# APPENDIX E
# EXISTING CONDITIONS
# HEC-RAS ANALYSIS

Appendix E.1
HEC-RAS Output

Appendix E.2
Cross-Section and Profile Plots

# APPENDIX E.1
# HEC-RAS OUTPUT

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X   X XXXXXX  XXXX     XXXX     XX    XXXX
X   X X      X   X    X  X   X X X  X
X   X X      X       X  X   X   X  X
XXXXXXX XXXX   X    XXX XXXX   XXXXXX  XXXX
X   X X      X       X X    X   X     X
X   X X      X   X    X  X   X   X     X
X   X XXXXXX  XXXX     X   X  X   X  XXXXX
```

**********

PROJECT DATA
Project Title: Pantano-Sediment Transport
Project File : PantanoSediment.prj
Run Date and Time: 9/10/2008 1:17:52 PM

Project in English units

**********

PLAN DATA

Plan Title: Existing
Plan File : t:\07125\01\WATRES\GLBBASE\CALCS\Hydraulics\HEC-RAS (Sediment)\PantanoSediment.p08

Geometry Title: ExistingConditions
Geometry File : t:\07125\01\WATRES\GLBBASE\CALCS\Hydraulics\HEC-RAS (Sediment)\PantanoSediment.g02

Flow Title : 1 Flow Profiles
Flow File : t:\07125\01\WATRES\GLBBASE\CALCS\Hydraulics\HEC-RAS (Sediment)\PantanoSediment.F01

Plan Summary Information:
Number of: Cross Sections = 41 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 2 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only

Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

**********

FLOW DATA

Flow Title: 1 Flow Profiles
Flow File : t:\07125\01\WATRES\GLBBASE\CALCS\Hydraulics\HEC-RAS (Sediment)\PantanoSediment.F01

Flow Data (cfs)

| River | Reach | RS | 100 year | 50 year | 25 year | 10 year |
|---|---|---|---|---|---|---|
| River #1 | Reach #1 | 1600 | 32000 | 20000 | 14000 | 8700 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| River #1 | Reach #1 | 100 year | | Normal S = 0.005 |
| River #1 | Reach #1 | 50 year | | Normal S = 0.005 |
| River #1 | Reach #1 | 25 year | | Normal S = 0.005 |
| River #1 | Reach #1 | 10 year | | Normal S = 0.005 |

**********

GEOMETRY DATA

Geometry Title: ExistingConditions
Geometry File : t:\07125\01\WATRES\GLBBASE\CALCS\Hydraulics\HEC-RAS (Sediment)\PantanoSediment.g02

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1600

INPUT
Description:
Station Elevation Data num= 39

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2560 | 6.4 | 2559 | 12.63 | 2558 | 18.96 | 2557 | 25.3 | 2556 |
| 31.64 | 2555 | 37.97 | 2554 | 44.38 | 2553 | 50.84 | 2552 | 57.29 | 2551 |
| 63.85 | 2550 | 70.23 | 2549 | 76.66 | 2548 | 83.12 | 2547 | 89.57 | 2546 |
| 96.03 | 2545 | 104.28 | 2544 | 113.13 | 2543 | 121.99 | 2542 | 130.94 | 2541 |
| 142.12 | 2540 | 202.75 | 2540 | 242.37 | 2540 | 320.07 | 2540 | 328.69 | 2541 |
| 337.31 | 2542 | 345.93 | 2543 | 354.55 | 2544 | 363.17 | 2545 | 371.79 | 2546 |

```
 380.41    2547  389.03    2548  397.65    2549  406.22    2550  414.78    2551
 423.34    2552   431.9    2553  440.46    2554  449.02    2555

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
     0    .055     6.4     .03   431.9     .55

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         6.4   431.9          714.82  679.46  667.01            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*********************************************************************************************
* E.G. Elev (ft)        * 2562.92  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.27  * Wt. n-Val.           *   0.055  *   0.030  *   0.550  *
* W.S. Elev (ft)        * 2562.66  * Reach Len. (ft)      *  714.82  *  679.46  *  667.01  *
* Crit W.S. (ft)        *         * Flow Area (sq ft)     *   20.21  * 7733.65  *  148.22  *
* E.G. Slope (ft/ft)    *0.000147  * Area (sq ft)         *   20.21  * 7733.65  *  148.22  *
* Q Total (cfs)         *32000.00  * Flow (cfs)           *   11.23  *31972.83  *   15.94  *
* Top Width (ft)        *  449.02  * Top Width (ft)       *    6.40  *  425.50  *   17.12  *
* Vel Total (ft/s)      *    4.05  * Avg. Vel. (ft/s)     *    0.56  *    4.13  *    0.11  *
* Max Chl Dpth (ft)     *   22.66  * Hydr. Depth (ft)     *    3.16  *   18.18  *    8.66  *
* Conv. Total (cfs)     *2641492.0  * Conv. (cfs)         *   927.1  *2639249.0  *  1315.5  *
* Length Wtd. (ft)      *  681.46  * Wetted Per. (ft)     *    9.14  *  427.61  *   24.89  *
* Min Ch El (ft)        * 2540.00  * Shear (lb/sq ft)     *    0.02  *    0.17  *    0.05  *
* Alpha                 *    1.04  * Stream Power (lb/ft s) *    0.01  *    0.69  *    0.01  *
* Frctn Loss (ft)       *    0.05  * Cum Volume (acre-ft)  *  190.81  *  932.92  *  171.53  *
* C & E Loss (ft)       *    0.05  * Cum SA (acres)       *   11.07  *   56.69  *    8.66  *
*********************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 1500

