.00	0.00	20.00	290.00	0.00
2500.000	579.16	0.00	579.16	209.59	0.00	560.00	0.00	0.00	0.00	40.00	330.00	0.00
2500.000	579.34	0.00	579.36	219.38	0.00	1160.00	0.00	0.00	0.00	40.00	330.00	0.00
2500.000	579.80	0.00	579.86	244.73	0.00	2075.00	0.00	0.00	0.00	40.00	330.00	0.00
2500.000	579.99	0.00	580.07	247.67	0.00	2400.00	0.00	0.00	0.00	40.00	330.00	0.00
3000.000	579.17	0.00	579.18	163.59	0.00	560.00	0.00	0.00	0.00	0.00	290.00	0.00
3000.000	579.38	0.00	579.41	168.50	0.00	1160.00	0.00	0.00	0.00	0.00	290.00	0.00
3000.000	579.91	0.00	579.98	180.31	0.00	2075.00	0.00	0.00	0.00	0.00	290.00	0.00
3000.000	580.12	0.00	580.21	193.61	0.00	2400.00	0.00	0.00	0.00	0.00	290.00	0.00

	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
	3500.000	579.18	0.00	579.19	187.55	0.00	560.00	0.00	0.00	0.00	40.00	320 00	0.00
	3500.000	579.43	0.00	579.45	205.42	0.00	1160.00	0.00	0.00	0.00	40.00	320.00	0.00
	3500.000	580 03	0.00	580.09	252.39	0.00	2075 00	0.00	0.00	0.00	40.00	320.00	0.00
	3500.000	580.28	0.00	580.34	255.05	0.00	2400.00	0.00	0.00	0.00	40.00	320.00	0.00
	4000.000	579 19	0.00	579.20	163.98	0 00	560.00	0.00	0.00	0.00	40.00	290.00	0.00
	4000.000	579.47	0.00	579.49	168.79	0.00	1160.00	0.00	0.00	0.00	40.00	290 00	0.00
	4000.000	580 13	0.00	580.20	222.73	0.00	2075 00	0.00	0 00	0.00	40.00	290.00	0.00
	4000.000	580.39	0.00	580 47	229.40	0.00	2400.00	0.00	0.00	0.00	40.00	290.00	0.00
*	4500.000	579.08	0.00	579 10	200.76	0.00	793.08	206.92	0.00	0.00	60.00	320.00	0.00
*	4500.000	579.60	0.00	579.66	241.18	0 00	1564.08	435.92	0.00	0.00	60.00	320.00	0 00
*	4500.000	580 35	0.00	580.48	906.96	0.00	3022 68	977.32	0.00	0.00	60.00	320.00	0.00
*	4500 000	580.42	0 00	580.62	918.80	0.00	3848.94	1281.06	0.00	0.00	60.00	320.00	0.00
	5560.000	579.16	0.00	579.18	182.80	0.00	1000.00	0.00	198.00	384.00	384.00	582.00	582.00
	5560.000	579.81	0.00	579 88	186.86	0.00	2000.00	0.00	198.00	384.00	384.00	582.00	582 00
	5560.000	580.84	0.00	581.02	189.95	0.00	4000.00	0.00	198.00	384.00	384.00	582.00	582 00
	5560.000	581.15	0.00	581 42	190.89	0.00	5130.00	0.00	198.00	384.00	384.00	582.00	582 00
	6820.000	579.26	0 00	579.28	170.14	0.00	1000.00	0.00	180.00	220.00	220.00	400.00	400.00
	6820.000	580.09	0.00	580.14	172.18	0.00	2000.00	0.00	180.00	220.00	220.00	400.00	400 00
	6820 000	581.46	0.00	581 60	175.51	0.00	4000 00	0.00	180.00	220.00	220.00	400.00	400.00
	6820.000	582.01	0 00	582.21	176.85	0.00	5130.00	0.00	180.00	220.00	220.00	400.00	400.00
	7780.000	579.32	0.00	579.34	153.18	0.00	1000.00	0.00	160.00	1000.00	1000.00	1160.00	1160.00
	7780.000	580.24	0 00	580.29	155.32	0.00	2000.00	0.00	160.00	1000.00	1000.00	1160.00	1160 00
	7780 000	581.78	0.00	581.92	158.91	0 00	4000.00	0.00	160.00	1000.00	1000.00	1160.00	1160 00
	7780.000	582.43	0.00	582.63	159.96	0.00	5130.00	0.00	160.00	1000.00	1000.00	1160.00	1160.00
	8640.000	579.36	0.00	579.38	149.44	0 00	1000 00	0.00	157.00	813.00	813.00	970.00	970 00
	8640.000	580 36	0.00	580.40	151.98	0.00	2000.00	0.00	157.00	813.00	813.00	970.00	970.00
	8640.000	582.04	0.00	582.16	156.24	0.00	4000.00	0.00	157.00	813.00	813.00	970.00	970.00
	8640.000	582.77	0.00	582.94	157.00	0.00	5130.00	0.00	157.00	813.00	813.00	970.00	970 00
	9230.000	579.39	0.00	579 41	146.04	0.00	1000.00	0.00	154.00	1167.00	1167.00	1321.00	1321.00
	9230.000	580.43	0.00	580.48	148.37	0.00	2000.00	0.00	154.00	1167.00	1167.00	1321.00	1321.00
	9230.000	582 18	0.00	582.31	152.28	0.00	4000 00	0.00	154.00	1167.00	1167.00	1321.00	1321.00
	9230.000	582.96	0.00	583.14	153.89	0.00	5130.00	0.00	154.00	1167.00	1167.00	1321.00	1321 00
	10430 000	579.45	0.00	579.47	140.23	0.00	1000.00	0 00	144.00	856.00	856.00	1000.00	1000.00
	10430.000	580.58	0.00	580.63	141.37	0.00	2000.00	0 00	144.00	856.00	856.00	1000.00	1000.00
	10430 000	582.49	0.00	582.63	143.31	0.00	4000.00	0 00	144.00	856.00	856.00	1000.00	1000 00
	10430.000	583.35	0.00	583.54	144.00	0.00	5130.00	0.00	144.00	856.00	856.00	1000.00	1000 00
	11940.000	579.55	0.00	579.58	137.60	0.00	1000.00	0.00	141.00	546.00	546.00	687.00	687 00
	11940.000	580.81	0.00	580 87	138.63	0.00	2000.00	0.00	141.00	546.00	546.00	687.00	687.00
	11940.000	582.92	0.00	583.07	140.37	0.00	4000.00	0.00	141.00	546.00	546.00	687.00	687.00
	11940.000	583.87	0 00	584.08	140.99	0 00	5130.00	0 00	141.00	546.00	546.00	687.00	687.00

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
12400.000	579.59	0.00	579.63	108.68	0.00	1000.00	0.00	0.00	0.00	240.00	380.00	0.00
12400.000	580.89	0.00	580.99	109.93	0.00	2000.00	0.00	0.00	0.00	240.00	380.00	0.00
12400.000	583.04	0.00	583.28	111.08	0.00	4000.00	0.00	0.00	0.00	240.00	380.00	0.00
12400.000	584.00	0.00	584.33	111.59	0.00	5130.00	0.00	0.00	0.00	240.00	380.00	0.00
13180.000	579.71	0.00	579.76	102.95	0.00	1000.00	0.00	0.00	0.00	270.00	390.00	0.00
13180.000	581.13	0.00	581.24	107.97	0.00	2000.00	0.00	0.00	0.00	270.00	390.00	0.00
13180.000	583.45	0.00	583.70	119.79	0.00	4000.00	0.00	0.00	0.00	270.00	390.00	0.00
13180.000	584.49	0.00	584.82	129.69	3.08	5126.77	0.15	0.00	0.00	270.00	390.00	0.00
13975.000	579.92	0.00	580.02	114.98	0.00	1000.00	0.00	115.10	149.90	149.90	265.00	265.00
13975.000	581.49	0.00	581.67	115.05	0.00	2000.00	0.00	115.10	149.90	149.90	265.00	265.00
13975.000	583.97	0.00	584.30	115.10	0.00	4000.00	0.00	115.10	149.90	149.90	265.00	265.00
13975.000	585.06	0.00	585.47	115.10	0.00	5130.00	0.00	115.10	149.90	149.90	265.00	265.00
13976.000	579.92	0.00	580.02	114.98	0.00	1000.00	0.00	115.10	149.90	149.90	265.00	265.00
13976.000	581.49	0.00	581.68	115.05	0.00	2000.00	0.00	115.10	149.90	149.90	265.00	265.00
13976.000	583.95	0.00	584.31	115.10	0.00	4000.00	0.00	115.10	149.90	149.90	265.00	265.00
13976.000	585.04	0.00	585.49	115.10	0.00	5130.00	0.00	115.10	149.90	149.90	265.00	265.00
14016.000	579.94	0.00	580.05	114.98	0.00	1000.00	0.00	115.10	149.90	149.90	265.00	265.00
14016.000	581.52	0.00	581.71	115.05	0.00	2000.00	0.00	115.10	149.90	149.90	265.00	265.00
14016.000	583.99	0.00	584.34	115.10	0.00	4000.00	0.00	115.10	149.90	149.90	265.00	265.00
14016.000	585.09	0.00	585.53	115.10	0.00	5130.00	0.00	115.10	149.90	149.90	265.00	265.00
14017.000	579.95	0.00	580.05	114.98	0.00	1000.00	0.00	115.10	149.90	149.90	265.00	265.00
14017.000	581.54	0.00	581.72	115.05	0.00	2000.00	0.00	115.10	149.90	149.90	265.00	265.00
14017.000	584.03	0.00	584.35	115.10	0.00	4000.00	0.00	115.10	149.90	149.90	265.00	265.00
14017.000	585.13	0.00	585.54	115.10	0.00	5130.00	0.00	115.10	149.90	149.90	265.00	265.00
14077.000	579.99	0.00	580.09	114.98	0.00	1000.00	0.00	0.00	0.00	149.90	265.00	0.00
14077.000	581.59	0.00	581.76	115.05	0.00	2000.00	0.00	0.00	0.00	149.90	265.00	0.00
14077.000	584.08	0.00	584.41	120.75	1.52	3997.03	1.45	0.00	0.00	149.90	265.00	0.00
14077.000	585.20	0.00	585.60	125.38	7.69	5115.02	7.29	0.00	0.00	149.90	265.00	0.00
15000.000	580.62	0.00	580.72	114.98	0.00	1000.00	0.00	0.00	0.00	149.90	265.00	0.00
15000.000	582.30	0.00	582.48	115.05	0.00	2000.00	0.00	0.00	0.00	149.90	265.00	0.00
15000.000	584.86	0.00	585.18	121.01	1.70	3996.69	1.61	0.00	0.00	149.90	265.00	0.00
15000.000	586.01	0.00	586.40	125.79	8.37	5113.69	7.94	0.00	0.00	149.90	265.00	0.00
16000.000	581.40	0.00	581.55	86.80	0.00	1000.00	0.00	-126.00	126.00	250.00	348.00	1000.00
16000.000	583.15	0.00	583.43	100.34	0.00	1994.51	5.49	-126.00	126.00	250.00	348.00	1000.00
16000.000	585.75	0.00	586.11	574.73	0.50	3620.65	378.85	-126.00	126.00	250.00	348.00	1000.00
16000.000	586.93	0.00	587.21	817.26	96.08	4011.75	1022.17	-126.00	126.00	250.00	348.00	1000.00
17050.000	582.35	0.00	582.49	87.54	0.00	999.97	0.03	-126.00	126.00	250.00	348.00	1000.00
17050.000	584.24	0.00	584.48	103.67	0.00	1992.07	7.93	-126.00	126.00	250.00	348.00	1000.00
17050.000	586.78	0.00	587.09	643.47	7.21	3524.05	468.74	-126.00	126.00	250.00	348.00	1000.00
17050.000	587.73	0.00	588.01	819.78	98.10	4002.65	1029.24	-126.00	126.00	250.00	348.00	1000.00

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
18565.000	583 29	0.00	583.38	93.13	0 00	999.21	0.79	0.00	0.00	1250.00	1348.00	0.00
18565.000	585.37	0.00	585.53	250.10	0.24	1970.76	29.00	0.00	0.00	1250.00	1348.00	0.00
18565.000	587 85	0.00	588.01	972.96	103.82	3087.55	808.62	0.00	0.00	1250.00	1348.00	0 00
18565.000	588.67	0.00	588.81	1846.32	427.34	3352.87	1349.79	0.00	0.00	1250.00	1348.00	0.00
20080.000	583.87	0.00	583.95	97.80	0.00	998.07	1.93	0.00	0.00	1750.00	1848.00	0.00
20080.000	586.08	0.00	586.21	403.91	1 41	1913.39	85.20	0.00	0.00	1750.00	1848.00	0 00
20080 000	588.46	0.00	588.58	1490.65	246.45	2905.56	847.98	0.00	0.00	1750.00	1848.00	0 00
20080 000	589.21	0.00	589 31	2416.56	867.07	3077.59	1185.34	0.00	0.00	1750.00	1848.00	0.00
21940.000	584.38	0.00	584.43	214 48	4.42	664.61	330.97	0.00	0.00	264.00	325.00	0.00
21940.000	586.54	0.00	586.57	1509.11	25.50	904.42	1070.08	0.00	0.00	264.00	325.00	0.00
21940.000	588 77	0.00	588.78	2447.75	80.69	1003.62	2915.69	0.00	0.00	264.00	325.00	0.00
21940.000	589.47	0.00	589.48	2806.79	160.81	1097.43	3871.77	0.00	0.00	264.00	325.00	0 00
24850.000	585.01	0.00	585.05	231 49	13.38	611.69	374.93	0.00	0.00	1755.00	1840.00	0.00
24850.000	586.90	0.00	586.95	271.79	68.99	1058.36	872.64	0.00	0.00	1755.00	1840.00	0 00
24850.000	588.95	0.00	588 98	2846.04	454.55	1493.67	2051.78	0.00	0.00	1755.00	1840.00	0 00
24850 000	589.63	0 00	589.65	3389 35	890.59	1530.40	2709.01	0.00	0.00	1755.00	1840.00	0 00
26560.000	585.42	0.00	585.49	130.36	74.05	922.42	3.52	3022.00	206.00	1950.00	2035.00	3228 00
26560.000	587 25	0.00	587.37	339.58	279.22	1698.15	22 63	3022.00	206.00	1950.00	2035.00	3228 00
26560.000	589.13	0 00	589.18	2922.38	1612.69	1866.53	520.78	3022.00	206.00	1950.00	2035.00	3228.00
26560.000	589.75	0.00	589.78	3022.00	2399.54	1696.77	1033.69	3022.00	206.00	1950.00	2035.00	3228.00
28410.000	586.32	0.00	586.53	62.88	0.00	1000.00	0.00	-155.00	155.00	1690.00	1758.00	2560.00
28410.000	588.26	0.00	588.62	155 26	35.34	1963.83	0.83	-155.00	155.00	1690.00	1758.00	2560.00
28410.000	589.65	0.00	589.99	1551.01	1083.70	2779 38	136.92	-155 00	155.00	1690.00	1758.00	2560.00
28410.000	590.09	0.00	590.33	2097.00	2012.04	2776.84	341.12	-155.00	155.00	1690.00	1758.00	2560 00
29200.000	586.90	0.00	586.97	236.88	231.35	731.93	36.71	-988.00	988.00	2240.00	2308.00	2770 00
29200 000	588.91	0.00	588.95	1541.10	653.61	955.75	390.65	-988.00	988.00	2240.00	2308.00	2770.00
29200.000	590.22	0.00	590.24	1687.18	2030.81	1091.83	877.37	-988.00	988.00	2240.00	2308.00	2770.00
29200.000	590.55	0.00	590.58	1702.14	2728.89	1238.61	1162.50	-988.00	988.00	2240.00	2308.00	2770 00
30100.000	587.25	0.00	587.42	64.73	0 00	1000.00	0.00	0.00	0.00	840.00	908.00	0.00
30100.000	589.01	0.00	589.33	182.21	56.49	1940.45	3 06	0.00	0.00	840.00	908.00	0 00
30100.000	590.17	0.00	590.57	1033.12	956.60	2918.98	124.42	0.00	0.00	840.00	908.00	0.00
30100.000	590 53	0.00	590.91	1249.47	1632.14	3202.34	295.52	0.00	0.00	840.00	908.00	0 00
31620.000	588.53	0.00	588 71	64 58	0.00	1000.00	0.00	0.00	0.00	1340.00	1408.00	0.00
31620.000	590.62	0 00	590.89	457.54	96.89	1894.47	8.64	0.00	0.00	1340.00	1408.00	0 00
31620.000	591.92	0.00	592.10	1720.35	1467.11	2291.15	241.74	0.00	0 00	1340.00	1408.00	0.00
31620.000	592.27	0.00	592.42	1953.91	2268.22	2421.14	440.64	0.00	0.00	1340.00	1408.00	0.00
32260.000	588.87	0.00	588.90	161.44	472.55	527 45	0.00	2565.00	469.00	2321.00	2391.00	3034.00
32260.000	591.04	0.00	591.06	1997.86	1103.78	804.51	91.71	2565.00	469.00	2321.00	2391.00	3034.00
32260.000	592.21	0.00	592.23	2515.60	2451.07	991.94	556.98	2565.00	469.00	2321.00	2391.00	3034 00
32260.000	592.54	0.00	592.56	2522.75	3200.17	1125.36	804.47	2565.00	469.00	2321.00	2391.00	3034 00

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
33000 000	589. 01	0. 00	589. 08	190. 55	0. 59	991. 29	8. 12	2154. 00	817. 00	1264. 00	1370. 00	2971. 00
33000. 000	591. 13	0. 00	591. 18	1324. 23	31 51	1474 96	493. 54	2154. 00	817. 00	1264. 00	1370. 00	2971. 00
33000 000	592. 29	0. 00	592 33	2146. 66	336. 55	1730. 79	1932. 66	2154. 00	817. 00	1264. 00	1370. 00	2971 00
33000. 000	592. 63	0. 00	592. 66	2154. 00	516. 49	1912. 08	2701. 43	2154. 00	817. 00	1264. 00	1370. 00	2971. 00
33750. 000	589. 28	0. 00	589. 35	185. 69	0. 39	994. 42	5. 19	0. 00	0. 00	314. 00	420. 00	0 00
33750. 000	591. 30	0 00	591. 37	755. 90	27. 47	1595. 33	377. 20	0. 00	0. 00	314. 00	420. 00	0. 00
33750. 000	592. 43	0. 00	592. 51	1560. 60	213. 61	2274. 24	1512. 15	0. 00	0. 00	314. 00	420. 00	0. 00
33750 000	592 78	0 00	592. 86	1777. 41	350 96	2587. 31	2191. 73	0. 00	0. 00	314. 00	420. 00	0. 00
34000. 000	589. 37	0. 00	589. 45	185. 14	0. 37	994. 73	4. 90	0. 00	0. 00	314. 00	420. 00	0. 00
34000. 000	591 36	0. 00	591. 44	728 92	26. 66	1609. 14	364. 20	0. 00	0. 00	314. 00	420. 00	0. 00
34000. 000	592. 51	0. 00	592. 59	1542. 20	208. 15	2297. 87	1493. 98	0. 00	0. 00	314. 00	420. 00	0. 00
34000. 000	592. 86	0. 00	592. 95	1770. 98	348. 58	2597. 47	2183. 95	0. 00	0. 00	314. 00	420. 00	0. 00