INPUT
Description:
Station Elevation Data    num=      55
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
     0    2552   44.32    2551   97.21    2550   217.4    2550  271.68    2550
 341.92    2549  479.35    2544  480.31    2543  481.37    2542   482.2    2541
 483.05    2540  483.78    2539  484.55    2538  486.23    2537  491.23    2536
 494.37    2535  495.54    2534  510.31    2534  516.95    2535  524.67    2536
 535.82    2536   537.4    2535  539.99    2534   542.3    2533  546.34    2532
  578.5    2532   581.8    2533  584.65    2534   587.3    2535   591.8    2536
 610.04    2537  650.01    2537  656.48    2537  682.04    2537     689    2536
  696.1    2535  722.11    2535   724.8    2536  736.31    2537  742.79    2538
 749.32    2539  750.68    2540  752.02    2541  753.35    2542  754.71    2543
  760.8    2544  771.13    2545  776.07    2546  781.82    2547  788.07    2547
 800.68    2547  825.75    2548  840.49    2549  847.09    2549  873.22    2550
```

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
**********
0 .055 341.92 .03 781.82 .055

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
341.92 781.82 249.54 214.53 208.71 .1 .3

CROSS SECTION OUTPUT Profile #100 year
**********

| | | | | |
|---|---|---|---|---|
| * E.G. Elev (ft) | * 2562.82 | * Element | * Left OB | * Channel * Right OB * |
| * Vel Head (ft) | * 0.09 | * Wt. n-Val. | * 0.055 | * 0.030 * 0.055 * |
| * W.S. Elev (ft) | * 2562.73 | * Reach Len. (ft) | * 249.54 | * 214.53 * 208.71 * |
| * Crit W.S. (ft) | * | * Flow Area (sq ft) | * 4294.75 | *10155.00 * 1324.53 * |
| * E.G. Slope (ft/ft) | *0.000044 | * Area (sq ft) | * 4294.75 | *10155.00 * 1324.53 * |
| * Q Total (cfs) | *32000.00 | * Flow (cfs) | * 4059.37 | *26652.39 * 1288.24 * |
| * Top Width (ft) | * 873.22 | * Top Width (ft) | * 341.92 | * 439.90 * 91.40 * |
| * Vel Total (ft/s) | * 2.03 | * Avg. Vel. (ft/s) | * 0.95 | * 2.62 * 0.97 * |
| * Max Chl Dpth (ft) | * 30.73 | * Hydr. Depth (ft) | * 12.56 | * 23.08 * 14.49 * |
| * Conv. Total (cfs) | *4841363.0 | * Conv. (cfs) | *614152.9 | *4032309.0 *194901.4 * |
| * Length Wtd. (ft) | * 217.22 | * Wetted Per. (ft) | * 352.68 | * 447.38 * 104.20 * |
| * Min Ch El (ft) | * 2532.00 | * Shear (lb/sq ft) | * 0.03 | * 0.06 * 0.03 * |
| * Alpha | * 1.43 | * Stream Power (lb/ft s) | * 0.03 | * 0.16 * 0.03 * |
| * Frctn Loss (ft) | * 0.01 | * Cum Volume (acre-ft) | * 155.41 | * 793.40 * 160.25 * |
| * C & E Loss (ft) | * 0.01 | * Cum SA (acres) | * 8.21 | * 49.94 * 7.83 * |

**********

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1450

INPUT
Description:
Station Elevation Data num= 45
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
**********
0 2546 19 2546 51.63 2546 56.22 2545 59.92 2544
69.95 2543 70.94 2542 71.97 2541 73.05 2540 74.14 2539
75.29 2538 76.27 2537 77.42 2536 80.49 2535 81.02 2534
84.75 2533 85.65 2532 86.57 2531 120.14 2531 122.76 2532
130.25 2533 138.86 2534 141.33 2535 146.34 2535 175.1 2535
179.28 2536 230.48 2537 236.4 2537 243.84 2536 245.96 2535
248.93 2534 271.08 2534 291.6 2535 304.77 2536 338.54 2537
340 2538 341.44 2539 342.85 2540 344.25 2541 345.61 2542
348.41 2543 368.53 2544 376.03 2545 383.95 2546 391.36 2547

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
**********
0 .055 51.63 .03 391.36 .055

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
51.63 391.36 208.29 198.71 196.74 .1 .3

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| * E.G. Elev (ft) | * 2562.80 | * Element | * Left OB | * Channel * Right OB * |
| * Vel Head (ft) | * 0.19 | * Wt. n-Val. | * 0.055 | * 0.030 * * |
| * W.S. Elev (ft) | * 2562.61 | * Reach Len. (ft) | * 208.29 | * 198.71 * 196.74 * |
| * Crit W.S. (ft) | * | * Flow Area (sq ft) | * 857.69 | * 8775.57 * * |
| * E.G. Slope (ft/ft) | *0.000073 | * Area (sq ft) | * 857.69 | * 8775.57 * * |
| * Q Total (cfs) | *32000.00 | * Flow (cfs) | * 1066.86 | *30933.14 * * |
| * Top Width (ft) | * 391.36 | * Top Width (ft) | * 51.63 | * 339.73 * * |
| * Vel Total (ft/s) | * 3.32 | * Avg. Vel. (ft/s) | * 1.24 | * 3.52 * * |
| * Max Chl Dpth (ft) | * 31.61 | * Hydr. Depth (ft) | * 16.61 | * 25.83 * * |
| * Conv. Total (cfs) | *3757155.0 | * Conv. (cfs) | *125261.2 | *3631894.0 * * |
| * Length Wtd. (ft) | * 198.74 | * Wetted Per. (ft) | * 68.24 | * 363.33 * * |
| * Min Ch El (ft) | * 2531.00 | * Shear (lb/sq ft) | * 0.06 | * 0.11 * * |
| * Alpha | * 1.09 | * Stream Power (lb/ft s) | * 0.07 | * 0.39 * * |
| * Frctn Loss (ft) | * 0.01 | * Cum Volume (acre-ft) | * 140.65 | * 746.79 * 157.08 * |
| * C & E Loss (ft) | * 0.01 | * Cum SA (acres) | * 7.08 | * 48.02 * 7.61 * |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1400

INPUT
Description:
Station Elevation Data num= 58

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2547 | 146.64 | 2545 | 255.29 | 2545 | 278.69 | 2545 | 285.61 | 2544 |
| 296.7 | 2543 | 297.96 | 2542 | 299.18 | 2541 | 300.32 | 2540 | 301.47 | 2539 |
| 302.62 | 2538 | 303.79 | 2537 | 304.95 | 2536 | 316.94 | 2535 | 321.52 | 2534 |
| 322.56 | 2533 | 323.65 | 2532 | 324.79 | 2531 | 346.78 | 2530 | 352.41 | 2530 |
| 354.84 | 2531 | 356.53 | 2532 | 364.04 | 2532 | 367.65 | 2532 | 371.65 | 2533 |
| 377.04 | 2533 | 380.29 | 2533 | 384.46 | 2534 | 389.3 | 2534 | 391.66 | 2534 |
| 397.87 | 2534 | 405.78 | 2534 | 415.27 | 2535 | 416.31 | 2535 | 427.87 | 2535 |
| 437.22 | 2535 | 446.39 | 2534 | 483.73 | 2533 | 497.25 | 2533 | 500.49 | 2534 |
| 503.73 | 2535 | 537.05 | 2536 | 541.55 | 2536 | 566.55 | 2536 | 567.89 | 2537 |
| 569.19 | 2538 | 570.53 | 2539 | 571.83 | 2540 | 573.15 | 2541 | 574.36 | 2542 |
| 576.21 | 2543 | 593.98 | 2544 | 600.64 | 2545 | 606.2 | 2546 | 612.52 | 2547 |
| 620.38 | 2548 | 628.23 | 2549 | 810.24 | 2548 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .055 | 278.69 | .03 | 576.21 | .055 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
278.69 576.21 208.05 211.15 211.03 .1 .3
Ineffective Flow num= 1

```
  Sta L   Sta R    Elev  Permanent
    0  278.69              F

CROSS SECTION OUTPUT  Profile #100 year
*********************************************************************************************
* E.G. Elev (ft)        * 2562.78  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.16  * Wt. n-Val.           *          *   0.030  *   0.055  *
* W.S. Elev (ft)        * 2562.62  * Reach Len. (ft)      *  208.05  *  211.15  *  211.03  *
* Crit W.S. (ft)        *         * Flow Area (sq ft)     *         * 8264.80  * 3457.32  *
* E.G. Slope (ft/ft)    *0.000057  * Area (sq ft)         * 4764.05  * 8264.80  * 3457.32  *
* Q Total (cfs)         *32000.00  * Flow (cfs)           *         *27921.17  * 4078.83  *
* Top Width (ft)        *  810.24  * Top Width (ft)       *  278.69  *  297.52  *  234.03  *
* Vel Total (ft/s)      *    2.73  * Avg. Vel. (ft/s)     *         *    3.38  *    1.18  *
* Max Chl Dpth (ft)     *   32.62  * Hydr. Depth (ft)     *         *   27.78  *   14.77  *
* Conv. Total (cfs)     *4232719.0  * Conv. (cfs)         *         *3693201.0  *539517.4  *
* Length Wtd. (ft)      *  211.14  * Wetted Per. (ft)     *         *  304.99  *  249.05  *
* Min Ch El (ft)        * 2530.00  * Shear (lb/sq ft)     *         *    0.10  *    0.05  *
* Alpha                 *    1.36  * Stream Power (lb/ft s) *         *    0.33  *    0.06  *
* Frctn Loss (ft)       *    0.01  * Cum Volume (acre-ft)  *  127.21  *  707.92  *  149.27  *
* C & E Loss (ft)       *    0.00  * Cum SA (acres)        *    6.29  *   46.57  *    7.08  *
*********************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 1350

INPUT
Description:
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0   2544    9.54    2543   28.09    2542      29    2541   29.96    2540
   30.94    2539    31.9    2538   32.89    2537   33.85    2536   34.79    2535
   45.98    2534   52.23    2533   53.89    2532   55.61    2531    57.3    2530
   97.27    2530   100.2    2531  116.73    2532  164.32    2532  176.99    2532
  188.83    2532  193.69    2532     196    2533  199.44    2534  206.79    2534
  218.33    2534  293.32    2535     297    2536  298.24    2537  299.46    2538
   300.7    2539  301.93    2540  303.13    2541  304.37    2542  305.58    2543
  306.81    2544  322.32    2545  329.31    2546     335    2547  338.98    2548
  344.34    2549  348.11    2549

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .055       0     .03  306.81    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0  306.81           267.52  277.24  286.29            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*********************************************************************************************
* E.G. Elev (ft)        * 2562.76  * Element              *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.19  * Wt. n-Val.            *        *   0.030  *   0.055  *
* W.S. Elev (ft)         * 2562.57  * Reach Len. (ft)       *   95.00  *   95.00  *   95.00  *
* Crit W.S. (ft)         * 2540.43  * Flow Area (sq ft)     *        * 8765.93  *  677.54  *
* E.G. Slope (ft/ft)     *0.000066  * Area (sq ft)          *        * 8765.93  *  677.54  *
* Q Total (cfs)          *32000.00  * Flow (cfs)            *        *31209.65  *  790.35  *
* Top Width (ft)         *  348.11  * Top Width (ft)        *        *  306.81  *   41.30  *
* Vel Total (ft/s)       *    3.39  * Avg. Vel. (ft/s)      *        *    3.56  *    1.17  *
* Max Chl Dpth (ft)      *   32.57  * Hydr. Depth (ft)      *        *   28.57  *   16.41  *
* Conv. Total (cfs)      *3940010.0  * Conv. (cfs)          *        *3842698.0  * 97311.8  *
* Length Wtd. (ft)       *   95.00  * Wetted Per. (ft)      *        *  332.93  *   55.28  *
* Min Ch El (ft)         * 2530.00  * Shear (lb/sq ft)      *        *    0.11  *    0.05  *
* Alpha                  *    1.08  * Stream Power (lb/ft s) *        *    0.39  *    0.06  *
* Frctn Loss (ft)        *    0.01  * Cum Volume (acre-ft)   *  115.83  *  666.64  *  139.26  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *    5.63  *   45.10  *    6.42  *
*********************************************************************************************
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

BRIDGE

RIVER: River #1
REACH: Reach #1 RS: 1325

INPUT
Description:
Distance from Upstream XS = 95
Deck/Roadway Width = 136
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|
| 0 | 2550 | 2545 | 700 | 2549 | 2545 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 42

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2544 | 9.54 | 2543 | 28.09 | 2542 | 29 | 2541 | 29.96 | 2540 |
| 30.94 | 2539 | 31.9 | 2538 | 32.89 | 2537 | 33.85 | 2536 | 34.79 | 2535 |
| 45.98 | 2534 | 52.23 | 2533 | 53.89 | 2532 | 55.61 | 2531 | 57.3 | 2530 |
| 97.27 | 2530 | 100.2 | 2531 | 116.73 | 2532 | 164.32 | 2532 | 176.99 | 2532 |
| 188.83 | 2532 | 193.69 | 2532 | 196 | 2533 | 199.44 | 2534 | 206.79 | 2534 |
| 218.33 | 2534 | 293.32 | 2535 | 297 | 2536 | 298.24 | 2537 | 299.46 | 2538 |
| 300.7 | 2539 | 301.93 | 2540 | 303.13 | 2541 | 304.37 | 2542 | 305.58 | 2543 |
| 306.81 | 2544 | 322.32 | 2545 | 329.31 | 2546 | 335 | 2547 | 338.98 | 2548 |
| 344.34 | 2549 | 348.11 | 2549 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .055 | 0 | .03 | 306.81 | .055 |

Bank Sta: Left Right Coeff Contr. Expan.
0 306.81 .1 .3

Downstream Deck/Roadway Coordinates
num= 2
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
**********
0 2550 2545 700 2549 2545

Downstream Bridge Cross Section Data
Station Elevation Data num= 46
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
**********
0 2545 1.19 2544 4.12 2543 8.6 2542 11.86 2541
12.76 2540 13.68 2539 14.75 2538 16.09 2537 17.41 2536
18.72 2535 20.14 2534 24.85 2533 39.94 2532 41.07 2531
41.99 2530 44.79 2529 57.58 2529 93.97 2530 97.18 2531
100.8 2532 177.85 2532 275.38 2533 278.07 2534 280.69 2535
283.27 2536 285.81 2537 288.31 2538 290.77 2539 293.19 2540
296.23 2541 298.55 2542 300.43 2543 302.26 2544 304.33 2545
307.09 2546 309.89 2547 313.97 2548 329.07 2548 360.23 2548
381.39 2549 436.21 2549 452.08 2548 467.95 2547 496.98 2546
506.55 2546

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
**********
0 .055 0 .03 313.97 .055

Bank Sta: Left Right Coeff Contr. Expan.
0 313.97 .1 .3

Upstream Embankment side slope = 1.5 horiz. to 1.0 vertical
Downstream Embankment side slope = 1.5 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 2550
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 70 Downstream= 50
Upstream num= 2
Width Elev Width Elev
**********
2.5 2525 2.5 2545
Downstream num= 2
Width Elev Width Elev
**********
2.5 2525 2.5 2545

Pier Data
Pier Station Upstream= 117 Downstream= 97
Upstream num= 2

```
   Width   Elev    Width   Elev
*******************************
    2.5    2525     2.5    2545
Downstream     num=       2
   Width   Elev    Width   Elev
*******************************
    2.5    2525     2.5    2545

Pier Data
Pier Station     Upstream=     164    Downstream=     144
Upstream     num=       2
   Width   Elev    Width   Elev
*******************************
    2.5    2529     2.5    2550
Downstream     num=       2
   Width   Elev    Width   Elev
*******************************
    2.5    2529     2.5    2550

Pier Data
Pier Station     Upstream=     211    Downstream=     191
Upstream     num=       2
   Width   Elev    Width   Elev
*******************************
    2.5    2525     2.5    2545
Downstream     num=       2
   Width   Elev    Width   Elev
*******************************
    2.5    2525     2.5    2545

Pier Data
Pier Station     Upstream=     258    Downstream=     238
Upstream     num=       2
   Width   Elev    Width   Elev
*******************************
    2.5    2525     2.5    2545
Downstream     num=       2
   Width   Elev    Width   Elev
*******************************
    2.5    2525     2.5    2545

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
      Energy Only

Additional Bridge Parameters
      Add Friction component to Momentum
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
         inside the bridge at the upstream end
      Criteria to check for pressure flow = Upstream energy grade line
```

BRIDGE OUTPUT  Profile #100 year

| | | | | | |
|---|---|---|---|---|---|
| * E.G. US. (ft) | * 2562.76 | * Element | *Inside BR US | *Inside BR DS | * |
| * W.S. US. (ft) | * 2562.57 | * E.G. Elev (ft) | * 2562.74 | * 2562.64 | * |
| * Q Total (cfs) | * 32000.00 | * W.S. Elev (ft) | * 2562.46 | * 2562.48 | * |
| * Q Bridge (cfs) | * 9106.62 | * Crit W.S. (ft) | * 2540.74 | * 2539.79 | * |
| * Q Weir (cfs) | * | * Max Chl Dpth (ft) | * 32.46 | * 33.48 | * |
| * Weir Sta Lft (ft) | * | * Vel Total (ft/s) | * 4.18 | * 3.20 | * |
| * Weir Sta Rgt (ft) | * | * Flow Area (sq ft) | * 7649.94 | * 10009.14 | * |
| * Weir Submerg | * | * Froude # Chl | * 0.14 | * 0.10 | * |
| * Weir Max Depth (ft) | * | * Specif Force (cu ft) | * 108200.30 | * 128951.90 | * |
| * Min El Weir Flow (ft) | * 2550.00 | * Hydr Depth (ft) | * 21.98 | * 19.76 | * |
| * Min El Prs (ft) | * 2545.00 | * W.P. Total (ft) | * 1126.74 | * 1259.69 | * |
| * Delta EG (ft) | * 0.13 | * Conv. Total (cfs) | * 1319988.0 | * 1733022.0 | * |
| * Delta WS (ft) | * 0.08 | * Top Width (ft) | * 348.11 | * 506.55 | * |
| * BR Open Area (sq ft) | * 3227.11 | * Frctn Loss (ft) | * 0.06 | * 0.00 | * |
| * BR Open Vel (ft/s) | * 2.82 | * C & E Loss (ft) | * 0.04 | * 0.01 | * |
| * Coef of Q | * | * Shear Total (lb/sq ft) | * 0.25 | * 0.17 | * |
| * Br Sel Method | *Energy only | * Power Total (lb/ft s) | * 1.04 | * 0.54 | * |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1  RS: 1300