GRES RIVER

SUMMARY PRINTOUT TABLE 150

SECND	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
0.000	0.00	0.00	0.00	571.10	560.00	579.10	0.00	579.11	0.20	0.67	840.44	1267.34
0.000	0.00	0.00	0.00	571.10	1160.00	579.10	0.00	579.13	0.84	1.38	840.44	1267.34
0.000	0.00	0.00	0.00	571.10	2075.00	579.10	0.00	579.19	2.68	2.47	840.44	1267.34
0.000	0.00	0.00	0.00	571.10	2400.00	579.10	0.00	579.23	3.59	2.86	840.44	1267.34
500.000	500.00	0.00	0.00	571.00	560.00	579.11	0.00	579.12	0.17	0.55	1010.70	1343.74
500.000	500.00	0.00	0.00	571.00	1160.00	579.15	0.00	579.17	0.73	1.14	1018.02	1355.90
500.000	500.00	0.00	0.00	571.00	2075.00	579.26	0.00	579.32	2.20	1.99	1044.72	1400.44
500.000	500.00	0.00	0.00	571.00	2400.00	579.31	0.00	579.39	2.85	2.27	1057.05	1421.14
1000.000	500.00	0.00	0.00	570.20	560.00	579.12	0.00	579.13	0.21	0.60	932.64	1222.69
1000.000	500.00	0.00	0.00	570.20	1160.00	579.19	0.00	579.21	0.87	1.22	947.30	1245.13
1000.000	500.00	0.00	0.00	570.20	2075.00	579.37	0.00	579.44	2.51	2.10	989.43	1310.31
1000.000	500.00	0.00	0.00	570.20	2400.00	579.46	0.00	579.54	3.21	2.38	1008.44	1340.08
1500.000	500.00	0.00	0.00	571.10	560.00	579.13	0.00	579.14	0.20	0.61	910.86	1263.22
1500.000	500.00	0.00	0.00	571.10	1160.00	579.23	0.00	579.25	0.80	1.25	929.70	1294.12
1500.000	500.00	0.00	0.00	571.10	2075.00	579.49	0.00	579.56	2.26	2.11	981.69	1380.58
1500.000	500.00	0.00	0.00	571.10	2400.00	579.61	0.00	579.70	2.85	2.38	1006.34	1422.17
2000.000	500.00	0.00	0.00	571.20	560.00	579.14	0.00	579.15	0.33	0.71	791.28	981.70
2000.000	500.00	0.00	0.00	571.20	1160.00	579.27	0.00	579.31	1.34	1.42	817.56	1002.77
2000.000	500.00	0.00	0.00	571.20	2075.00	579.62	0.00	579.70	3.74	2.32	893.92	1073.06
2000.000	500.00	0.00	0.00	571.20	2400.00	579.78	0.00	579.88	4.67	2.58	930.83	1110.57
2500.000	500.00	0.00	0.00	571.30	560.00	579.16	0.00	579.16	0.25	0.64	876.80	1120.01
2500.000	500.00	0.00	0.00	571.30	1160.00	579.34	0.00	579.36	0.99	1.27	915.08	1166.95
2500.000	500.00	0.00	0.00	571.30	2075.00	579.80	0.00	579.86	2.53	2.03	1022.28	1305.74
2500.000	500.00	0.00	0.00	571.30	2400.00	579.99	0.00	580.07	2.95	2.24	1069.53	1396.69
3000.000	500.00	0.00	0.00	570.50	560.00	579.17	0.00	579.18	0.23	0.68	819.88	1176.89
3000.000	500.00	0.00	0.00	570.50	1160.00	579.38	0.00	579.41	0.87	1.36	856.02	1240.23
3000.000	500.00	0.00	0.00	570.50	2075.00	579.91	0.00	579.98	2.19	2.19	945.91	1400.77
3000.000	500.00	0.00	0.00	570.50	2400.00	580.12	0.00	580.21	2.80	2.43	986.30	1433.22
3500.000	500.00	0.00	0.00	571.20	560.00	579.18	0.00	579.19	0.19	0.62	908.14	1279.60
3500.000	500.00	0.00	0.00	571.20	1160.00	579.43	0.00	579.45	0.78	1.21	956.35	1313.34
3500.000	500.00	0.00	0.00	571.20	2075.00	580.03	0.00	580.09	2.08	1.89	1096.53	1439.32
3500.000	500.00	0.00	0.00	571.20	2400.00	580.28	0.00	580.34	2.34	2.07	1159.43	1568.43
4000.000	500.00	0.00	0.00	570.80	560.00	579.19	0.00	579.20	0.20	0.66	847.68	1242.57
4000.000	500.00	0.00	0.00	570.80	1160.00	579.47	0.00	579.49	0.76	1.30	894.31	1332.66
4000.000	500.00	0.00	0.00	570.80	2075.00	580.13	0.00	580.20	2.19	2.02	1028.87	1402.36
4000.000	500.00	0.00	0.00	570.80	2400.00	580.39	0.00	580.47	2.53	2.21	1087.46	1508.29

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	iOK*S	VCH	AREA	.OiK
*	4500.000	500.00	0.00	0.00	571.40	1000.00	579.08	0.00	579.10	0.58	1.09	941.55	1310.15
*	4500 000	500.00	0.00	0.00	571.40	2000.00	579.60	0.00	579.66	1.74	1.93	1053.36	1514.36
*	4500 000	500.00	0.00	0.00	571.40	4000.00	580.35	0.00	580.48	4.40	3.10	1491.34	1906.78
*	4500.000	500.00	0.00	0.00	571.40	5130 00	580.42	0.00	580.62	6.88	3.89	1555.24	1955 57
	5560.000	1060 00	0.00	0 00	571.40	1000.00	579.16	0.00	579.18	1.02	1.19	843.73	987.79
	5560.000	1060.00	0 00	0.00	571.40	2000.00	579.81	0.00	579.88	2.70	2.07	966.10	1217.00
	5560.000	1060.00	0.00	0.00	571.40	4000 00	580.84	0.00	581.02	6.07	3.45	1158.85	1623.62
	5560.000	1060.00	0.00	0.00	571 40	5130.00	581.15	0.00	581.42	8.53	4.21	1218.27	1756 83
	6820.000	1260.00	0.00	0.00	570.60	1000.00	579.26	0.00	579.28	0.64	1.06	947.12	1250.03
	6820.000	1260 00	0.00	0.00	570.60	2000.00	580.09	0 00	580.14	1.64	1.83	1090.44	1562.65
	6820.000	1260.00	0.00	0.00	570.60	4000.00	581.46	0.00	581.60	3.53	3.01	1327.59	2129 33
	6820 000	1260 00	0.00	0.00	570.60	5130.00	582.01	0.00	582.21	4.66	3.60	1424.28	2376.58
	7780.000	960.00	0.00	0.00	570.60	1000.00	579.32	0.00	579.34	0.57	1.06	942.72	1327.03
	7780 000	960.00	0.00	0.00	570.60	2000.00	580.24	0.00	580.29	1.46	1.84	1084.61	1654.70
	7780.000	960.00	0.00	0.00	570.60	4000.00	581.78	0.00	581.92	3.12	3.02	1326.16	2265.00
	7780.000	960.00	0.00	0.00	570.60	5130.00	582.43	0.00	582.63	4.05	3.59	1429.80	2548.30
	8640.000	860.00	0.00	0.00	570.20	1000.00	579.36	0.00	579.38	0.46	0.99	1006.74	1480.37
	8640.000	860.00	0.00	0.00	570.20	2000.00	580.36	0.00	580.40	1.18	1.73	1156.63	1837.97
	8640.000	860.00	0.00	0.00	570.20	4000.00	582.04	0.00	582.16	2.54	2.83	1414.19	2507.68
	8640.000	860.00	0.00	0.00	570.20	5130.00	582.77	0.00	582.94	3.28	3.36	1528.51	2833 20
	9230.000	590.00	0.00	0.00	570.20	1000.00	579.39	0.00	579.41	0.49	1.03	966.58	1425.22
	9230 000	590.00	0.00	0.00	570.20	2000.00	580.43	0.00	580.48	1 24	1.79	1119.97	1794 42
	9230.000	590.00	0.00	0.00	570.20	4000.00	582.18	0.00	582.31	2.59	2.89	1382.54	2487 03
	9230.000	590 00	0.00	0.00	570.20	5130.00	582.96	0.00	583.14	3.30	3.42	1500.65	2821 93
	10430.000	1200 00	0.00	0.00	570.40	1000.00	579.45	0.00	579.47	0.57	1.09	915.11	1329.07
	10430 000	1200.00	0.00	0 00	570.40	2000 00	580.58	0.00	580.63	1.36	1.86	1073.41	1713.42
	10430.000	1200 00	0 00	0.00	570.40	4000.00	582.49	0.00	582.63	2.66	2.97	1346.32	2450.37
	10430.000	1200.00	0.00	0.00	570.40	5130 00	583.35	0.00	583.54	3.33	3.49	1469.63	2811.82
	11940.000	1510.00	0.00	0.00	570.70	1000.00	579.55	0 00	579.58	0.85	1.24	803.79	1082 66
	11940.000	1510.00	0.00	0.00	570.70	2000 00	580 81	0.00	580.87	1.82	2.04	978.61	1483 93
	11940.000	1510 00	0.00	0.00	570.70	4000.00	582.92	0.00	583.07	3.15	3.14	1272.93	2253.02
	11940.000	1510 00	0.00	0.00	570.70	5130.00	583.87	0.00	584.08	3.78	3.65	1406.82	2637.81
	12400.000	460.00	0 00	0.00	571.40	1000.00	579.59	0.00	579.63	1.43	1.60	623.96	834.94
	12400 000	460.00	0.00	0.00	571.40	2000.00	580.89	0.00	580.99	3.01	2.61	765.97	1153.34
	12400.000	460.00	0.00	0.00	571.40	4000.00	583.04	0.00	583.28	5.12	3.98	1004.92	1767.21
	12400.000	460.00	0.00	0.00	571.40	5130.00	584.00	0.00	584.33	6.16	4.62	1111.54	2067.52
	13180.000	780 00	0.00	0.00	571.40	1000.00	579.71	0.00	579.76	1.69	1.72	581.57	769.80
	13180 000	780 00	0.00	0 00	571.40	2000.00	581.13	0.00	581.24	3.38	2.74	731.14	1087.45
	13180.000	780 00	0.00	0 00	571.40	4000.00	583.45	0 00	583.70	5.56	4.02	994.01	1696.48
	13180.000	780 00	0.00	0.00	571.40	5130.00	584.49	0.00	584.82	6.25	4.58	1123.76	2052 47

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SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	O1K
13975 000	795.00	0 00	0.00	575 30	1000.00	579.92	0 00	580.02	6.70	2.48	403.33	386.32
13975.000	795.00	0.00	0.00	575.30	2000.00	581.49	0.00	581.67	8.09	3.43	583.77	703.17
13975.000	795 00	0.00	0.00	575.30	4000.00	583.97	0 00	584.30	9 07	4.61	868.57	1327.91
13975.000	795.00	0.00	0.00	575.30	5130.00	585.06	0.00	585.47	9.72	5.16	994.46	1645.13
13976.000	1.00	591.60	588.70	575.30	1000.00	579.92	0.00	580.02	5.80	2.57	388.37	415.22
13976.000	1.00	591.60	588 70	575.30	2000.00	581.49	0.00	581 68	7.22	3.56	562.45	744.50
13976.000	1.00	591.60	588.70	575.30	4000.00	583.95	0.00	584.31	8.49	4.78	836.38	1373.04
13976 000	1.00	591.60	588.70	575.30	5130.00	585.04	0.00	585.49	9.27	5.36	957.51	1685.00
14016 000	40.00	591.60	588.70	575.30	1000.00	579.94	0.00	580.05	5.69	2.56	390.75	419.27
14016.000	40.00	591.60	588.70	575.30	2000.00	581.52	0.00	581.71	7.11	3.54	565.08	749.96
14016.000	40 00	591.60	588.70	575.30	4000.00	583.99	0.00	584.34	8.39	4.76	839.55	1380.96
14016.000	40.00	591.60	588 70	575.30	5130.00	585.09	0.00	585.53	9.17	5.34	960.81	1693 74
14017 000	1.00	0.00	0.00	575.30	1000 00	579.95	0.00	580.05	6.57	2.46	405.86	390.28
14017.000	1.00	0.00	0.00	575.30	2000.00	581.54	0.00	581.72	7.86	3.40	589.03	713 39
14017.000	1.00	0.00	0.00	575.30	4000.00	584.03	0.00	584.35	8.84	4.57	875.85	1345 62
14017.000	1.00	0.00	0.00	575.30	5130.00	585.13	0.00	585 54	9.47	5.11	1002.96	1667.37
14077.000	60.00	0.00	0.00	575.33	1000.00	579 99	0.00	580.09	6.47	2.45	407.76	393.24
14077.000	60 00	0.00	0.00	575.33	2000.00	581.59	0.00	581.76	7.79	3.39	590.74	716 74
14077.000	60.00	0.00	0.00	575.33	4000.00	584.08	0.00	584.41	8.50	4.55	882.16	1372.21
14077.000	60.00	0.00	0.00	575.33	5130.00	585.20	0.00	585.60	8.85	5.08	1018.59	1724.05
15000.000	923.00	0.00	0.00	576.05	1000.00	580.62	0.00	580.72	7.12	2.53	395.85	374.73
15000.000	923.00	0.00	0.00	576.05	2000.00	582.30	0.00	582.48	7.76	3.38	591.34	717.90
15000.000	923.00	0.00	0.00	576.05	4000.00	584 86	0.00	585.18	8.27	4.51	889.72	1391.11
15000 000	923.00	0.00	0.00	576.05	5130 00	586.01	0.00	586.40	8.53	5.03	1030.83	1756.65
16000.000	1000.00	0.00	0.00	576.92	1000.00	581.40	0.00	581.55	9.57	3.11	321.67	323.33
16000.000	1000.00	0.00	0.00	576.92	2000.00	583.15	0.00	583.43	11.00	4.19	483.79	602.95
16000.000	1000.00	0.00	0.00	576.92	4000.00	585.75	0.00	586.11	10.16	5.02	1192.49	1254.75
16000 000	1000.00	0 00	0.00	576.92	5130.00	586.93	0.00	587.21	7.59	4.80	2028.68	1861 57
17050.000	1050.00	0.00	0.00	577.70	1000.00	582.35	0.00	582.49	8.29	2.97	336.32	347.24
17050.000	1050.00	0.00	0.00	577.70	2000.00	584 24	0.00	584.48	9.21	3.96	515.22	658.89
17050.000	1050.00	0.00	0.00	577.70	4000.00	586.78	0.00	587.09	8.60	4.73	1349.01	1364 10
17050.000	1050.00	0.00	0.00	577.70	5130.00	587.73	0.00	588.01	7.51	4.78	2042.00	1871.73
18565.000	1515 00	0.00	0.00	577.79	1000.00	583.29	0.00	583.38	4.38	2.44	412.32	477 92
18565.000	1515.00	0.00	0.00	577.79	2000.00	585.37	0.00	585.53	5.30	3.29	661.11	868.57
18565.000	1515.00	0.00	0.00	577.79	4000 00	587.85	0.00	588.01	4.41	3.67	2105.89	1904.12
18565.000	1515.00	0.00	0.00	577.79	5130.00	588.67	0.00	588.81	3.83	3.64	3254.11	2619 99
20080.000	1515.00	0.00	0.00	577.89	1000.00	583.87	0.00	583.95	3.20	2.20	458.68	558.78
20080.000	1515.00	0.00	0.00	577.89	2000.00	586.08	0.00	586.21	3.76	2.91	872.01	1030.74
20080.000	1515.00	0.00	0.00	577.89	4000.00	588.46	0.00	588.58	3.22	3.26	2514.35	2229 28
20080.000	1515.00	0.00	0.00	577.89	5130.00	589.21	0.00	589.31	2.78	3.19	3984.05	3077.92