INPUT
Description:
Station Elevation Data  num=  46

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2545 | 1.19 | 2544 | 4.12 | 2543 | 8.6 | 2542 | 11.86 | 2541 |
| 12.76 | 2540 | 13.68 | 2539 | 14.75 | 2538 | 16.09 | 2537 | 17.41 | 2536 |
| 18.72 | 2535 | 20.14 | 2534 | 24.85 | 2533 | 39.94 | 2532 | 41.07 | 2531 |
| 41.99 | 2530 | 44.79 | 2529 | 57.58 | 2529 | 93.97 | 2530 | 97.18 | 2531 |
| 100.8 | 2532 | 177.85 | 2532 | 275.38 | 2533 | 278.07 | 2534 | 280.69 | 2535 |
| 283.27 | 2536 | 285.81 | 2537 | 288.31 | 2538 | 290.77 | 2539 | 293.19 | 2540 |
| 296.23 | 2541 | 298.55 | 2542 | 300.43 | 2543 | 302.26 | 2544 | 304.33 | 2545 |
| 307.09 | 2546 | 309.89 | 2547 | 313.97 | 2548 | 329.07 | 2548 | 360.23 | 2548 |
| 381.39 | 2549 | 436.21 | 2549 | 452.08 | 2548 | 467.95 | 2547 | 496.98 | 2546 |
| 506.55 | 2546 | | | | | | | | |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .055 | 0 | .03 | 313.97 | .055 |

Bank Sta: Left  Right  Lengths: Left Channel  Right  Coeff Contr.  Expan.
0  313.97  385.44  383.38  385.44  .1  .3

CROSS SECTION OUTPUT  Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)        * 2562.63  * Element             *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.14  * Wt. n-Val.          *          *   0.030  *   0.055  *
* W.S. Elev (ft)        * 2562.49  * Reach Len. (ft)     *  385.44  *  383.38  *  385.44  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)    *         * 9150.15  * 2787.63  *
* E.G. Slope (ft/ft)    *0.000051  * Area (sq ft)         *         * 9150.15  * 2787.63  *
* Q Total (cfs)         *32000.00  * Flow (cfs)           *         *28989.55  * 3010.45  *
* Top Width (ft)        *  506.55  * Top Width (ft)       *         *  313.97  *  192.58  *
* Vel Total (ft/s)      *    2.68  * Avg. Vel. (ft/s)     *         *    3.17  *    1.08  *
* Max Chl Dpth (ft)     *   33.49  * Hydr. Depth (ft)     *         *   29.14  *   14.48  *
* Conv. Total (cfs)     *4499926.0  * Conv. (cfs)         *         *4076589.0  *423337.0  *
* Length Wtd. (ft)      *  383.73  * Wetted Per. (ft)     *         *  339.18  *  209.17  *
* Min Ch El (ft)        * 2529.00  * Shear (lb/sq ft)     *         *    0.09  *    0.04  *
* Alpha                 *    1.28  * Stream Power (lb/ft s) *       *    0.27  *    0.05  *
* Frctn Loss (ft)       *    0.02  * Cum Volume (acre-ft)  *  115.83  *  617.71  *  130.34  *
* C & E Loss (ft)       *    0.01  * Cum SA (acres)        *    5.63  *   43.13  *    5.76  *
*********************************************************************************************
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1230

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2543 | 46.64 | 2542 | 85.37 | 2542 | 117.86 | 2543 | 126.81 | 2543 |
| 128.42 | 2542 | 129.93 | 2541 | 131.48 | 2540 | 132.52 | 2539 | 133.32 | 2538 |
| 134.03 | 2537 | 134.72 | 2536 | 135.4 | 2535 | 136.08 | 2534 | 137.48 | 2533 |
| 138.88 | 2532 | 140.34 | 2531 | 141.74 | 2530 | 219.3 | 2529 | 293.5 | 2529 |
| 295.33 | 2530 | 302.46 | 2530 | 328.97 | 2529 | 345.46 | 2529 | 362.73 | 2530 |
| 363.86 | 2531 | 365.01 | 2532 | 366.16 | 2533 | 367.3 | 2534 | 368.41 | 2535 |
| 369.57 | 2536 | 370.76 | 2537 | 371.92 | 2538 | 420.65 | 2539 | 441.25 | 2539 |
| 471.42 | 2538 | 505.23 | 2540 | 522.09 | 2539 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 126.81 | .03 | 371.92 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Left | Right | Left | Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|---|
| 126.81 | 371.92 | 47.48 | 47.44 | 47.31 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)        * 2562.61  * Element             *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.11  * Wt. n-Val.          *   0.050  *   0.030  *   0.050  *
* W.S. Elev (ft)        * 2562.49  * Reach Len. (ft)     *   47.48  *   47.44  *   47.31  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)    * 2550.32  * 7981.54  * 3559.10  *
* E.G. Slope (ft/ft)    *0.000037  * Area (sq ft)         * 2550.32  * 7981.54  * 3559.10  *
* Q Total (cfs)         *32000.00  * Flow (cfs)           * 3109.80  *24057.41  * 4832.80  *
```

```
* Top Width (ft)         *  522.09  * Top Width (ft)         *  126.81  *  245.11  *  150.17  *
* Vel Total (ft/s)       *    2.27  * Avg. Vel. (ft/s)       *    1.22  *    3.01  *    1.36  *
* Max Chl Dpth (ft)      *   33.49  * Hydr. Depth (ft)       *   20.11  *   32.56  *   23.70  *
* Conv. Total (cfs)      *5242572.0  * Conv. (cfs)           *509478.9  *3941334.0  *791758.9  *
* Length Wtd. (ft)       *   47.42  * Wetted Per. (ft)       *  146.33  *  253.55  *  173.78  *
* Min Ch El (ft)         * 2529.00  * Shear (lb/sq ft)       *    0.04  *    0.07  *    0.05  *
* Alpha                  *    1.41  * Stream Power (lb/ft s) *    0.05  *    0.22  *    0.06  *
* Frctn Loss (ft)        *    0.00  * Cum Volume (acre-ft)   *  104.55  *  542.32  *  102.26  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    5.06  *   40.67  *    4.24  *
*********************************************************************************************
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1220

INPUT
Description:
Station Elevation Data num= 58

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2542 | 18.62 | 2541 | 39.62 | 2541 | 45.78 | 2541 | 55.76 | 2541 |
| 61.41 | 2542 | 72.93 | 2542 | 74.08 | 2541 | 75.24 | 2540 | 76.4 | 2539 |
| 77.46 | 2538 | 78.36 | 2537 | 79.23 | 2536 | 80.14 | 2535 | 80.97 | 2534 |
| 81.91 | 2533 | 83.24 | 2532 | 84.71 | 2531 | 86.18 | 2530 | 87.71 | 2529 |
| 118.12 | 2528 | 120.9 | 2528 | 128.57 | 2528 | 156.62 | 2528 | 164.95 | 2528 |
| 178.24 | 2528 | 185.15 | 2528 | 189.77 | 2528 | 193.91 | 2528 | 201.47 | 2528 |
| 213.24 | 2528 | 215.78 | 2528 | 222 | 2528 | 227.84 | 2528 | 230.94 | 2528 |
| 234.18 | 2527 | 253.8 | 2527 | 258.2 | 2528 | 309.84 | 2529 | 310.87 | 2530 |
| 311.93 | 2531 | 313 | 2532 | 314.07 | 2533 | 315.14 | 2534 | 316.18 | 2535 |
| 317.25 | 2536 | 318.31 | 2537 | 319.41 | 2538 | 351.91 | 2538 | 355.9 | 2537 |
| 362.09 | 2536 | 387.7 | 2535 | 402.39 | 2534 | 437.07 | 2534 | 457.93 | 2541 |
| 469.62 | 2541 | 492.75 | 2540 | 514.1 | 2539 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 72.93 | .03 | 319.41 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
72.93 319.41 415.98 411.79 408.49 .1 .3

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)         * 2562.60  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.10  * Wt. n-Val.           *   0.050  *   0.030  *   0.050  *
* W.S. Elev (ft)         * 2562.50  * Reach Len. (ft)      *  415.98  *  411.79  *  408.49  *
* Crit W.S. (ft)         *         * Flow Area (sq ft)     * 1544.39  * 8328.34  * 4921.00  *
* E.G. Slope (ft/ft)     *0.000032  * Area (sq ft)         * 1544.39  * 8328.34  * 4921.00  *
* Q Total (cfs)          *32000.00  * Flow (cfs)           * 1679.21  *23762.21  * 6558.58  *
* Top Width (ft)         *  514.10  * Top Width (ft)       *   72.93  *  246.48  *  194.69  *
* Vel Total (ft/s)       *    2.16  * Avg. Vel. (ft/s)      *    1.09  *    2.85  *    1.33  *
* Max Chl Dpth (ft)      *   35.50  * Hydr. Depth (ft)      *   21.18  *   33.79  *   25.28  *
```

```
* Conv. Total (cfs)      *5670890.0  * Conv. (cfs)           *297582.1  *4211027.0  *1162281.0  *
* Length Wtd. (ft)       *  411.74  * Wetted Per. (ft)       *   93.55  *  255.34  *  219.64  *
* Min Ch El (ft)         * 2527.00  * Shear (lb/sq ft)       *    0.03  *    0.06  *    0.04  *
* Alpha                  *    1.38  * Stream Power (lb/ft s) *    0.04  *    0.18  *    0.06  *
* Frctn Loss (ft)        *    0.01  * Cum Volume (acre-ft)   *  102.32  *  533.43  *   97.65  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    4.96  *   40.40  *    4.05  *
*********************************************************************************************
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1200

INPUT
Description:
Station Elevation Data num= 40

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2540 | 68.09 | 2539 | 121.68 | 2541 | 128.69 | 2541 | 147.65 | 2534 |
| 148.1 | 2533 | 148.5 | 2532 | 149.06 | 2531 | 149.92 | 2530 | 150.86 | 2529 |
| 151.8 | 2528 | 153.39 | 2527 | 155.27 | 2526 | 248.74 | 2526 | 272.27 | 2527 |
| 297.29 | 2527 | 305.15 | 2526 | 307.38 | 2526 | 310.49 | 2526 | 316.89 | 2526 |
| 324.53 | 2527 | 349.28 | 2527 | 364.33 | 2526 | 392.42 | 2526 | 395.21 | 2527 |
| 396.18 | 2528 | 397.09 | 2529 | 398.09 | 2530 | 398.98 | 2531 | 399.97 | 2532 |
| 400.9 | 2533 | 401.85 | 2534 | 402.79 | 2535 | 403.76 | 2536 | 404.8 | 2537 |
| 410.44 | 2537 | 422.02 | 2537 | 426.84 | 2538 | 429.8 | 2539 | 443.87 | 2539 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 128.69 | .03 | 404.8 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Left | Right | Left | Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|---|
| 128.69 | 404.8 | 57.6 | 56.56 | 56.61 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)         * 2562.59  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.11  * Wt. n-Val.            *   0.050  *   0.030  *   0.050  *
* W.S. Elev (ft)         * 2562.48  * Reach Len. (ft)       *   57.60  *   56.56  *   56.61  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     * 2919.48  * 9695.30  *  960.36  *
* E.G. Slope (ft/ft)     *0.000030  * Area (sq ft)          * 2919.48  * 9695.30  *  960.36  *
* Q Total (cfs)          *32000.00  * Flow (cfs)            * 3425.58  *27609.92  *  964.50  *
* Top Width (ft)         *  443.87  * Top Width (ft)        *  128.69  *  276.11  *   39.07  *
* Vel Total (ft/s)       *    2.36  * Avg. Vel. (ft/s)      *    1.17  *    2.85  *    1.00  *
* Max Chl Dpth (ft)      *   36.48  * Hydr. Depth (ft)      *   22.69  *   35.11  *   24.58  *
* Conv. Total (cfs)      *5833049.0  * Conv. (cfs)           *624423.9  *5032813.0  *175812.1  *
* Length Wtd. (ft)       *   56.72  * Wetted Per. (ft)       *  151.21  *  285.76  *   62.81  *
* Min Ch El (ft)         * 2526.00  * Shear (lb/sq ft)       *    0.04  *    0.06  *    0.03  *
* Alpha                  *    1.29  * Stream Power (lb/ft s) *    0.04  *    0.18  *    0.03  *
* Frctn Loss (ft)        *    0.00  * Cum Volume (acre-ft)   *   81.00  *  448.24  *   70.08  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *    3.99  *   37.93  *    2.96  *
*********************************************************************************************
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1120

INPUT
Description:
Station Elevation Data num= 47

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2539 | 336.05 | 2541 | 342.65 | 2534 | 343.23 | 2533 | 343.69 | 2532 |
| 344.08 | 2531 | 345.04 | 2530 | 345.92 | 2529 | 346.9 | 2528 | 347.83 | 2527 |
| 348.74 | 2526 | 349.76 | 2525 | 440.16 | 2525 | 445.47 | 2525 | 451.76 | 2525 |
| 465.52 | 2525 | 467.89 | 2524 | 468.82 | 2524 | 477.19 | 2525 | 488.72 | 2526 |
| 499.18 | 2527 | 503.32 | 2527 | 512.05 | 2526 | 517.81 | 2525 | 524.94 | 2525 |
| 538.1 | 2525 | 550.62 | 2524 | 573.43 | 2524 | 573.77 | 2525 | 578.28 | 2526 |
| 590.85 | 2527 | 591.77 | 2528 | 592.73 | 2529 | 593.66 | 2530 | 594.62 | 2531 |
| 595.54 | 2532 | 596.52 | 2533 | 597.47 | 2534 | 598.38 | 2535 | 599.33 | 2536 |
| 619.96 | 2537 | 622.38 | 2538 | 624.78 | 2539 | 638.13 | 2539 | 665.12 | 2538 |
| 710.79 | 2534 | 868.76 | 2533 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 336.05 | .03 | 599.33 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
336.05 599.33 440.13 443.73 447.38 .1 .3

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2562.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.04 | Wt. n-Val. | 0.050 | 0.030 | 0.050 |
| W.S. Elev (ft) | 2562.53 | Reach Len. (ft) | 440.13 | 443.73 | 447.38 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 7569.58 | 9682.91 | 7414.13 |
| E.G. Slope (ft/ft) | 0.000013 | Area (sq ft) | 7569.58 | 9682.91 | 7414.13 |
| Q Total (cfs) | 32000.00 | Flow (cfs) | 6290.10 | 18847.12 | 6862.78 |
| Top Width (ft) | 868.76 | Top Width (ft) | 336.05 | 263.28 | 269.43 |
| Vel Total (ft/s) | 1.30 | Avg. Vel. (ft/s) | 0.83 | 1.95 | 0.93 |
| Max Chl Dpth (ft) | 38.53 | Hydr. Depth (ft) | 22.53 | 36.78 | 27.52 |
| Conv. Total (cfs) | 8725133.0 | Conv. (cfs) | 1715062.0 | 5138864.0 | 1871208.0 |
| Length Wtd. (ft) | 443.77 | Wetted Per. (ft) | 359.58 | 276.07 | 299.57 |
| Min Ch El (ft) | 2524.00 | Shear (lb/sq ft) | 0.02 | 0.03 | 0.02 |
| Alpha | 1.52 | Stream Power (lb/ft s) | 0.01 | 0.06 | 0.02 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 74.07 | 435.66 | 64.64 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.69 | 37.58 | 2.76 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1110

INPUT
Description:
Station Elevation Data num= 46

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2538 | 104.77 | 2538 | 121.02 | 2538 | 172.26 | 2537 | 181.45 | 2536 |
| 189.22 | 2535 | 192.95 | 2534 | 196.9 | 2533 | 198.01 | 2532 | 198.99 | 2531 |
| 200.02 | 2530 | 200.72 | 2529 | 201.39 | 2528 | 202.12 | 2527 | 202.84 | 2526 |
| 203.53 | 2525 | 204.37 | 2524 | 205.16 | 2523 | 280.28 | 2523 | 285.89 | 2523 |
| 288.08 | 2523 | 311.08 | 2523 | 350.63 | 2523 | 417.4 | 2524 | 418.47 | 2525 |
| 419.48 | 2526 | 420.52 | 2527 | 421.57 | 2528 | 422.55 | 2529 | 423.62 | 2530 |
| 424.67 | 2531 | 425.68 | 2532 | 426.76 | 2533 | 427.88 | 2534 | 446.96 | 2535 |
| 448.96 | 2536 | 450.96 | 2537 | 506.22 | 2537 | 509.54 | 2536 | 512.84 | 2535 |
| 516.23 | 2534 | 519.47 | 2533 | 522.7 | 2532 | 525.9 | 2531 | 552.62 | 2533 |
| 590.04 | 2532 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 189.22 | .03 | 427.88 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
189.22 427.88 46.86 36.39 42.45 .1 .3