SECND	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
21940.000	1860.00	0.00	0.00	578.00	1000.00	584.38	0.00	584.43	2.62	2.05	622.87	618.00
21940.000	1860.00	0.00	0.00	578.00	2000.00	586.54	0.00	586.57	1.56	1.98	2221.96	1603.28
21940.000	1860.00	0.00	0.00	578.00	4000.00	588.77	0.00	588.78	0.80	1.69	6570.64	4461.86
21940.000	1860.00	0.00	0.00	578.00	5130.00	589.47	0.00	589.48	0.76	1.73	8426.22	5875.54
24850.000	2910.00	0.00	0.00	580.60	1000.00	585.01	0.00	585.05	2.89	1.80	652.77	588.27
24850.000	2910.00	0.00	0.00	580.60	2000.00	586.90	0.00	586.95	2.38	2.12	1127.06	1295.54
24850.000	2910.00	0.00	0.00	580.60	4000.00	588.95	0.00	588.98	1.75	2.22	4215.36	3025.78
24850.000	2910.00	0.00	0.00	580.60	5130.00	589.63	0.00	589.65	1.40	2.09	6326.30	4341.51
26560.000	1710.00	0.00	0.00	580.09	1000.00	585.42	0.00	585.49	3.30	2.21	483.96	550.53
26560.000	1710.00	0.00	0.00	580.09	2000.00	587.25	0.00	587.37	3.89	2.97	762.93	1014.11
26560.000	1710.00	0.00	0.00	580.09	4000.00	589.13	0.00	589.18	2.06	2.55	3693.68	2784.25
26560.000	1710.00	0.00	0.00	580.09	5130.00	589.75	0.00	589.78	1.36	2.16	5523.64	4399.66
28410.000	1850.00	0.00	0.00	579.54	1000.00	586.32	0.00	586.53	10.57	3.60	278.12	307.60
28410.000	1850.00	0.00	0.00	579.54	2000.00	588.26	0.00	588.62	12.94	4.83	442.55	556.06
28410.000	1850.00	0.00	0.00	579.54	4000.00	589.65	0.00	589.99	12.93	5.54	1413.16	1112.34
28410.000	1850.00	0.00	0.00	579.54	5130.00	590.09	0.00	590.33	10.66	5.23	2211.15	1571.01
29200.000	790.00	0.00	0.00	579.30	1000.00	586.90	0.00	586.97	3.46	2.21	548.00	537.68
29200.000	790.00	0.00	0.00	579.30	2000.00	588.91	0.00	588.95	1.93	2.04	1735.04	1437.99
29200.000	790.00	0.00	0.00	579.30	4000.00	590.22	0.00	590.24	1.42	1.96	3853.89	3362.22
29200.000	790.00	0.00	0.00	579.30	5130.00	590.55	0.00	590.58	1.59	2.14	4419.93	4063.58
30100.000	900.00	0.00	0.00	580.09	1000.00	587.25	0.00	587.42	8.36	3.31	302.21	345.94
30100.000	900.00	0.00	0.00	580.09	2000.00	589.01	0.00	589.33	11.34	4.61	476.39	593.90
30100.000	900.00	0.00	0.00	580.09	4000.00	590.17	0.00	590.57	14.48	5.85	1200.11	1051.05
30100.000	900.00	0.00	0.00	580.09	5130.00	590.53	0.00	590.91	14.88	6.12	1606.97	1329.72
31620.000	1520.00	0.00	0.00	581.40	1000.00	588.53	0.00	588.71	8.52	3.33	300.17	342.64
31620.000	1520.00	0.00	0.00	581.40	2000.00	590.62	0.00	590.89	9.28	4.30	538.75	656.57
31620.000	1520.00	0.00	0.00	581.40	4000.00	591.92	0.00	592.10	7.34	4.33	1951.44	1476.14
31620.000	1520.00	0.00	0.00	581.40	5130.00	592.27	0.00	592.42	7.10	4.38	2595.06	1925.90
32260.000	640.00	0.00	0.00	582.00	1000.00	588.87	0.00	588.90	1.75	1.61	674.39	756.11
32260.000	640.00	0.00	0.00	582.00	2000.00	591.04	0.00	591.06	1.28	1.68	2249.25	1766.30
32260.000	640.00	0.00	0.00	582.00	4000.00	592.21	0.00	592.23	1.15	1.77	5073.37	3726.89
32260.000	640.00	0.00	0.00	582.00	5130.00	592.54	0.00	592.56	1.30	1.93	5892.93	4502.67
33000.000	740.00	0.00	0.00	582.35	1000.00	589.01	0.00	589.08	3.52	2.11	492.72	533.00
33000.000	740.00	0.00	0.00	582.35	2000.00	591.13	0.00	591.18	2.11	2.12	1512.39	1376.55
33000.000	740.00	0.00	0.00	582.35	4000.00	592.29	0.00	592.33	1.69	2.12	3791.64	3079.09
33000.000	740.00	0.00	0.00	582.35	5130.00	592.63	0.00	592.66	1.79	2.24	4512.33	3836.89
33750.000	750.00	0.00	0.00	582.70	1000.00	589.28	0.00	589.35	3.76	2.16	477.78	515.53
33750.000	750.00	0.00	0.00	582.70	2000.00	591.30	0.00	591.37	2.72	2.36	1177.66	1213.47
33750.000	750.00	0.00	0.00	582.70	4000.00	592.43	0.00	592.51	3.20	2.86	2528.99	2237.40
33750.000	750.00	0.00	0.00	582.70	5130.00	592.78	0.00	592.86	3.56	3.11	3104.97	2718.68

SECND	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
34000.000	250.00	0.00	0.00	582.80	1000.00	589.37	0.00	589.45	3.79	2.16	476.12	513.60
34000.000	250.00	0.00	0.00	582.80	2000.00	591.36	0.00	591.44	2.82	2.40	1148.21	1190.59
34000.000	250.00	0.00	0.00	582.80	4000.00	592.51	0.00	592.59	3.31	2.90	2482.44	2199.65
34000.000	250.00	0.00	0.00	582.80	5130.00	592.86	0.00	592.95	3.61	3.13	3085.01	2701.58

GRES RIVER

SUMMARY PRINTOUT TABLE 150

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
0.000	560.00	579.10	0.00	0.00	0.00	156.35	0.00
0.000	1160.00	579.10	0.00	0.00	0.00	156.35	0.00
0.000	2075.00	579.10	0.00	0.00	0.00	156.35	0.00
0.000	2400.00	579.10	0.00	0.00	0.00	156.35	0.00
500.000	560.00	579.11	0.00	0.01	0.00	227.52	500.00
500.000	1160.00	579.15	0.04	0.05	0.00	228.57	500.00
500.000	2075.00	579.26	0.11	0.16	0.00	232.34	500.00
500.000	2400.00	579.31	0.05	0.21	0.00	234.06	500.00
1000.000	560.00	579.12	0.00	0.01	0.00	214.50	500.00
1000.000	1160.00	579.19	0.07	0.04	0.00	217.05	500.00
1000.000	2075.00	579.37	0.18	0.11	0.00	224.22	500.00
1000.000	2400.00	579.46	0.09	0.15	0.00	227.38	500.00
1500.000	560.00	579.13	0.00	0.01	0.00	192.73	500.00
1500.000	1160.00	579.23	0.10	0.04	0.00	195.65	500.00
1500.000	2075.00	579.49	0.26	0.12	0.00	203.49	500.00
1500.000	2400.00	579.61	0.12	0.15	0.00	207.10	500.00
2000.000	560.00	579.14	0.00	0.01	0.00	198.05	500.00
2000.000	1160.00	579.27	0.13	0.05	0.00	208.24	500.00
2000.000	2075.00	579.62	0.35	0.13	0.00	235.36	500.00
2000.000	2400.00	579.78	0.15	0.17	0.00	247.41	500.00
2500.000	560.00	579.16	0.00	0.02	0.00	209.59	500.00
2500.000	1160.00	579.34	0.18	0.06	0.00	219.38	500.00
2500.000	2075.00	579.80	0.46	0.17	0.00	244.73	500.00
2500.000	2400.00	579.99	0.19	0.21	0.00	247.67	500.00
3000.000	560.00	579.17	0.00	0.01	0.00	163.59	500.00
3000.000	1160.00	579.38	0.21	0.04	0.00	168.50	500.00
3000.000	2075.00	579.91	0.52	0.11	0.00	180.31	500.00
3000.000	2400.00	580.12	0.22	0.13	0.00	193.61	500.00
3500.000	560.00	579.18	0.00	0.01	0.00	187.55	500.00
3500.000	1160.00	579.43	0.25	0.05	0.00	205.42	500.00
3500.000	2075.00	580.03	0.60	0.13	0.00	252.39	500.00
3500.000	2400.00	580.28	0.24	0.16	0.00	255.05	500.00
4000.000	560.00	579.19	0.00	0.01	0.00	163.98	500.00
4000.000	1160.00	579.47	0.28	0.04	0.00	168.79	500.00
4000.000	2075.00	580.13	0.67	0.10	0.00	222.73	500.00
4000.000	2400.00	580.39	0.26	0.12	0.00	229.40	500.00

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	4500.000	1000.00	579.08	0.00	-0.11	0.00	200.76	500.00
*	4500.000	2000.00	579.60	0.52	0.13	0.00	241.18	500.00
*	4500.000	4000.00	580.35	0.75	0.22	0.00	906.96	500.00
*	4500.000	5130.00	580.42	0.07	0.03	0.00	918.80	500.00
	5560.000	1000.00	579.16	0.00	0.08	0.00	182.80	1060.00
	5560.000	2000.00	579.81	0.66	0.21	0.00	186.86	1060.00
	5560.000	4000.00	580.84	1.02	0.49	0.00	189.95	1060.00
	5560.000	5130.00	581.15	0.31	0.73	0.00	190.89	1060.00
	6820.000	1000.00	579.26	0.00	0.11	0.00	170.14	1260.00
	6820.000	2000.00	580.09	0.83	0.28	0.00	172.18	1260.00
	6820.000	4000.00	581.46	1.37	0.62	0.00	175.51	1260.00
	6820.000	5130.00	582.01	0.55	0.86	0.00	176.85	1260.00
	7780.000	1000.00	579.32	0.00	0.06	0.00	153.18	960.00
	7780.000	2000.00	580.24	0.92	0.15	0.00	155.32	960.00
	7780.000	4000.00	581.78	1.54	0.32	0.00	158.91	960.00
	7780.000	5130.00	582.43	0.65	0.42	0.00	159.96	960.00
	8640.000	1000.00	579.36	0.00	0.05	0.00	149.44	860.00
	8640.000	2000.00	580.36	0.99	0.12	0.00	151.98	860.00
	8640.000	4000.00	582.04	1.68	0.26	0.00	156.24	860.00
	8640.000	5130.00	582.77	0.73	0.34	0.00	157.00	860.00
	9230.000	1000.00	579.39	0.00	0.03	0.00	146.04	590.00
	9230.000	2000.00	580.43	1.04	0.07	0.00	148.37	590.00
	9230.000	4000.00	582.18	1.76	0.15	0.00	152.28	590.00
	9230.000	5130.00	582.96	0.77	0.19	0.00	153.89	590.00
	10430.000	1000.00	579.45	0.00	0.06	0.00	140.23	1200.00
	10430.000	2000.00	580.58	1.13	0.15	0.00	141.37	1200.00
	10430.000	4000.00	582.49	1.91	0.31	0.00	143.31	1200.00
	10430.000	5130.00	583.35	0.85	0.39	0.00	144.00	1200.00
	11940.000	1000.00	579.55	0.00	0.10	0.00	137.60	1510.00
	11940.000	2000.00	580.81	1.26	0.23	0.00	138.63	1510.00
	11940.000	4000.00	582.92	2.11	0.43	0.00	140.37	1510.00
	11940.000	5130.00	583.87	0.95	0.52	0.00	140.99	1510.00
	12400.000	1000.00	579.59	0.00	0.04	0.00	108.68	460.00
	12400.000	2000.00	580.89	1.29	0.08	0.00	109.93	460.00
	12400.000	4000.00	583.04	2.15	0.12	0.00	111.08	460.00
	12400.000	5130.00	584.00	0.97	0.13	0.00	111.59	460.00
	13180.000	1000.00	579.71	0.00	0.12	0.00	102.95	780.00
	13180.000	2000.00	581.13	1.42	0.24	0.00	107.97	780.00
	13180.000	4000.00	583.45	2.32	0.41	0.00	119.79	780.00
	13180.000	5130.00	584.49	1.04	0.49	0.00	129.69	780.00

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
13975.000	1000.00	579.92	0.00	0.21	0.00	114.98	795.00
13975.000	2000.00	581.49	1.57	0.36	0.00	115.05	795.00
13975.000	4000.00	583.97	2.47	0.52	0.00	115.10	795.00
13975.000	5130.00	585.06	1.09	0.57	0.00	115.10	795.00
13976.000	1000.00	579.92	0.00	0.00	0.00	114.98	1.00
13976.000	2000.00	581.49	1.57	-0.01	0.00	115.05	1.00
13976.000	4000.00	583.95	2.47	-0.01	0.00	115.10	1.00
13976.000	5130.00	585.04	1.09	-0.02	0.00	115.10	1.00
14016.000	1000.00	579.94	0.00	0.02	0.00	114.98	40.00
14016.000	2000.00	581.52	1.57	0.03	0.00	115.05	40.00
14016.000	4000.00	583.99	2.48	0.04	0.00	115.10	40.00
14016.000	5130.00	585.09	1.09	0.04	0.00	115.10	40.00
14017.000	1000.00	579.95	0.00	0.01	0.00	114.98	1.00
14017.000	2000.00	581.54	1.58	0.02	0.00	115.05	1.00
14017.000	4000.00	584.03	2.49	0.04	0.00	115.10	1.00
14017.000	5130.00	585.13	1.10	0.05	0.00	115.10	1.00
14077.000	1000.00	579.99	0.00	0.04	0.00	114.98	60.00
14077.000	2000.00	581.59	1.59	0.05	0.00	115.05	60.00
14077.000	4000.00	584.08	2.50	0.05	0.00	120.75	60.00
14077.000	5130.00	585.20	1.11	0.06	0.00	125.38	60.00
15000.000	1000.00	580.62	0.00	0.62	0.00	114.98	923.00
15000.000	2000.00	582.30	1.69	0.72	0.00	115.05	923.00
15000.000	4000.00	584.86	2.56	0.78	0.00	121.01	923.00
15000.000	5130.00	586.01	1.14	0.81	0.00	125.79	923.00
16000.000	1000.00	581.40	0.00	0.79	0.00	86.80	1000.00
16000.000	2000.00	583.15	1.75	0.85	0.00	100.34	1000.00
16000.000	4000.00	585.75	2.60	0.89	0.00	574.73	1000.00
16000.000	5130.00	586.93	1.18	0.92	0.00	817.26	1000.00
17050.000	1000.00	582.35	0.00	0.95	0.00	87.54	1050.00
17050.000	2000.00	584.24	1.89	1.09	0.00	103.67	1050.00
17050.000	4000.00	586.78	2.54	1.03	0.00	643.47	1050.00
17050.000	5130.00	587.73	0.94	0.80	0.00	819.78	1050.00
18565.000	1000.00	583.29	0.00	0.94	0.00	93.13	1515.00
18565.000	2000.00	585.37	2.08	1.12	0.00	250.10	1515.00
18565.000	4000.00	587.85	2.48	1.07	0.00	972.96	1515.00
18565.000	5130.00	588.67	0.82	0.95	0.00	1846.32	1515.00
20080.000	1000.00	583.87	0.00	0.58	0.00	97.80	1515.00
20080.000	2000.00	586.08	2.21	0.72	0.00	403.91	1515.00
20080.000	4000.00	588.46	2.38	0.61	0.00	1490.65	1515.00
20080.000	5130.00	589.21	0.75	0.53	0.00	2416.56	1515.00

4/3
23

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
21940.000	1000.00	584.38	0.00	0.51	0.00	214.48	1860.00
21940.000	2000.00	586.54	2.16	0.46	0.00	1509.11	1860.00
21940.000	4000.00	588.77	2.23	0.31	0.00	2447.75	1860.00
21940.000	5130.00	589.47	0.70	0.26	0.00	2806.79	1860.00
24850.000	1000.00	585.01	0.00	0.62	0.00	231.49	2910.00
24850.000	2000.00	586.90	1.89	0.36	0.00	271.79	2910.00
24850.000	4000.00	588.95	2.05	0.18	0.00	2846.04	2910.00
24850.000	5130.00	589.63	0.68	0.16	0.00	3389.35	2910.00
26560.000	1000.00	585.42	0.00	0.41	0.00	130.36	1710.00
26560.000	2000.00	587.25	1.83	0.35	0.00	339.58	1710.00
26560.000	4000.00	589.13	1.88	0.18	0.00	2922.38	1710.00
26560.000	5130.00	589.75	0.62	0.12	0.00	3022.00	1710.00
28410.000	1000.00	586.32	0.00	0.91	0.00	62.88	1850.00
28410.000	2000.00	588.26	1.94	1.01	0.00	155.26	1850.00
28410.000	4000.00	589.65	1.38	0.51	0.00	1551.01	1850.00
28410.000	5130.00	590.09	0.44	0.34	0.00	2097.00	1850.00
29200.000	1000.00	586.90	0.00	0.58	0.00	236.88	790.00
29200.000	2000.00	588.91	2.01	0.65	0.00	1541.10	790.00
29200.000	4000.00	590.22	1.30	0.57	0.00	1687.18	790.00
29200.000	5130.00	590.55	0.33	0.46	0.00	1702.14	790.00
30100.000	1000.00	587.25	0.00	0.35	0.00	64.73	900.00
30100.000	2000.00	589.01	1.76	0.10	0.00	182.21	900.00
30100.000	4000.00	590.17	1.16	-0.05	0.00	1033.12	900.00
30100.000	5130.00	590.53	0.36	-0.02	0.00	1249.47	900.00
31620.000	1000.00	588.53	0.00	1.28	0.00	64.58	1520.00
31620.000	2000.00	590.62	2.09	1.61	0.00	457.54	1520.00
31620.000	4000.00	591.92	1.30	1.75	0.00	1720.35	1520.00
31620.000	5130.00	592.27	0.35	1.74	0.00	1953.91	1520.00
32260.000	1000.00	588.87	0.00	0.34	0.00	161.44	640.00
32260.000	2000.00	591.04	2.17	0.42	0.00	1997.86	640.00
32260.000	4000.00	592.21	1.17	0.29	0.00	2515.60	640.00
32260.000	5130.00	592.54	0.33	0.27	0.00	2522.75	640.00
33000.000	1000.00	589.01	0.00	0.14	0.00	190.55	740.00
33000.000	2000.00	591.13	2.12	0.09	0.00	1324.23	740.00
33000.000	4000.00	592.29	1.16	0.08	0.00	2146.66	740.00
33000.000	5130.00	592.63	0.33	0.09	0.00	2154.00	740.00
33750.000	1000.00	589.28	0.00	0.27	0.00	185.69	750.00
33750.000	2000.00	591.30	2.02	0.17	0.00	755.90	750.00
33750.000	4000.00	592.43	1.13	0.14	0.00	1560.60	750.00
33750.000	5130.00	592.78	0.35	0.15	0.00	1777.41	750.00

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFXWS	TOPWID	XLCH
34000.000	1000.00	589.37	0.00	0.09	0.00	185.14	250.00
34000.000	2000.00	591.36	1.99	0.07	0.00	728.92	250.00
34000.000	4000.00	592.51	1.15	0.08	0.00	1542.20	250.00
34000.000	5130.00	592.86	0.35	0.09	0.00	1770.98	250.00

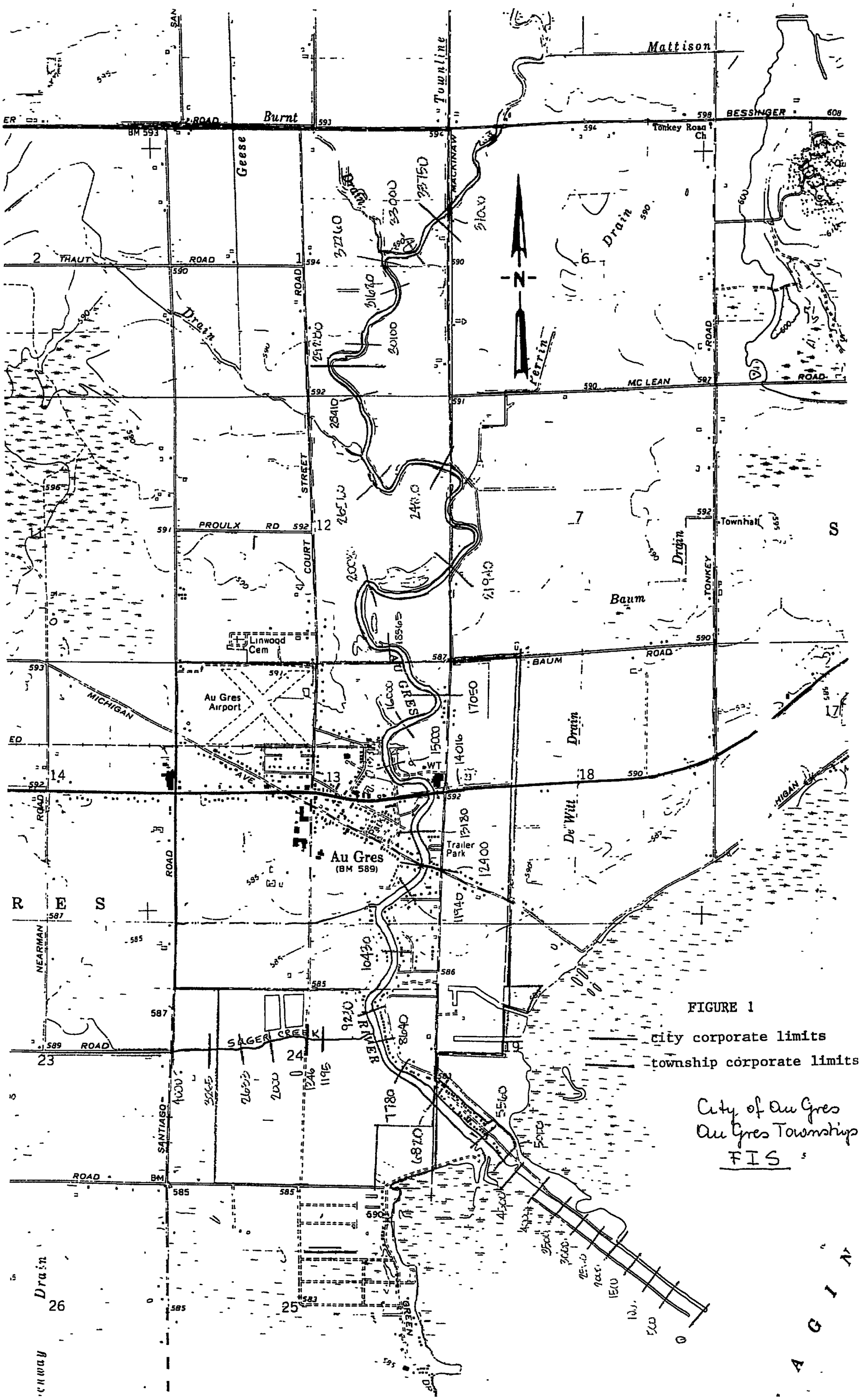
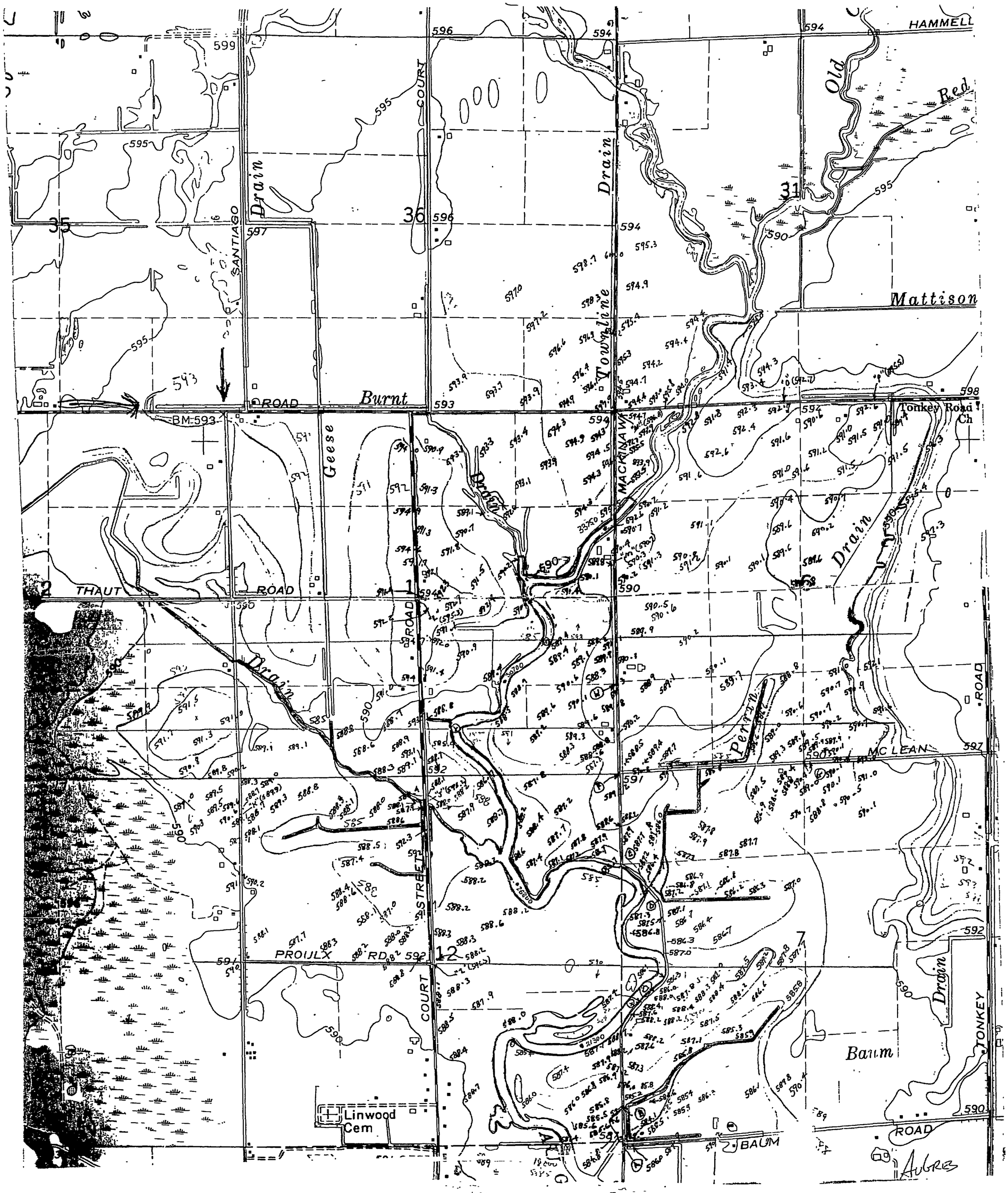


FIGURE 1

city corporate limits

township corporate limits

City of Au Gres
Au Gres Township
FIS


HAMMELL
Old Red
Drain
SANTIAGO
COURT
Drain
Drain
Mattison
Burnt
ROAD
Geese
Drain
MACKINAW
Tonkey Road
Drain
THAUT
ROAD
Drain
Perry
MC LEAN
ROAD
STREET
PROULX
RD
COURT
Linwood
Cem
Baum
Drain
TONKEY
ROAD
BAUM
Augres

00BREAK00

1) COUNTY: ARENAC

2) STUDY NAME: SIMS TWP

3) WATERCOURSE: WAVE RUN-UP

4) DOCUMENT TYPE: REPORT

00BREAK00

TECHNICAL LETTER REPORT ON
SIMS TOWNSHIP, MICHIGAN

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TECHNICAL LETTER REPORT ON
SIMS TOWNSHIP, MICHIGAN

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TECHNICAL LETTER REPORT ON
SIMS TOWNSHIP, MICHIGAN

1.0 INTRODUCTION

1.1 Purpose of Study

This report describes the application of the procedures developed in the 1989 "Great Lakes Wave Runup Methodology Study" to flood levels on Saginaw Bay, specifically in Sims Township, Michigan. The flood levels applicable to Sims Township were developed in the September 1989 "Flood Levels Report for Saginaw Bay".

1.2 Authority and Acknowledgments

The "Great Lakes Wave Runup Methodology Study" was prepared in 1989 by the U.S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), for application to future coastal Flood Insurance Studies (FIS) and/or restudies of communities bordering the Great Lakes. The work was conducted under Inter-Agency Work Agreement, EMW-89-E-3218, Project Order No. 1, between the COE and FEMA. The 100-year and 500-year flood levels from the September 1989 report referenced above, were used in combination with the maximum wave runup elevations to update the previous study in Sims Township on Saginaw Bay. TABLE 1 lists profile locations and the 100-year and 500-year "base" flood levels at five locations along the Sims Township shoreline. The five profiles were plotted from data obtained from a May-June 1990 survey.

1.3 Coordination

The "Flood Levels Report for Saginaw Bay", along with examples of the application of the methodology from the 1989

SHORELINE PROFILES
SIMS TOWNSHIP, MICHIGAN

Profile Location	100-year Flood Level	500-year Flood Level
1. Sims-1	584.8	585.7
2. Sims-2	584.8	585.7
3. Sims-3	584.8	585.7
4. Sims-4	584.8	585.7
5. Sims-5	584.8	585.7

NOTE: All elevations are in FT, NGVD and were obtained from the September 1989 "Saginaw Bay Flood Levels Report."

TABLE 1

"Great Lakes Wave Runup Methodology Study", were presented to FEMA on 1 March 1990. The procedures outlined in the above references were approved at this meeting for application to all Saginaw Bay FIS sites, including Sims Township.

2.0 AREA STUDIED

2.1 Community Description

Sims Township, Michigan, shown on FIGURE 1, is located in Arenac County along approximately 8.5 miles of shoreline on Saginaw Bay. There are no major populated communities located along the Sims Township shoreline. The developed shoreline consists of small seasonal and year-round residential homes.

The entire Sims Township shoreline on Saginaw Bay is exposed from the northeast to a Lake Huron/Saginaw Bay fetch of about 120 miles. Bathymetry in Saginaw Bay along the Sims Township shoreline varies from 30-foot depths offshore to less than five feet deep near shore. Ordinary fluctuations of water levels along this shoreline are subject to change due to wind. A northeast storm can push water into the bay and raise the water level along the Sims Township shoreline 1 to 2 feet. Accordingly, a storm from the southwest can lower water levels. The lowest seasonal bay stages usually prevail during the winter months and the highest during the summer months. During the past 13 years, fluctuations of monthly mean water levels on Saginaw Bay measured at the Essexville, Michigan water level gage have ranged from a minimum of 578.14 feet to a maximum of 581.9 feet (NGVD).

SIMS TOWNSHIP LOCATION MAP

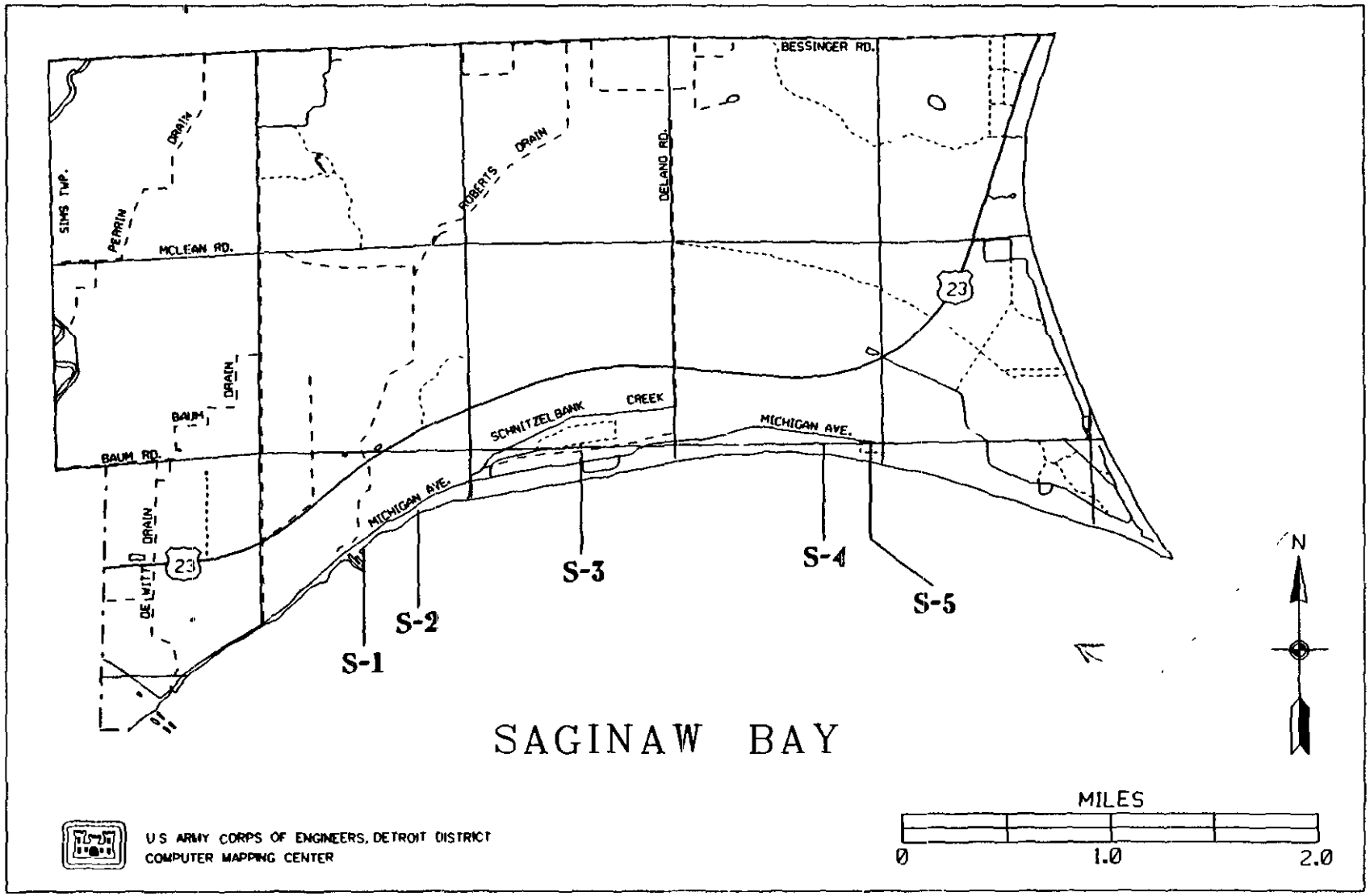


FIGURE 1

2.2 Principal Flood Problems

Short-term Saginaw Bay water level fluctuations are most often due to variations in wind and barometric pressure. Occasionally, a surge of considerable proportions takes place within a few hours, due to strong and persistent northerly or southerly winds.

When lake levels are high and storms occur from the northeast, Sims Township shoreline communities are usually subjected to extreme conditions. Along the Sims Township shoreline, substantial flooding has occurred because of the flat topography along the reaches on Saginaw Bay.

3.0 ENGINEERING METHODS

The flood levels established in the U.S. Army Corps of Engineer's September 1989 "Flood Levels Report for Saginaw Bay" and the procedures developed in the 1989 "Great Lakes Wave Runup Methodology Study" were used to analyze the flooding potential at the five Sims Township FIS sites shown on FIGURE 1. The hydraulic analyses presented herein involved the determination of the wave runup components and maximum wave runup elevations for selected sites.

Input data used for flood calculations include site specific design wave, water depth at the toe of the structure, and wave period. Additional data such as nearshore profiles, high water marks, and existing conditions, bathymetry and topography, were also analyzed to determine the maximum wave runup elevation at each site. This technical letter report presents the wave runup

application procedures for each of the five FIS sites located in Sims Township. Representative profiles for each site are included in APPENDIX A.

4.0 VE-, AO-, and X-Zone Delineations

Reaches of the Sims Township shoreline in the surf zone which are subject to significant wave attack are referred to by FEMA as Coastal High Hazard Zones or velocity ("VE") zones. A "VE" Zone is the flood insurance rate zone that corresponds to the 100-year coastal flood plains where average depths are more than 4 feet and have additional hazards associated with storm waves. An "AO" Zone is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. A "X" Zone is the flood insurance rate zone that corresponds to the areas outside the 500-year flood plain, areas within the 500-year flood plain, areas of 100-year flooding where average depths are less than 1 foot, areas of the 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees.