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2562.56 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.07 | Wt. n-Val. | 0.050 | 0.030 | 0.050 |
| W.S. Elev (ft) | 2562.49 | Reach Len. (ft) | 46.86 | 36.39 | 42.45 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4692.04 | 9198.60 | 4545.03 |
| E.G. Slope (ft/ft) | 0.000019 | Area (sq ft) | 4692.04 | 9198.60 | 4545.03 |
| Q Total (cfs) | 32000.00 | Flow (cfs) | 4810.65 | 22323.52 | 4865.83 |
| Top Width (ft) | 590.04 | Top Width (ft) | 189.22 | 238.66 | 162.16 |
| Vel Total (ft/s) | 1.74 | Avg. Vel. (ft/s) | 1.03 | 2.43 | 1.07 |
| Max Chl Dpth (ft) | 39.49 | Hydr. Depth (ft) | 24.80 | 38.54 | 28.03 |
| Conv. Total (cfs) | 7269809.0 | Conv. (cfs) | 1092892.0 | 5071491.0 | 1105426.0 |
| Length Wtd. (ft) | 37.64 | Wetted Per. (ft) | 213.83 | 247.69 | 194.13 |
| Min Ch El (ft) | 2523.00 | Shear (lb/sq ft) | 0.03 | 0.04 | 0.03 |
| Alpha | 1.47 | Stream Power (lb/ft s) | 0.03 | 0.11 | 0.03 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 12.12 | 339.49 | 3.22 |
| C & E Loss (ft) | 1.36 | Cum SA (acres) | 1.03 | 35.03 | 0.54 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1100

INPUT
Description:
Station Elevation Data num= 45

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2538 | 7.97 | 2538 | 75.6 | 2537 | 183.84 | 2537 | 194.63 | 2537 |
| 237.75 | 2537 | 254.58 | 2536 | 256.12 | 2535 | 257.6 | 2534 | 259.1 | 2533 |
| 260.96 | 2532 | 262.94 | 2531 | 264.61 | 2530 | 265.9 | 2529 | 267.15 | 2528 |
| 268.45 | 2527 | 271.56 | 2526 | 273.55 | 2526 | 279.63 | 2526 | 280.83 | 2525 |
| 281.87 | 2524 | 282.83 | 2523 | 283.81 | 2522 | 284.68 | 2521 | 285.65 | 2520 |
| 324.84 | 2520 | 432.65 | 2521 | 435.97 | 2522 | 448.45 | 2522 | 464.17 | 2522 |
| 493.16 | 2523 | 494.3 | 2524 | 495.3 | 2525 | 496.31 | 2526 | 497.31 | 2527 |
| 498.31 | 2528 | 499.33 | 2529 | 500.34 | 2530 | 501.37 | 2531 | 502.41 | 2532 |
| 503.41 | 2533 | 504.48 | 2534 | 524.02 | 2535 | 525.94 | 2536 | 527.91 | 2537 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 237.75 | .03 | 527.91 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
237.75 527.91 294 294 294 .1 .3
Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 285.65 | | F |
| 324.84 | 527.91 | | F |

Left Levee Station= 78.35 Elevation= 2534

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2561.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 13.69 | Wt. n-Val. | | 0.030 | |
| W.S. Elev (ft) | 2547.50 | Reach Len. (ft) | 294.00 | 294.00 | 294.00 |
| Crit W.S. (ft) | 2547.50 | Flow Area (sq ft) | | 1077.55 | |
| E.G. Slope (ft/ft) | 0.004332 | Area (sq ft) | 2453.55 | 6821.77 | |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 32000.00 | |
| Top Width (ft) | 527.91 | Top Width (ft) | 237.75 | 290.16 | |
| Vel Total (ft/s) | 29.70 | Avg. Vel. (ft/s) | | 29.70 | |
| Max Chl Dpth (ft) | 27.50 | Hydr. Depth (ft) | | 27.50 | |
| Conv. Total (cfs) | 486207.2 | Conv. (cfs) | | 486207.2 | |
| Length Wtd. (ft) | 294.00 | Wetted Per. (ft) | | 39.19 | |
| Min Ch El (ft) | 2520.00 | Shear (lb/sq ft) | | 7.44 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 220.81 | |
| Frctn Loss (ft) | 1.57 | Cum Volume (acre-ft) | 8.28 | 332.80 | 1.01 |
| C & E Loss (ft) | 2.93 | Cum SA (acres) | 0.80 | 34.81 | 0.46 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1050