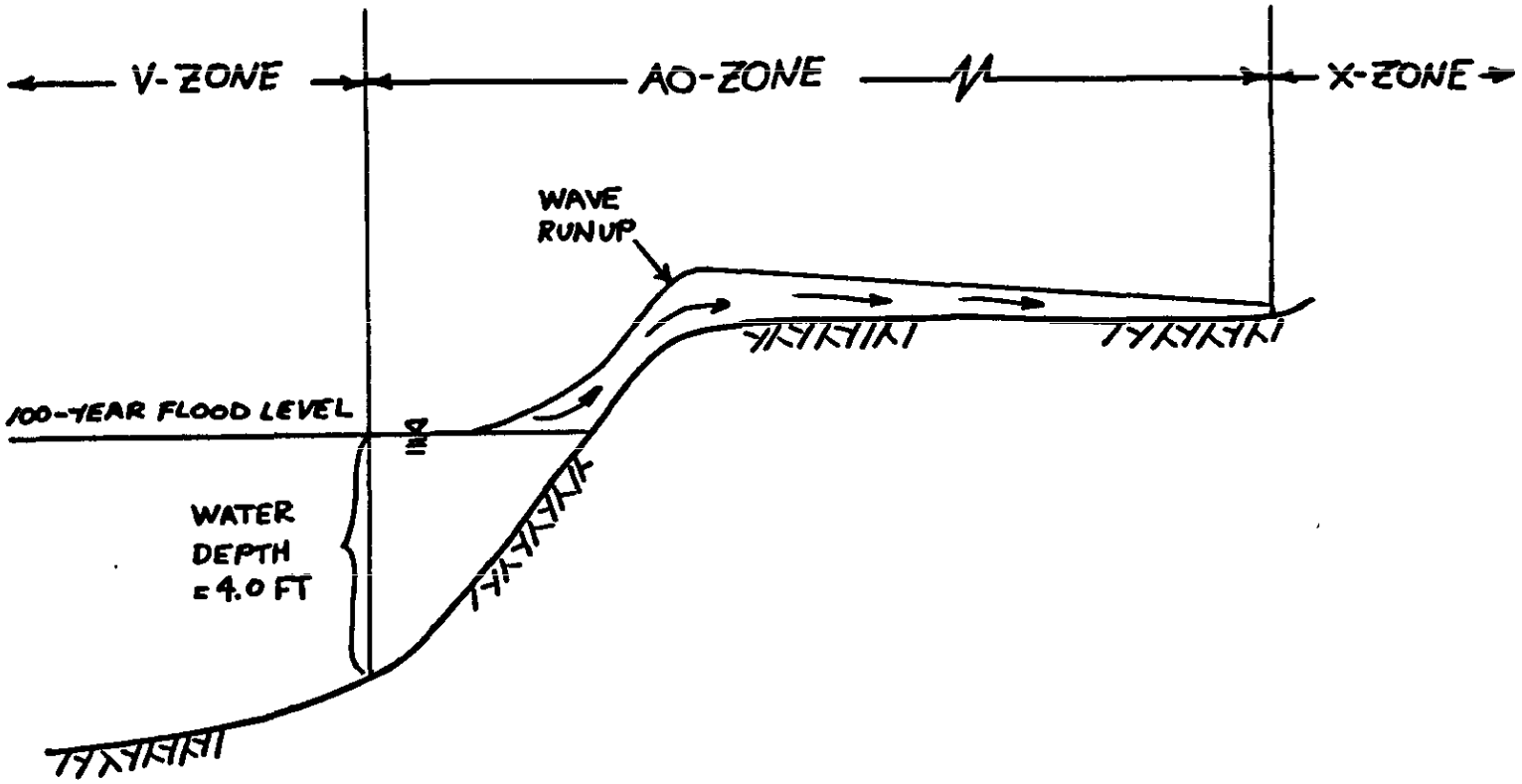
Two flood conditions as defined by FEMA, most closely represent the FIS sites in Sims Township. The first type of condition involves a beach that is overtopped by wave runup, but not flooded. The V/A demarcation line is fixed at the extended front crest of the calculated post-storm profile. The segment from the extended front crest to the inland termination point of

overtopping water is mapped as an AO-Zone. The X-Zone is the remaining area landward of the AO-Zone. This mapping is considered appropriate for profiles Sims-1 thru Sims-4 and is shown on FIGURES 2 thru 5.

The second type of flood condition along the Sims Township shoreline involves a shoreline structure that is not flooded or damaged, but is overtopped by wave runup. The V/A demarcation line is fixed at the most landward edge of the exposed portion of the structure. The segment between the VE-Zone and the inland termination point of overtopping water is mapped as an AO-Zone. FIGURE 6 depicts this condition, which is representative of the Sims-5 profile.

The VE-, AO-, and X-Zones for these sites have been delineated according to FEMA's 1990 "Guidelines for Great Lakes Wave Runup Computation and Mapping" and are shown on the attached work maps. The formal submittal of the Sims Township study will include original mylar copies showing sufficient detail for submittal to FEMA's technical review contractor.

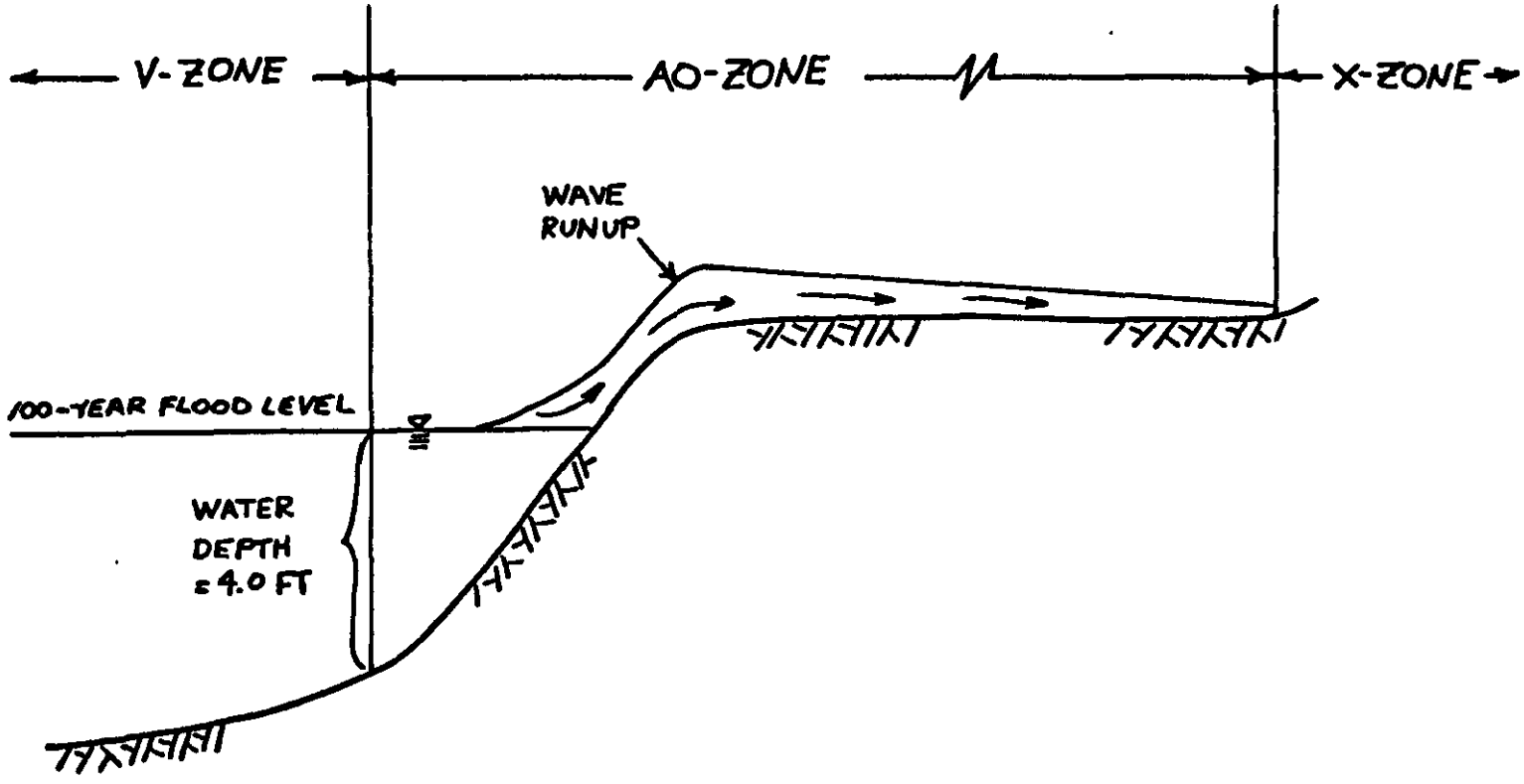
SIMS TOWNSHIP A & V ZONE DELINEATIONS ON A BEACH SYSTEM



Sims-1

FIGURE 2

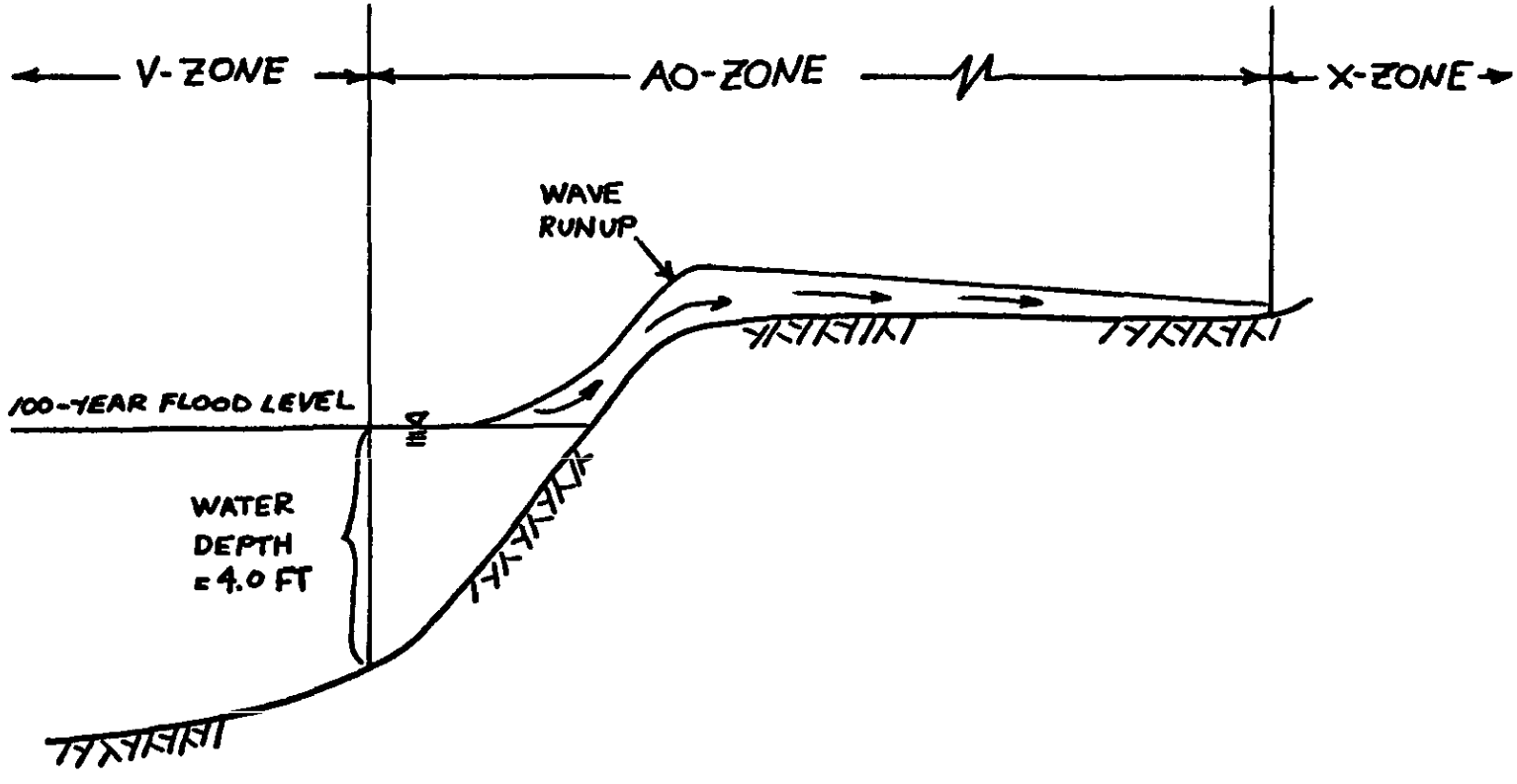
SIMS TOWNSHIP A & V ZONE DELINEATIONS ON A BEACH SYSTEM



Sims-2

FIGURE 3

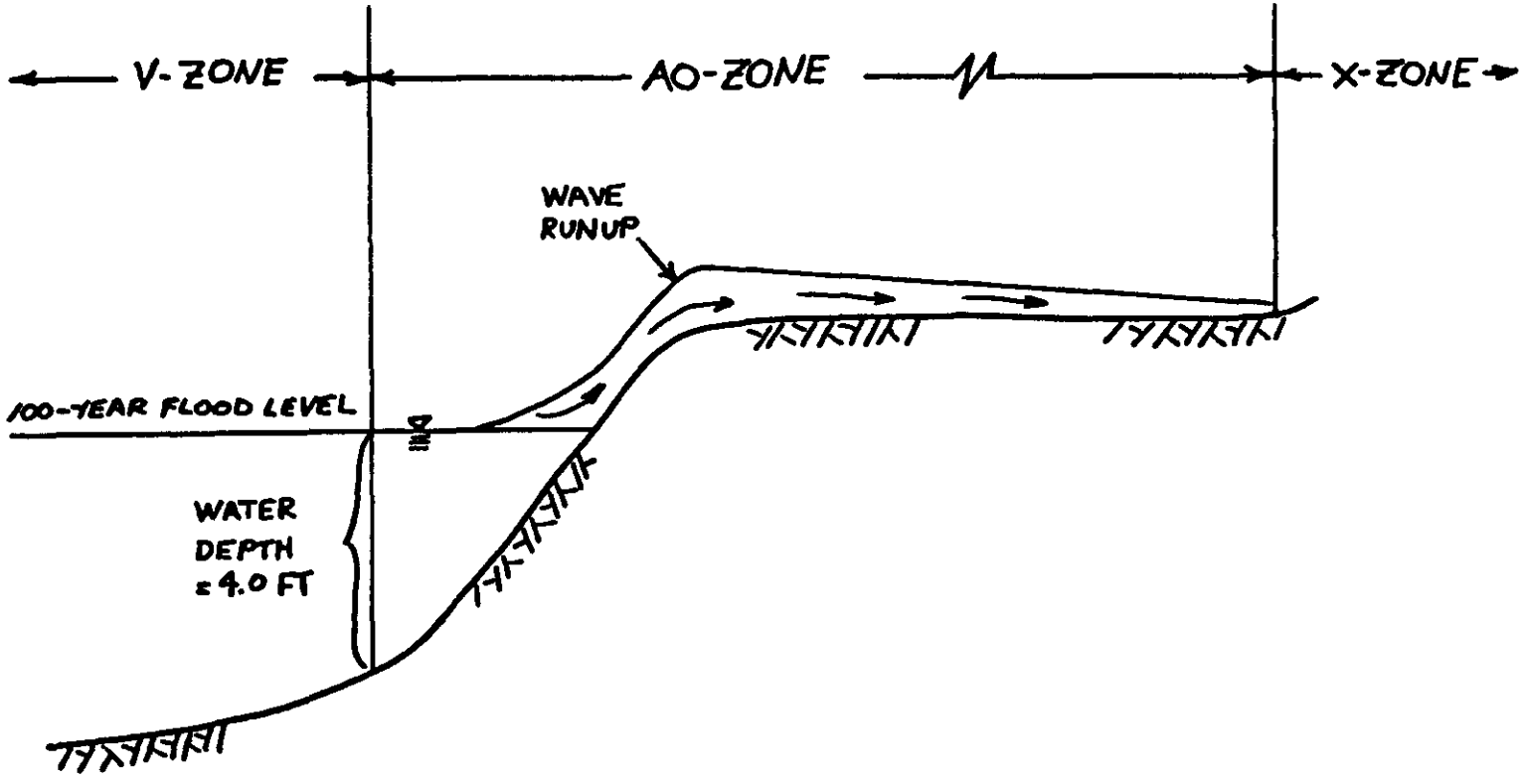
SIMS TOWNSHIP A & V ZONE DELINEATIONS ON A BEACH SYSTEM



Sims-3

FIGURE 4

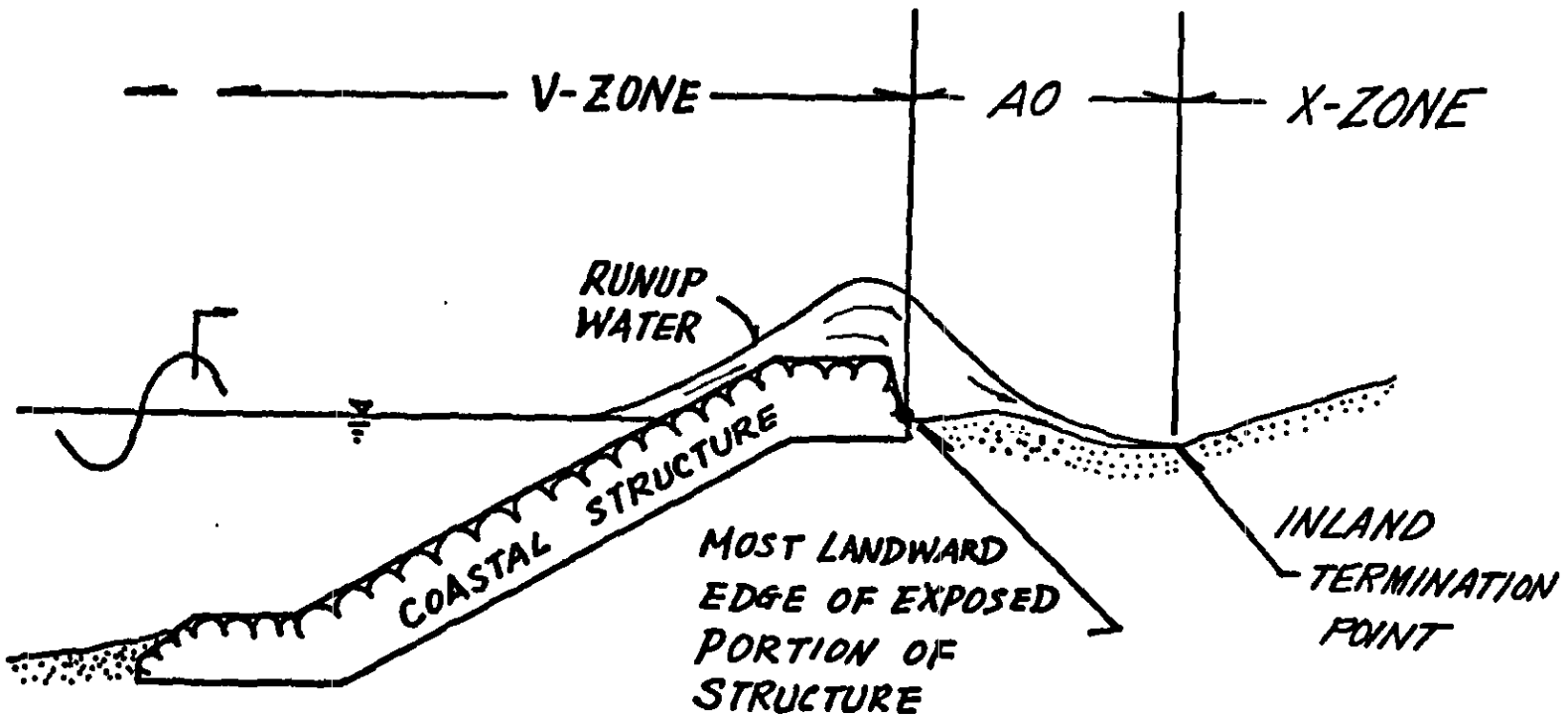
SIMS TOWNSHIP A & V ZONE DELINEATIONS ON A BEACH SYSTEM



Sims-4

FIGURE 5

SIMS TOWNSHIP A & V ZONE DELINEATIONS ON A BEACH SYSTEM



Sims-5

FIGURE 6

5.0 CONCLUSIONS

For each of the Sims Township sites where the 100-year flood level inundates the shoreline property, the inundated area will experience a minimal water depth shoreward of the shoreline protection. This water depth will generate a negligible wave across the property. Therefore, the 100-year flood level will be used to delineate the flood profiles at each site.

Accordingly, where structures protect against flooding, the 100-year VE-, AO-, and X-Zones, based on wave runup elevations, will be delineated on the work maps in the final FIS for the site. TABLE 2 lists the 100-year computed wave runup components and the associated wave runup elevations for the two sites.

In conclusion, it is recommended that the delineated 100-year flood profiles for the five Sims Township sites included herein be used by FEMA for updating the Sims Township FIS.

TABLE 2

WAVE RUNUP ELEVATIONS

Sims Township FIS Sites	100-year Computed Wave Runup(ft.)	100-year Wave Runup Elevation (ft., NGVD)
1. Sims-1	2.9	587.7
2. Sims-2	3.3	588.1
3. Sims-3	2.6	587.4
4. Sims-4	2.6	587.4
5. Sims-5	2.6	587.4

6.0 GLOSSARY

Annual Maximum Instantaneous Water Level: The highest water level that was recorded during a year by a gage with a sampling frequency of an hour or less.

AE-Zone: The flood insurance rate zone that corresponds to the 100-year flood plains where average depths are less than 4 feet and are determined in the Flood Insurance Study by detailed methods.

AO-Zone: The flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are 1 and 3 feet.

Beach: The zone of sedimentary material that extends landward from the low water line to the place where there is a marked change in material or form, or to the line of permanent vegetation.

Bluff: A high, steep bank composed of erodible materials.

Floodplain: The area adjoining a river, stream, watercourse, ocean, lake or other body of standing water that has been or may be covered by floodwater.

National Geodetic Vertical Datum of 1929 (NGVD): The nationwide reference datum for land elevations throughout the United States. It was established in 1929.

Runup: The rush of water up a beach or structure from the breaking of a wave. Also, the vertical height of uprush above the still-water level.

Still-water level: The elevation that the water surface would assume if all wave action were absent.

Storm-water level: The rise above the normal water level on the open-coast, due to wind stress on the water surface.

VE-Zone: The flood insurance rate zone that corresponds to the 100-year coastal flood plains where average depths are more than 4 feet and have additional hazards associated with storm waves.

Wave-height: The vertical distance between the wave crest and the preceding trough.

Wave setup: The superelevation of the water surface over normal surge elevation due to the onshore mass transport of the water by wave action alone.

Wind setup: The vertical rise in the still-water level on the leeward side of a body of water caused by wind stresses on the surface of the water.

X-Zone: The flood insurance rate zone that corresponds to areas outside the 500-year flood plain, areas within the 500-year flood plain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees.

7.0 REFERENCES

1. U.S. Army Corps of Engineers, Coastal Engineering Research Center, Vicksburg, MS, "Shore Protection Manual," Volumes I & II, 1984.

2. U.S. Army Corps of Engineers, Detroit District, "Phase I, Revised Report on Great Lakes Open-Coast Flood Levels," April 1988.

3. U.S. Army Corps of Engineers, Detroit District, "Phase II, Revised Report on Great Lakes Open-Coast Flood Levels," April 1988.

4. U.S. Army Corps of Engineers, Detroit District, "Appendices, Revised Report on Great Lakes Open-Coast Flood Levels," April 1988.

5. U.S. Army Corps of Engineers, Coordinating Committee on Great Lakes Basin Hydraulic and Hydrologic Data, "History of Water Level Gauges, Upper Great Lakes and the St. Clair - Detroit Rivers," January 1978.

6. U.S. Army Corps of Engineers, North Central Division, "Great Lakes Region Inventory Report National Shoreline Study," August 1978.

7. U.S. Army Corps of Engineers, Detroit District, "Flood Levels Report - Saginaw Bay," September 1989.

8. U.S. Army Corps of Engineers, Detroit District, "Flood Levels Report - Anchor Bay," September 1989.

9. Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan, SCHWAB, D.J., and LYNN, E.W., "Great Lakes Storm Surge Planning Program," 1987.

10. U.S. Army Corps of Engineers, Detroit District, "Phase II Report on Great Lakes Flood Levels - Little Bay De Noc," August 1981.

11. U.S. Army Corps of Engineers, Detroit District, "Phase II Report on Great Lakes Flood Levels - Big Bay De Noc," July 1981. April 1988,

12. FEMA's 1990 "Guidelines for Great Lakes Wave Runup Computation and Mapping".

TECHNICAL LETTER REPORT ON SIMS TOWNSHIP, MICHIGAN

APPENDIX A

Prepared by the U.S. Army Corps of Engineers
for the Federal Emergency Management Agency

Detroit, Michigan
December 1990

TECHNICAL LETTER REPORT ON
SIMS TOWNSHIP, MICHIGAN

SYNOPSIS

APPENDIX A outlines the procedures necessary to calculate the wave runup component and the maximum wave runup elevation associated with the 100-year flood level. These data, with the information provided from the profile surveys will enable the user to delineate the 100-year VE-, AO- and X-Zone profiles according to FEMA's 1990 "Guidelines for Great Lakes Wave Runup Computation and Mapping. The following list shows the five Sims Township sites and the 100-year wave runup flood profiles. Samples of these computations are included in APPENDIX A.

Sims Township FIS Sites	100-year Computed Wave Runup(ft.)	100-year Wave Runup Elevation (ft., NGVD)
1. Sims-1	2.9	587.7
2. Sims-2	3.3	588.1
3. Sims-3	2.6	587.4
4. Sims-4	2.6	587.4
5. Sims-5	2.6	587.4

8.0 DEFINITION OF TERMS

SYMBOL	DEFINITIONS
a	Wave transmission coefficient
b	Wave transmission coefficient
d	Relative depth (ft.)
ξ	Surf parameter
ϵ	Significant wave steepness
f'	Frequency (sec.)
g	Gravitational constant (ft./sec^2)
H_i	Incident wave height (ft.)
H_o'	Unrefracted deepwater wave height (ft.)
H_{mo}	Zero-moment wave height (ft.)
H_s	Average height of the 1/3 highest waves (ft.)
k	Dimensionless wave number
L_m	Wavelength (ft.)
L_o	Deepwater wavelength (ft.)
θ	Structure slope (degrees)
R	Wave runup (ft.)
T'	Wave period (sec.)
T_m	Spectral peak period (sec.)
α	Spectral parameter

TECHNICAL LETTER REPORT ON
SIMS TOWNSHIP, MICHIGAN

SYNOPSIS

APPENDIX A outlines the procedures necessary to calculate the wave runup component and the maximum wave runup elevation associated with the 100-year flood level. These data, with the information provided from the profile surveys will enable the user to delineate the 100-year VE-, AO- and X-Zone profiles according to FEMA's 1990 "Guidelines for Great Lakes Wave Runup Computation and Mapping. The following list shows the five Sims Township sites and the 100-year wave runup flood profiles. Samples of these computations are included in APPENDIX A.

Sims Township FIS Sites	100-year Computed Wave Runup(ft.)	100-year Wave Runup Elevation (ft., NGVD)
1. Sims-1	2.4	587.2
2. Sims-2	2.8	587.6
3. Sims-3	2.2	587.0
4. Sims=4	2.2	587.0
5. Sims-5	2.6	587.4

TABLE 2

WAVE RUNUP ELEVATIONS

Sims Township FIS Sites	100-year Computed Wave Runup(ft.)	100-year Wave Runup Elevation (ft., NGVD)
1. Sims-1	2.4	587.2
2. Sims-2	2.8	587.6
3. Sims-3	2.2	587.0
4. Sims-4	2.2	587.0
5. Sims-5	2.6	587.4

RUNUP COMPUTATION
WAVE RUNUP AT SIMS TOWNSHIP, SIMS-1

```
                runup on:  beach
        100-year flood: 584.8 feet above IGLD, optional
    water depth at toe:  26.0 feet            1st: significant wave computation
  100-year wave period T:  11.4       (enter per Ref. 3)
                     T':   5.7
                      L: 329.59
100-yr deep water wave H:  24.9 feet  (enter per Ref. 3)
                      K:   2.0
                  alpha:   0.0110
                    Hmo:  11.0
                  d bar:   0.0062
                epsilon:   0.0083
                 Hs/Hmo:   1.018     (enter per Ref. 4, Figure 10)
       Hs in deep water:  11.2                (significant wave)
            beach slope:   0.02900  (tan 30H:1V = 0.03333)
             beach zeta:   0.224               2nd: wave runup computation
            beach runup:   2.4
         runup elevation: 587.2 feet above IGLD
```

A:\>NOTE: ALL ELEVATIONS ABOVE ARE IN FEET ABOVE NGVD

FIS PROFILE
SIMS - 1

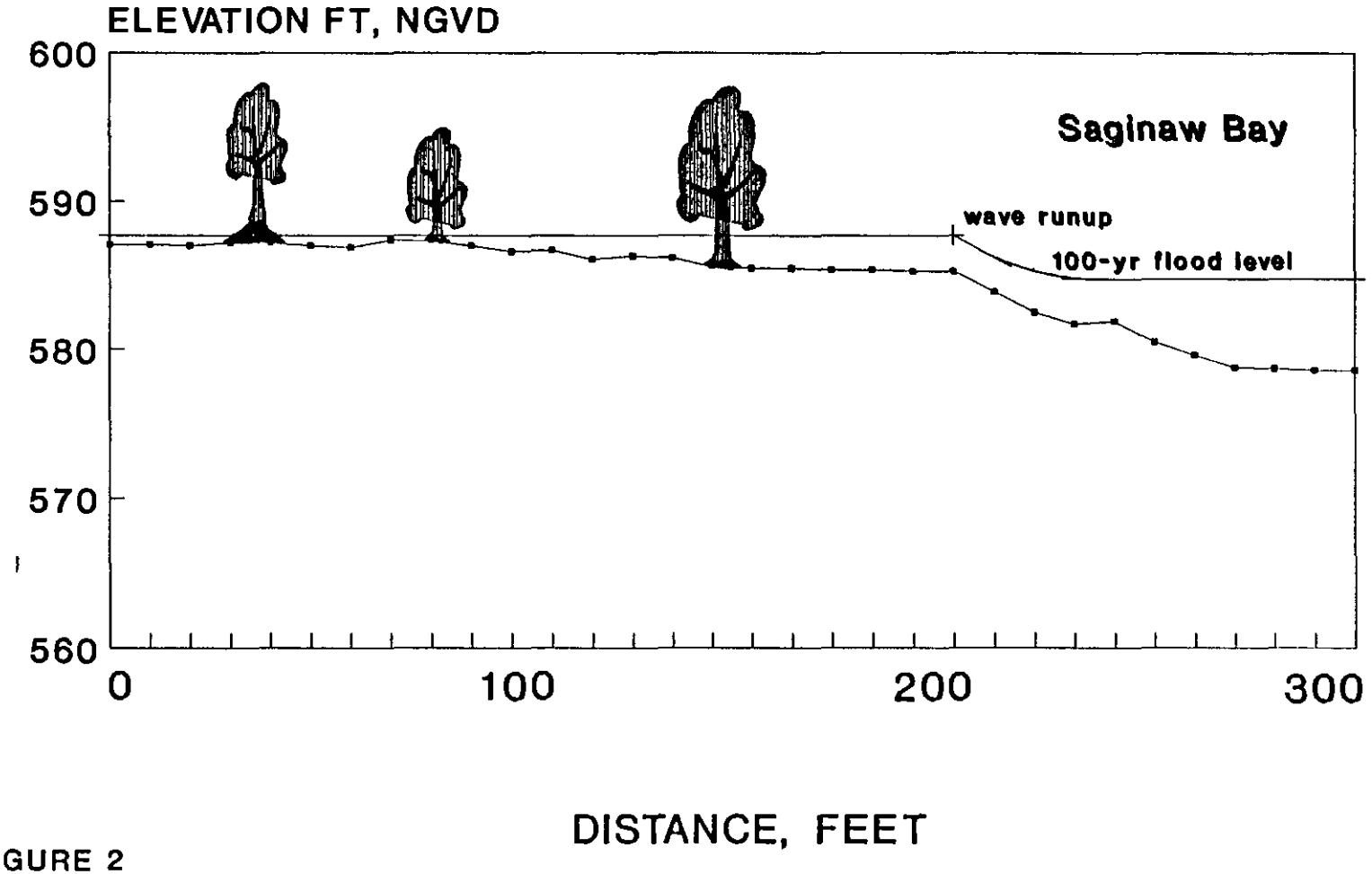


FIGURE 2

RUNUP COMPUTATION
WAVE RUNUP AT SIMS TOWNSHIP, SIMS-2

```
                runup on:  beach
        100-year flood: 584.8 feet above IGLD, optional
    water depth at toe:  26.0 feet            1st: significant wave computation
 100-year wave period T:  11.4       (enter per Ref. 3)
                     T':   5.7
                      L: 329.59
100-yr deep water wave H:  24.9 feet  (enter per Ref. 3)
                      K:   2.0
                  alpha:   0.0110
                    Hmo:  11.0
                  d bar:   0.0062
                epsilon:   0.0083
                 Hs/Hmo:   1.018     (enter per Ref. 4, Figure 10)
      Hs in deep water:  11.2                (significant wave)
           beach slope:   0.03400  (tan 30H:1V = 0.03333)
            beach zeta:   0.262              2nd: wave runup computation
           beach runup:   2.8
       runup elevation: 587.6 feet above IGLD
```

A:\>NOTE: ALL ELEVATIONS ABOVE ARE IN FEET ABOVE NGVD

FIS PROFILE

SIMS - 2

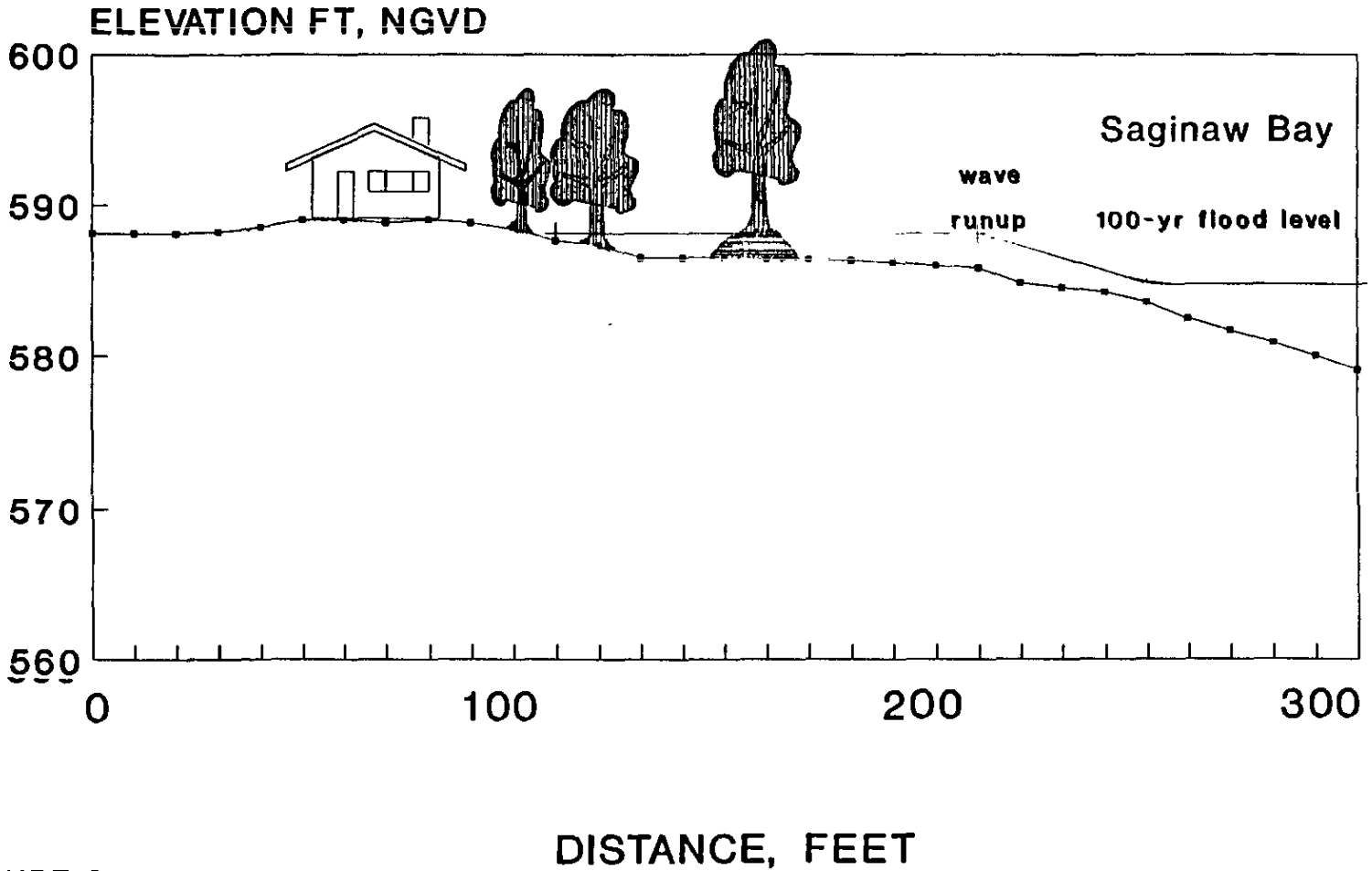


FIGURE 3

RUNUP COMPUTATION
WAVE RUNUP AT SIMS TOWNSHIP, SIMS-3

```
                runup on:  beach
        100-year flood: 584.8 feet above IGLD, optional
     water depth at toe:  26.0 feet           1st: significant wave computation
  100-year wave period T:  11.4       (enter per Ref. 3)
                      T':   5.7
                       L: 329.59
100-yr deep water wave H:  24.9 feet  (enter per Ref. 3)
                       K:   2.0
                   alpha:   0.0110
                     Hmo:  11.0
                   d bar:   0.0062
                 epsilon:   0.0083
                  Hs/Hmo:   1.018     (enter per Ref. 4, Figure 10)
        Hs in deep water:  11.2                (significant wave)
             beach slope:   0.02600  (tan 30H:1V = 0.03333)
              beach zeta:   0.200              2nd: wave runup computation
             beach runup:   2.2
          runup elevation: 587.0 feet above IGLD
```