INPUT
Description:
Station Elevation Data num= 65

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2535 | 19.46 | 2535 | 47.69 | 2534 | 72.02 | 2534 | 155.9 | 2535 |
| 219.33 | 2536 | 231.16 | 2536 | 232.43 | 2535 | 232.95 | 2534 | 233.46 | 2533 |
| 233.85 | 2532 | 234.25 | 2531 | 234.58 | 2530 | 234.94 | 2529 | 235.64 | 2528 |
| 236.59 | 2527 | 237.5 | 2526 | 238.51 | 2525 | 239.59 | 2524 | 241.05 | 2523 |
| 242.44 | 2522 | 243.96 | 2521 | 247.52 | 2520 | 255.19 | 2519 | 273.9 | 2519 |
| 284.32 | 2520 | 335.05 | 2520 | 397.98 | 2520 | 404.81 | 2520 | 435.94 | 2520 |
| 444.6 | 2521 | 474.12 | 2522 | 484.03 | 2523 | 485.53 | 2524 | 486.59 | 2525 |
| 487.65 | 2526 | 488.72 | 2527 | 489.75 | 2528 | 490.87 | 2529 | 492.17 | 2530 |
| 493.39 | 2531 | 494.65 | 2532 | 512.73 | 2533 | 515.72 | 2534 | 517.96 | 2535 |
| 520.35 | 2536 | 525.36 | 2537 | 530.35 | 2538 | 535.6 | 2539 | 542.47 | 2540 |
| 551.81 | 2540 | 564.09 | 2539 | 571.52 | 2538 | 608.38 | 2538 | 635.45 | 2530 |
| 651.98 | 2531 | 667.79 | 2532 | 677.67 | 2533 | 685.8 | 2534 | 704.45 | 2535 |
| 715.92 | 2536 | 728.92 | 2537 | 747.85 | 2538 | 786.05 | 2539 | 813.15 | 2540 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 231.16 | .03 | 525.36 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 231.16 | 525.36 | 162 | 162 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2532.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.94 | Wt. n-Val. | | 0.030 | |
| W.S. Elev (ft) | 2528.34 | Reach Len. (ft) | 162.00 | 162.00 | 162.00 |
| Crit W.S. (ft) | 2528.34 | Flow Area (sq ft) | | 2008.14 | |
| E.G. Slope (ft/ft) | 0.006777 | Area (sq ft) | | 2008.14 | |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 32000.00 | |
| Top Width (ft) | 254.74 | Top Width (ft) | | 254.74 | |
| Vel Total (ft/s) | 15.94 | Avg. Vel. (ft/s) | | 15.94 | |
| Max Chl Dpth (ft) | 9.34 | Hydr. Depth (ft) | | 7.88 | |
| Conv. Total (cfs) | 388715.4 | Conv. (cfs) | | 388715.4 | |
| Length Wtd. (ft) | 162.00 | Wetted Per. (ft) | | 259.93 | |

```
* Min Ch El (ft)       * 2519.00  * Shear (lb/sq ft)      *        *   3.27  *        *
* Alpha                *   1.00  * Stream Power (lb/ft s) *        *  52.09  *        *
* Frctn Loss (ft)      *   1.12  * Cum Volume (acre-ft)  *        *  303.00  *   1.01  *
* C & E Loss (ft)      *   0.14  * Cum SA (acres)        *        *  32.97  *   0.46  *
*********************************************************************************************
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1010

INPUT
Description:
Station Elevation Data num= 43

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2533 | 38.6 | 2533 | 39.06 | 2533 | 78.35 | 2534 | 116.92 | 2533 |
| 133.06 | 2532 | 142.27 | 2531 | 144.51 | 2530 | 146.56 | 2529 | 148.5 | 2528 |
| 150.44 | 2527 | 152.25 | 2526 | 154.32 | 2525 | 156.45 | 2524 | 162.38 | 2520 |
| 225.22 | 2519 | 319.11 | 2519 | 424.94 | 2520 | 448.16 | 2521 | 453.24 | 2522 |
| 454.76 | 2523 | 455.72 | 2524 | 456.73 | 2525 | 457.7 | 2526 | 458.85 | 2527 |
| 460.14 | 2528 | 461.47 | 2529 | 462.88 | 2530 | 464.32 | 2531 | 484.17 | 2532 |
| 485.92 | 2533 | 487.69 | 2534 | 489.54 | 2535 | 494.16 | 2536 | 499.81 | 2537 |
| 506.54 | 2538 | 512.26 | 2539 | 517.03 | 2540 | 535.74 | 2540 | 541.23 | 2539 |
| 573.19 | 2539 | 662.53 | 2537 | 733.3 | 2537 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 78.35 | .03 | 517.03 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 78.35 | 517.03 | 111.18 | 71.92 | 89.39 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)       * 2530.12  * Element             *  Left OB *  Channel * Right OB *
* Vel Head (ft)        *   3.48  * Wt. n-Val.           *        *   0.030  *        *
* W.S. Elev (ft)       * 2526.64  * Reach Len. (ft)     *  111.18  *   71.92  *   89.39  *
* Crit W.S. (ft)       * 2526.64  * Flow Area (sq ft)   *        * 2137.81  *        *
* E.G. Slope (ft/ft)   *0.006991  * Area (sq ft)        *        * 2137.81  *        *
* Q Total (cfs)        *32000.00  * Flow (cfs)          *        *32000.00  *        *
* Top Width (ft)       *  307.34  * Top Width (ft)      *        *  307.34  *        *
* Vel Total (ft/s)     *   14.97  * Avg. Vel. (ft/s)    *        *   14.97  *        *
* Max Chl Dpth (ft)    *    7.64  * Hydr. Depth (ft)    *        *    6.96  *        *
* Conv. Total (cfs)    *382715.7  * Conv. (cfs)         *        *382715.7  *        *
* Length Wtd. (ft)     *   71.92  * Wetted Per. (ft)    *        *  311.11  *        *
```

```
* Min Ch El (ft)        * 2519.00  * Shear (lb/sq ft)       *         *    3.00  *         *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *         *   44.89  *         *
* Frctn Loss (ft)       *    0.32  * Cum Volume (acre-ft)   *         *  295.29  *    1.01  *
* C & E Loss (ft)       *    0.37  * Cum SA (acres)         *         *   31.92  *    0.46  *
*********************************************************************************************
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 1000

INPUT
Description:
Station Elevation Data num= 66

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2530 | 72.47 | 2531 | 123.23 | 2532 | 127.39 | 2532 | 206.84 | 2532 |
| 228.14 | 2531 | 229.18 | 2530 | 230.2 | 2529 | 231.27 | 2528 | 232.31 | 2527 |
| 233.34 | 2526 | 234.44 | 2525 | 235.58 | 2524 | 236.81 | 2523 | 237.96 | 2522 |
| 239.13 | 2521 | 240.33 | 2520 | 241.5 | 2519 | 258.54 | 2518 | 270.55 | 2517 |
| 297.2 | 2516 | 316.68 | 2515 | 325.33 | 2514 | 328.79 | 2514 | 345.62 | 2514 |
| 349.01 | 2513 | 365.23 | 2513 | 372.83 | 2513 | 378.8 | 2513 | 387.11 | 2513 |
| 413.5 | 2513 | 423.78 | 2513 | 436.36 | 2513 | 453.28 | 2514 | 460.62 | 2515 |
| 469.34 | 2516 | 477.85 | 2517 | 486.46 | 2518 | 499.76 | 2519 | 513.14 | 2520 |
| 516.43 | 2521 | 517.76 | 2522 | 519.14 | 2523 | 520.49 | 2524 | 521.85 | 2525 |
| 523.2 | 2526 | 524.36 | 2527 | 525.49 | 2528 | 526.62 | 2529 | 527.74 | 2530 |
| 528.86 | 2531 | 546.98 | 2532 | 548.95 | 2533 | 550.75 | 2534 | 552.59 | 2535 |
| 557.43 | 2536 | 563.53 | 2537 | 569.55 | 2538 | 574.84 | 2539 | 578.79 | 2540 |
| 582.76 | 2541 | 599.7 | 2541 | 604.88 | 2540 | 610.61 | 2539 | 619.05 | 2539 |
| 655.41 | 2540 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 228.14 | .03 | 528.86 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
228.14 528.86 147 147 147 .1 .3

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)        * 2527.07  * Element             *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    2.24  * Wt. n-Val.          *          *   0.030  *         *
```

```
* W.S. Elev (ft)        * 2524.83  * Reach Len. (ft)       *  147.00  *  147.00  *  147.00  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)     *         * 2664.29  *          *
* E.G. Slope (ft/ft)    *0.003073  * Area (sq ft)          *         * 2664.29  *          *
* Q Total (cfs)         *32000.00  * Flow (cfs)            *         *32000.00  *          *
* Top Width (ft)        *  287.00  * Top Width (ft)        *         *  287.00  *          *
* Vel Total (ft/s)      *   12.01  * Avg. Vel. (ft/s)      *         *   12.01  *          *
* Max Chl Dpth (ft)     *   11.83  * Hydr. Depth (ft)      *         *    9.28  *          *
* Conv. Total (cfs)     *577255.7  * Conv. (cfs)           *         *577255.7  *          *
* Length Wtd. (ft)      *  147.00  * Wetted Per. (ft)      *         *  291.21  *          *
* Min Ch El (ft)        * 2513.00  * Shear (lb/sq ft)      *         *    1.76  *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *         *   21.08  *          *
* Frctn Loss (ft)       *    0.41  * Cum Volume (acre-ft)   *         *  291.33  *    1.01  *
* C & E Loss (ft)       *    0.05  * Cum SA (acres)         *         *   31.43  *    0.46  *
*********************************************************************************************
```

CROSS SECTION

RIVER: River #1
REACH: Reach #1  RS: 990

INPUT
Description:
Station Elevation Data  num=  68

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2529 | 71.19 | 2531 | 147.47 | 2531 | 150.26 | 2530 | 152.74 | 2529 |
| 154.71 | 2528 | 156.12 | 2527 | 156.77 | 2526 | 157.35 | 2525 | 158.14 | 2524 |
| 158.97 | 2523 | 159.86 | 2522 | 160.67 | 2521 | 161.59 | 2520 | 164.35 | 2519 |
| 172.87 | 2518 | 189.47 | 2517 | 203.44 | 2516 | 215.81 | 2515 | 228.73 | 2514 |
| 245.33 | 2513 | 273.27 | 2512 | 275.98 | 2511 | 280.26 | 2510 | 284.43 | 2509 |
| 316.97 | 2509 | 329.97 | 2509 | 339.77 | 2509 | 347.04 | 2510 | 350.43 | 2511 |
| 353.95 | 2512 | 355.51 | 2513 | 355.97 | 2514 | 356.38 | 2515 | 356.71 | 2516 |
| 362.16 | 2517 | 410.03 | 2518 | 416.62 | 2519 | 420.58 | 2520 | 422.41 | 2521 |
| 423.44 | 2522 | 424.47 | 2523 | 425.48 | 2524 | 426.54 | 2525 | 427.53 | 2526 |
| 428.54 | 2527 | 429.6 | 2528 | 430.6 | 2529 | 431.56 | 2530 | 432.54 | 2531 |
| 449.79 | 2532 | 452.84 | 2533 | 454.88 | 2534 | 456.9 | 2535 | 460.69 | 2536 |
| 464.69 | 2537 | 469.64 | 2538 | 474.54 | 2539 | 478.3 | 2540 | 482.08 | 2541 |
| 499.22 | 2541 | 504.31 | 2540 | 507.3 | 2539 | 549.1 | 2539 | 580.36 | 2537 |
| 661.7 | 2538 | 705.6 | 2538 | 764.81 | 2538 | | | | |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 147.47 | .03 | 432.54 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 147.47 | 432.54 | 168 | 168 | 168 | .1 | .3 |

CROSS SECTION OUTPUT  Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)        * 2526.62  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    2.07  * Wt. n-Val.           *          *    0.030  *          *
* W.S. Elev (ft)        * 2524.55  * Reach Len. (ft)      *  168.00  *  168.00  *  168.00  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)     *         * 2773.44  *          *
* E.G. Slope (ft/ft)    *0.002502  * Area (sq ft)          *         * 2773.44  *          *
```