A:\>NOTE: ALL ELEVATIONS ABOVE ARE IN FEET ABOVE NGVD

FIS PROFILE

SIMS - 3

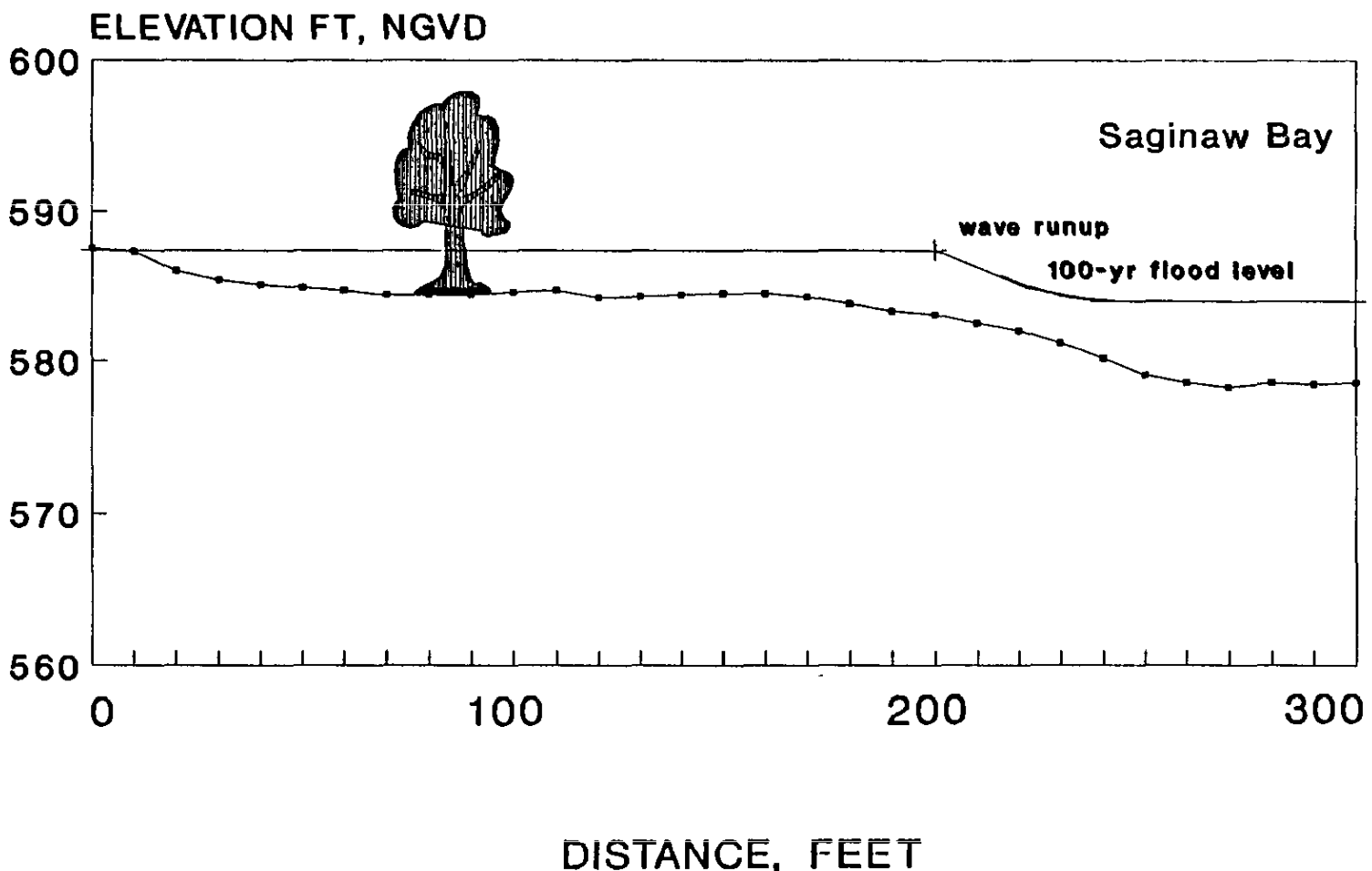


FIGURE 4

RUNUP COMPUTATION
WAVE RUNUP AT SIMS TOWNSHIP, SIMS-4

```
                runup on:  beach
        100-year flood: 584.8 feet above IGLD, optional
    water depth at toe:  26.0 feet           1st: significant wave computation
 100-year wave period T:  11.4       (enter per Ref. 3)
                     T':   5.7
                      L: 329.59
100-yr deep water wave H:  24.9 feet  (enter per Ref. 3)
                      K:   2.0
                  alpha:   0.0110
                    Hmo:  11.0
                  d bar:   0.0062
                epsilon:   0.0083
                 Hs/Hmo:   1.018     (enter per Ref. 4, Figure 10)
       Hs in deep water:  11.2                (significant wave)
            beach slope:   0.02600  (tan 30H:1V = 0.03333)
             beach zeta:   0.200              2nd: wave runup computation
            beach runup:   2.2
         runup elevation: 587.0 feet above IGLD
```

A:\>NOTE: ALL ELEVATIONS ABOVE ARE IN FEET ABOVE NGVD

FIS PROFILE
SIMS - 4

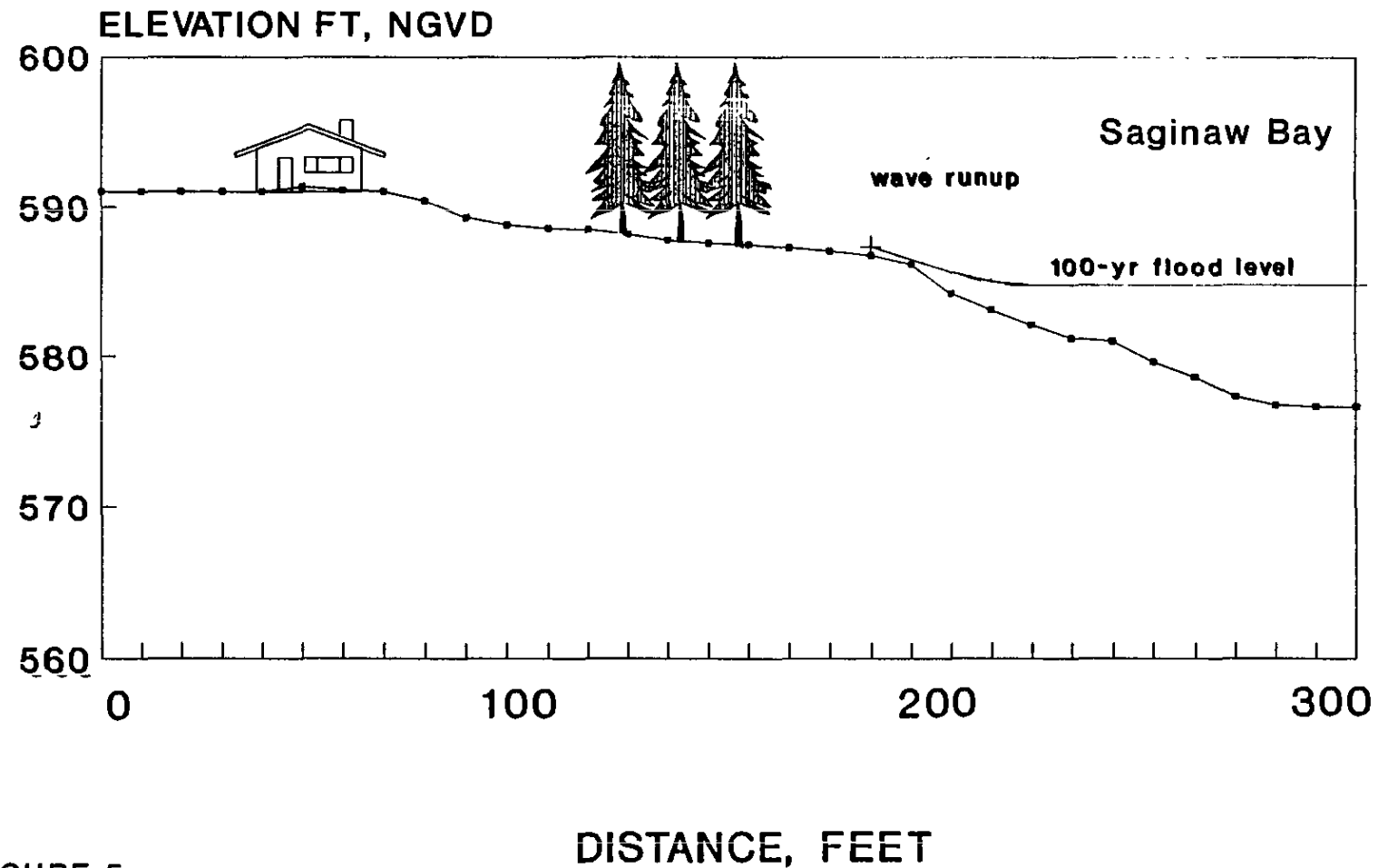


FIGURE 5

RUNUP COMPUTATION
WAVE RUNUP AT SIMS TOWNSHIP, SIMS-5

```
                runup on:  vertical wall
          100-year flood: 584.8 feet
      water depth       :   2.5 feet                 significant wave computation
100-year wave period T:  11.4
                      T':   1.8
                       L: 102.20
100-yr deep water wave H:  24.9 feet
                       K:   6.6
                   alpha:   0.0197
                     Hmo:   1.5
                  d bar:   0.0006
                 epsilon:   0.0037
                  Hs/Hmo:   1.000
         Hs at structure:   1.5                 (significant wave)
                    d/Lo:   0.0038                2nd: wave runup computation
                  H/Ho':   1.8116
                     Ho':   0.8
            Ho'/(gT**2):   0.00019
                 ds/Ho':   3.1
               runup/Ho':   3.25
     vertical wall runup:   2.6
        runup elevation: 587.4 feet above IGLD
```

NOTE: ALL ELEVATIONS ABOVE ARE IN FEET ABOVE NGVD

FIS PROFILE
SIMS - 5

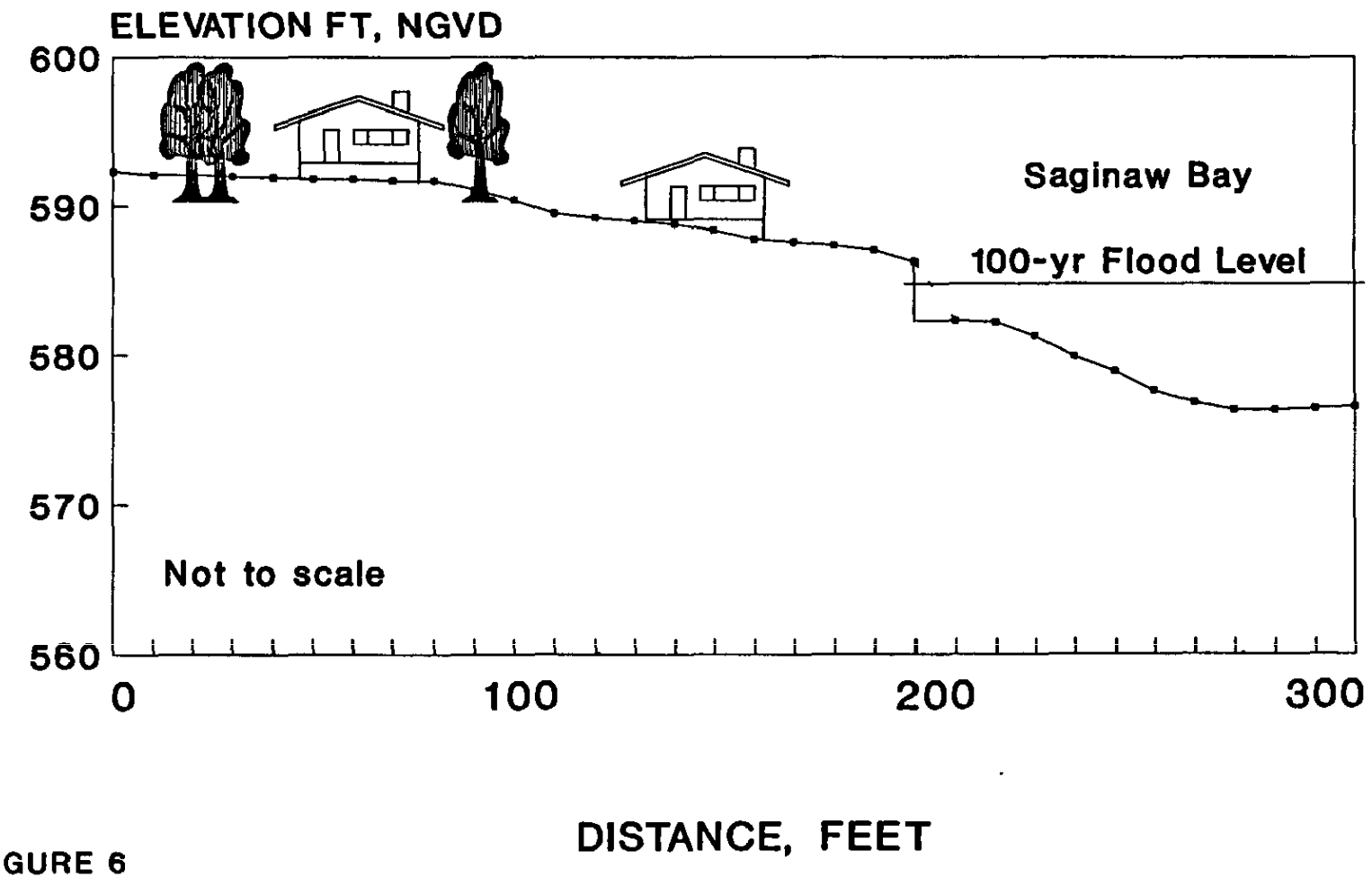


FIGURE 6

Enclosed for your information are revised wave runup elevations for the Saginaw Bay Flood Insurance Studies submitted to your office in February 1991, for 8 communities. Since approval by FEMA of the Great Lakes wave runup methodology, the Detroit District has employed this methodology in a number of other projects within the District. During this time, it had become apparent to District personnel that certain improprieties existed in the results obtained from these wave runup calculations. Consequently, the District conducted a review of these calculations and discovered that a minor error existed in the program's equations. Subsequent to this review, all runup elevations for the study sites were re-computed. Attached for your use is a summary of the original and revised runup elevations at each site. Although any change in runup elevation will result in a corresponding change to the Base Flood Elevation (BFE), the impacts on the flood zone delineation are minimal, except for Alpena.

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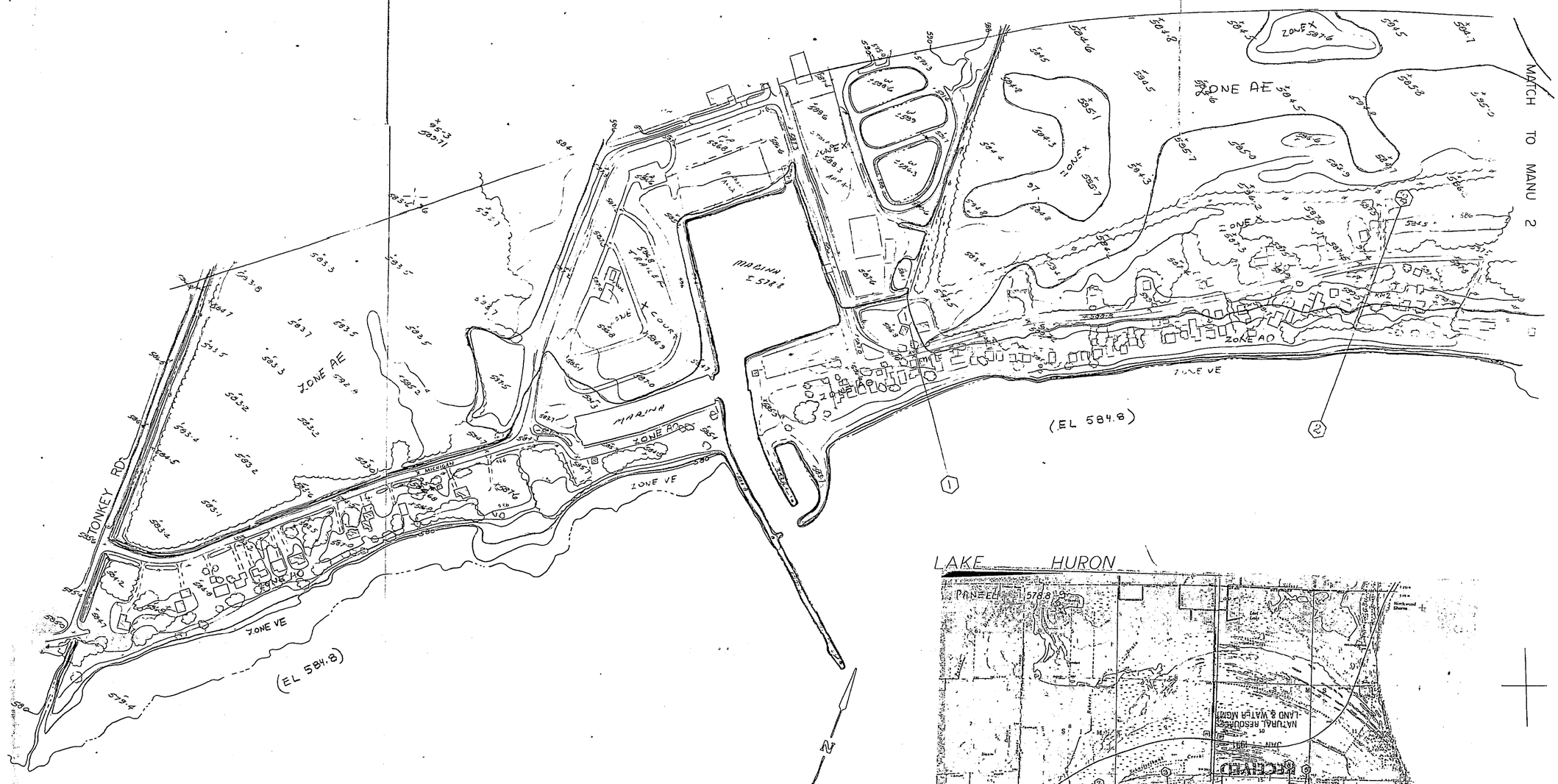
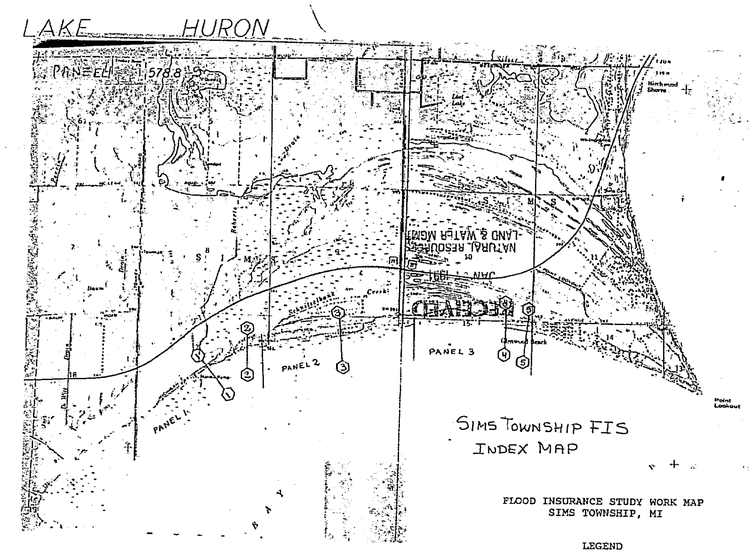
SAGINAW BAY FIS
WAVE RUNUP INFORMATION
7 January 1992

LOCATION	INITIAL RUNUP	REVISED RUNUP	CHANGE	BASE FLOOD ELEVATION INITIAL	BASE FLOOD ELEVATION REVISED	TYPE
Alpena 1 (P-1)	4.7	3.9	0.8	588.5	587.7	beach
Alpena 2 (P-1)	4.7	3.9	0.8	588.5	587.7	beach
Alpena 3 (P-2,4)	3.8	3.2	0.6	587.6	587.0	beach
Alpena 4	-	-	-	583.8	-	open coast
Alpena 5	-	-	-	583.8	-	open coast
Baldwin 1	-	-	-	584.0	-	open coast
Baldwin 2 (P-1,5)	0.4	0.4	0.0	584.4	584.4	beach
Baldwin 3 (P-2)	3.0	2.5	0.5	587.0	586.5	beach
Baldwin 4 (P-2)	3.0	2.5	0.5	587.0	586.5	beach
Baldwin 5	10.0	10.0	0.0	594.0	594.0	beach
Baldwin 6 (P-3)	9.0	7.7	1.3	593.0	591.7	beach
Baldwin 7 (P-3)	2.0	1.7	0.3	586.0	585.7	beach
Baldwin 8 (P-4)	2.0	1.7	0.3	586.0	585.7	beach
Baldwin 9	-	-	-	584.0	584.0	open coast
Greenbush 1 (P-1,2)	1.7	1.4	0.3	585.5	585.2	beach
Greenbush 2 (P-3)	1.7	1.4	0.3	585.5	585.2	beach
Greenbush 3 (P-3)	1.7	1.4	0.3	585.5	585.2	beach
Kawkawlin 1 (P-1)	2.3	1.9	0.4	588.0	587.6	beach
Kawkawlin 2	3.6	-	-	589.3	-	vert. struc.
Kawkawlin 3	0.9	-	-	586.6	-	vert. struc.
Kawkawlin 4	2.9	-	-	588.6	-	vert. struc.
Pinconning 1 (P-1)	2.4	2.0	0.4	587.9	587.5	beach
Pinconning 2	-	-	-	585.5	585.5	open coast
Pinconning 3	-	-	-	585.5	585.5	open coast

SAGINAW BAY FIS
WAVE RUNUP INFORMATION
7 January 1992

LOCATION	INITIAL RUNUP	REVISED RUNUP	CHANGE	BASE FLOOD ELEVATION INITIAL	BASE FLOOD ELEVATION REVISED	STRUCTURE TYPE
Pinconning 4	-	-	-	585.5	585.5	open coast
Pinconning 5	-	-	-	585.5	585.5	open coast
Pinconning 6	-	-	-	585.5	585.5	open coast
Pinconning 7	-	-	-	585.5	585.5	open coast
Pinconning 8	-	-	-	585.5	585.5	open coast
Pinconning 9	-	-	-	585.5	585.5	open coast
Sims 1 (P-1,4)	2.9	2.4	0.5	587.7	587.2	beach
Sims 2 (P-1)	3.3	2.8	0.5	588.1	587.6	beach
Sims 3 (P-2)	2.6	2.2	0.4	587.4	587.0	beach
Sims 4 (P-3)	2.6	2.2	0.4	587.4	587.0	beach
Sims 5	2.6	-	-	587.4	-	vert. struc.
Tawas City 1 (P-1,2)	3.9	3.3	0.6	587.9	587.3	beach
Tawas City 2	2.6	-	-	586.6	-	vert. struc.
Tawas City 3 (P-1)	3.9	3.3	0.6	587.9	587.3	beach
Tawas City 4 (P-1,2)	3.9	3.3	0.6	587.9	587.3	beach
East Tawas 1 (P-1)	0.6	0.5	0.1	584.6	584.5	beach
East Tawas 2	4.8	2.8	2.0	588.8	586.8	revetment
Fraser 2 (new)	-	3.1	3.1	585.7 (open coast)	588.8	revetment





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9700 KOGER BLVD., ST. PETERSBURG, FLORIDA 33702
(813) 577-3801

SIMS TOWNSHIP FIS
INDEX MAP

FLOOD INSURANCE STUDY WORK MAP
SIMS TOWNSHIP, MI

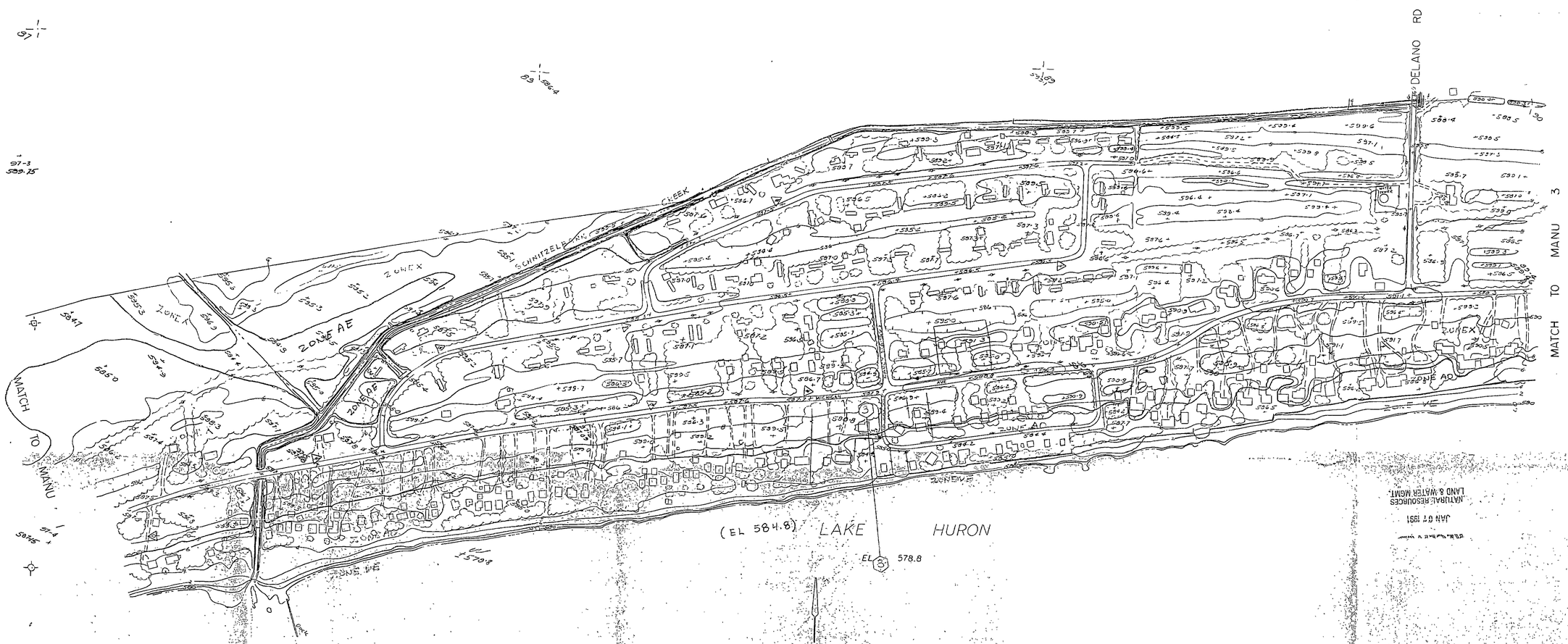
LEGEND

CORPORATE LIMITS	
100-YEAR FLOOD PLAIN BOUNDARY	
500-YEAR FLOOD PLAIN BOUNDARY	
CROSS SECTION	Z — Z
ELEVATION REFERENCE MARKS	RM1 ×
ZONE GUTTERS	
BASE FLOOD ELEVATION (COASTAL)	(584.8)
ZONE DESIGNATIONS	ZONE VE

SCALE 1" = 200'

PANEL 1

Gordie Fraser
Arenac Co MI
Sims Twp Mull 95/98
1" = 200', 2 ct
WO 23535



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FLOOD INSURANCE STUDY WORK MAP
SIMS TOWNSHIP, MI

LEGEND

CORPORATE LIMITS	
100-YEAR FLOOD PLAIN BOUNDARY	
500-YEAR FLOOD PLAIN BOUNDARY	
CROSS SECTION	3 — 3
ELEVATION REFERENCE MARKS	RM1 x
ZONE GUTTERS	
BASE FLOOD ELEVATION (COASTAL)	(584.8)
ZONE DESIGNATIONS	ZONE VE

SCALE 1" = 200'

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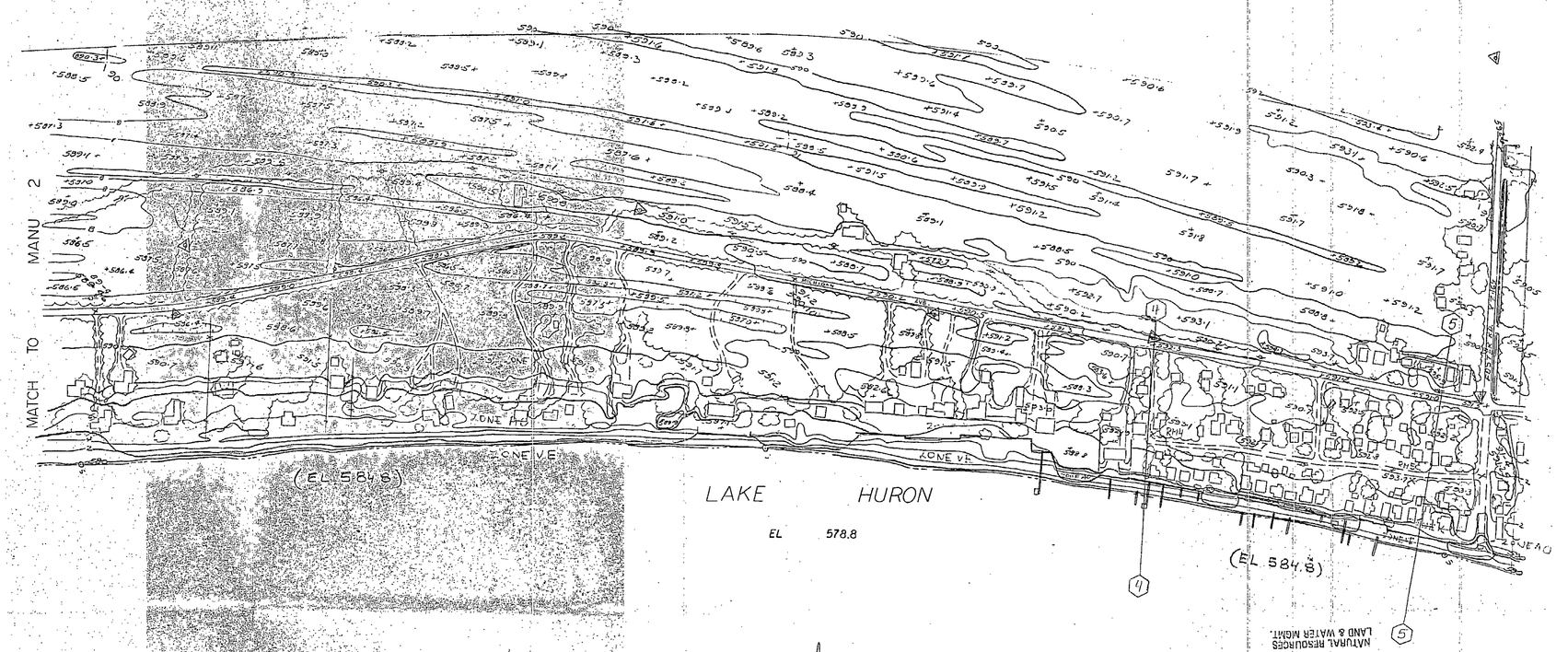
PANEL 2

Gordie Fraser
Arenac Co Mich.
Sims Twp
Map 87 thru 92
1" = 200'
WO 23535

Manu 2 of 3



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FLOOD INSURANCE STUDY WORK MAP
SIMS TOWNSHIP, MI

LEGEND

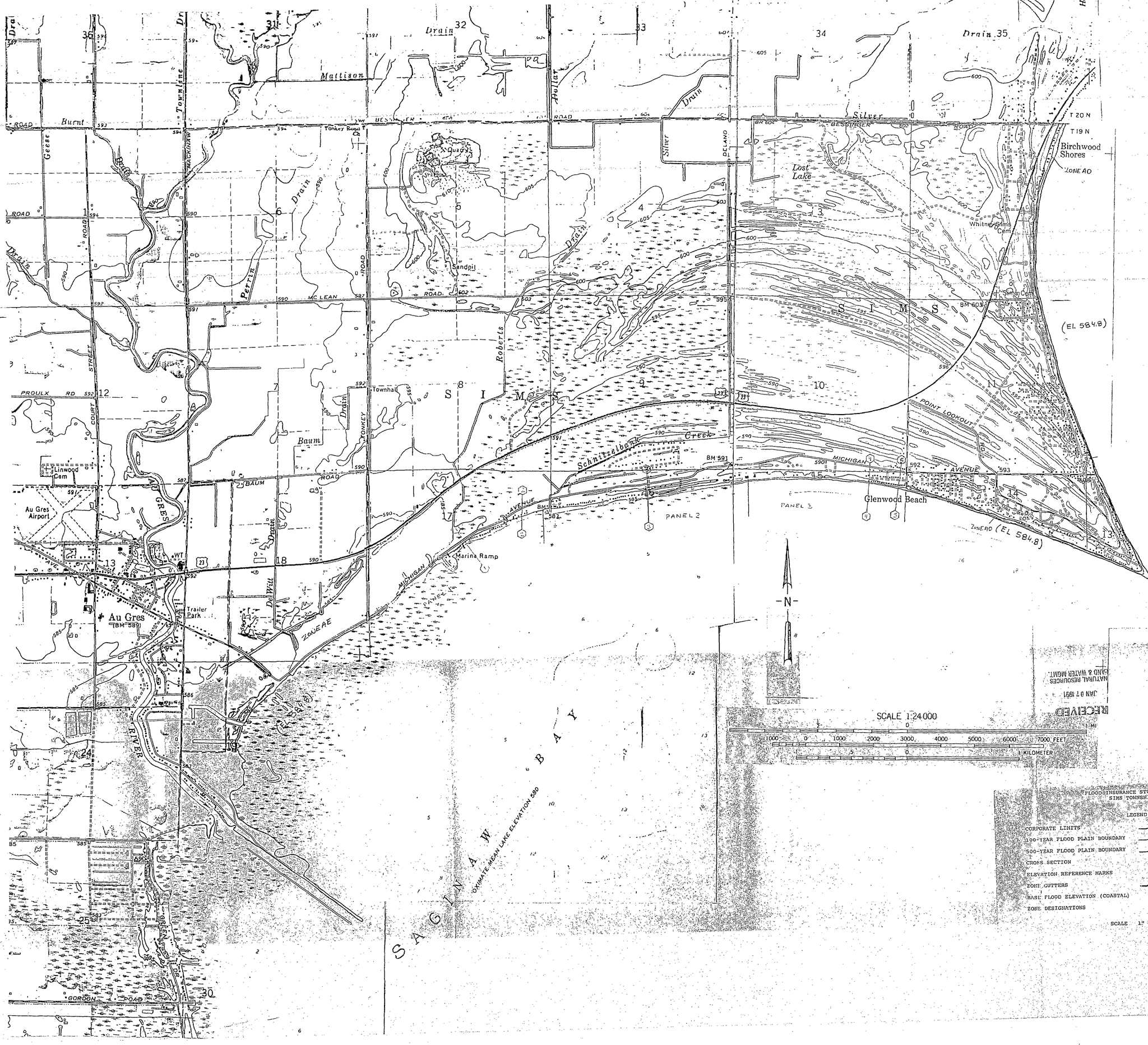
CORPORATE LIMITS	
100-YEAR FLOOD PLAIN BOUNDARY	
500-YEAR FLOOD PLAIN BOUNDARY	
CROSS SECTION	4 — 4
ELEVATION REFERENCE MARKS	RM1 x
ZONE GUTTERS	
BASE FLOOD ELEVATION (COASTAL)	(584.8)
ZONE DESIGNATIONS	ZONE VE

SCALE 1" = 200'

PANEL 3

Coastal Area of Sims Twp
1" = 200' 2/1 map

Map 3 of 3


Drain
Mattison
Townline
Burnt
ROAD
Geese
Perrin
Drain
MACKINAW
Tonkey Road Ch
Quarry
Sandpit
MC LEAN
ROAD
Roberts
Drain
Silver
Drain
DELANO
Hollar
BESSINGER
ROAD
Lost Lake
Birchwood Shores
ZONE AO
T 20 N
T 19 N
Whitney Sims Cem
Sims Cem
BM 603
S I M S
(EL 584.8)
PROULX RD
COURT
STREET
Townhall
TONKEY
Baum
ROAD
BAUM
Linwood Cem
Au Gres Airport
AU GRES
Schnitzelbank Creek
BM 591
MICHIGAN
AVENUE
POINT LOOKOUT
ROAD
Glenwood Beach
PANEL 2
PANEL 3
ZONE AO (EL 584.8)
Point Lookout
Marina Ramp
Trailer Park
Au Gres
(BM 589)
DeWitt
ZONE AE
RIVER
GORDON
ROAD
S A G I N A W
B A Y
APPROXIMATE MEAN LAKE ELEVATION 580
-N-
SCALE 1:24 000
MI
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER
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NATURAL RESOURCES
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SIMS TOWNSHIP, MI
LEGEND
CORPORATE LIMITS
100-YEAR FLOOD PLAIN BOUNDARY
500-YEAR FLOOD PLAIN BOUNDARY
CROSS SECTION
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ZONE GUTTERS
BASE FLOOD ELEVATION (COASTAL) (584.8)
ZONE DESIGNATIONS ZONE VE
SCALE 1" = 1000'
PANEL 4