```
* Q Total (cfs)         *32000.00  * Flow (cfs)            *        *32000.00  *        *
* Top Width (ft)         *  268.36  * Top Width (ft)        *         *  268.36  *        *
* Vel Total (ft/s)       *   11.54  * Avg. Vel. (ft/s)      *        *   11.54  *        *
* Max Chl Dpth (ft)      *   15.55  * Hydr. Depth (ft)      *        *   10.33  *        *
* Conv. Total (cfs)      *639730.3  * Conv. (cfs)           *        *639730.3  *        *
* Length Wtd. (ft)       *  168.00  * Wetted Per. (ft)      *        *  275.97  *        *
* Min Ch El (ft)         * 2509.00  * Shear (lb/sq ft)      *        *    1.57  *        *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *        *   18.11  *        *
* Frctn Loss (ft)        *    0.45  * Cum Volume (acre-ft)   *        *  282.15  *    1.01  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *        *   30.49  *    0.46  *
*********************************************************************************************************
```

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 975

INPUT
Description:
Station Elevation Data num= 72

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2529 | 13.44 | 2530 | 73.64 | 2530 | 81.3 | 2529 | 84.43 | 2528 |
| 87.48 | 2527 | 89.2 | 2526 | 89.97 | 2525 | 90.75 | 2524 | 91.41 | 2523 |
| 92.07 | 2522 | 92.7 | 2521 | 93.36 | 2520 | 94.66 | 2519 | 97.08 | 2518 |
| 99.79 | 2517 | 105.15 | 2516 | 107.47 | 2515 | 113.98 | 2514 | 117.45 | 2514 |
| 150.9 | 2514 | 155.15 | 2513 | 159.45 | 2512 | 178.85 | 2511 | 189.95 | 2511 |
| 194.35 | 2512 | 204.93 | 2512 | 215.82 | 2511 | 218.38 | 2510 | 223.48 | 2509 |
| 261.51 | 2508 | 274.29 | 2508 | 275.33 | 2509 | 276.33 | 2510 | 276.66 | 2511 |
| 276.97 | 2512 | 277.25 | 2513 | 277.55 | 2514 | 277.86 | 2515 | 278.15 | 2516 |
| 282.31 | 2517 | 300.88 | 2518 | 320.03 | 2518 | 330.7 | 2518 | 334.94 | 2519 |
| 336.61 | 2520 | 338.04 | 2521 | 339.21 | 2522 | 340.3 | 2523 | 341.46 | 2524 |
| 342.54 | 2525 | 343.49 | 2526 | 344.41 | 2527 | 345.32 | 2528 | 346.26 | 2529 |
| 347.2 | 2530 | 354.36 | 2531 | 356.86 | 2531 | 357.02 | 2531 | 368.19 | 2532 |
| 370.63 | 2533 | 373.14 | 2534 | 377.42 | 2535 | 382.06 | 2536 | 387.37 | 2537 |
| 392.15 | 2538 | 396.09 | 2539 | 399.58 | 2540 | 410.55 | 2540 | 418.34 | 2539 |
| 421.18 | 2538 | 462.2 | 2538 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 73.64 | .03 | 354.36 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Left | Right | Left | Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|---|
| 73.64 | 354.36 | 151 | 151 | 151 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************************
* E.G. Elev (ft)         * 2526.14  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    2.34  * Wt. n-Val.           *         *   0.030  *         *
* W.S. Elev (ft)         * 2523.80  * Reach Len. (ft)      *  151.00  *  151.00  *  151.00  *
* Crit W.S. (ft)         *         * Flow Area (sq ft)     *         * 2606.25  *         *
* E.G. Slope (ft/ft)     *0.002863  * Area (sq ft)         *         * 2606.25  *         *
* Q Total (cfs)          *32000.00  * Flow (cfs)           *        *32000.00  *         *
* Top Width (ft)         *  250.34  * Top Width (ft)       *         *  250.34  *         *
```

```
* Vel Total (ft/s)       *   12.28  * Avg. Vel. (ft/s)       *         *   12.28  *         *
* Max Chl Dpth (ft)      *   15.80  * Hydr. Depth (ft)      *         *   10.41  *         *
* Conv. Total (cfs)      *598023.8  * Conv. (cfs)           *         *598023.8  *         *
* Length Wtd. (ft)       *  151.00  * Wetted Per. (ft)      *         *  261.38  *         *
* Min Ch El (ft)         * 2508.00  * Shear (lb/sq ft)      *         *    1.78  *         *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   21.88  *         *
* Frctn Loss (ft)        *    0.34  * Cum Volume (acre-ft)   *         *  271.78  *    1.01  *
* C & E Loss (ft)        *    0.15  * Cum SA (acres)         *         *   29.49  *    0.46  *
*********************************************************************************************
```

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 965

INPUT
Description:
Station Elevation Data num= 61

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2529 | 24.24 | 2529 | 44.28 | 2528 | 49.27 | 2527 | 52.07 | 2526 |
| 54.03 | 2525 | 54.57 | 2524 | 55.1 | 2523 | 55.7 | 2522 | 56.35 | 2521 |
| 56.9 | 2520 | 57.58 | 2519 | 58.19 | 2518 | 59.52 | 2517 | 60.86 | 2516 |
| 62.25 | 2515 | 63.88 | 2514 | 65.95 | 2513 | 73.38 | 2513 | 94.97 | 2513 |
| 103.19 | 2512 | 111.82 | 2512 | 124.26 | 2512 | 141.97 | 2511 | 146.16 | 2511 |
| 151.53 | 2511 | 174.49 | 2510 | 178.24 | 2510 | 181.59 | 2510 | 184.15 | 2509 |
| 212.77 | 2508 | 246.92 | 2508 | 250.42 | 2509 | 253.64 | 2510 | 256.84 | 2511 |
| 259.32 | 2512 | 261.76 | 2513 | 264.39 | 2514 | 267.09 | 2515 | 269.75 | 2516 |
| 287.15 | 2517 | 290.69 | 2518 | 292.01 | 2519 | 293.41 | 2520 | 294.74 | 2521 |
| 295.97 | 2522 | 297.18 | 2523 | 298.34 | 2524 | 299.3 | 2525 | 300.3 | 2526 |
| 301.26 | 2527 | 302.22 | 2528 | 303.24 | 2529 | 304.18 | 2530 | 323.93 | 2531 |
| 325.91 | 2532 | 327.91 | 2533 | 329.91 | 2534 | 335.04 | 2535 | 340.64 | 2536 |
| 347.99 | 2537 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 44.28 | .03 | 304.18 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Left | Right | Left | Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|---|
| 44.28 | 304.18 | 148 | 148 | 148 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)         * 2525.65  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.84  * Wt. n-Val.           *          *   0.030  *          *
* W.S. Elev (ft)         * 2523.80  * Reach Len. (ft)      *  148.00  *  148.00  *  148.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *          * 2935.87  *          *
* E.G. Slope (ft/ft)     *0.001834  * Area (sq ft)          *          * 2935.87  *          *
* Q Total (cfs)          *32000.00  * Flow (cfs)           *          *32000.00  *          *
* Top Width (ft)         *  243.44  * Top Width (ft)       *          *  243.44  *          *
* Vel Total (ft/s)       *   10.90  * Avg. Vel. (ft/s)      *          *   10.90  *          *
* Max Chl Dpth (ft)      *   15.80  * Hydr. Depth (ft)      *          *   12.06  *          *
* Conv. Total (cfs)      *747157.1  * Conv. (cfs)           *          *747157.1  *          *
* Length Wtd. (ft)       *  148.00  * Wetted Per. (ft)      *          *  252.08  *          *
```

* Min Ch El (ft) * 2508.00 * Shear (lb/sq ft) * * 1.33 * *
* Alpha * 1.00 * Stream Power (lb/ft s) * * 14.54 * *
* Frctn Loss (ft) * 0.29 * Cum Volume (acre-ft) * * 262.17 * 1.01 *
* C & E Loss (ft) * 0.03 * Cum SA (acres) * * 28.64 * 0.46 *
**********

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 950

INPUT
Description:
Station Elevation Data num= 66

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2527 | 30.62 | 2527 | 106.02 | 2527 | 113.8 | 2526 | 118.53 | 2525 |
| 119.36 | 2524 | 120.03 | 2523 | 120.72 | 2522 | 121.39 | 2521 | 122.07 | 2520 |
| 122.75 | 2519 | 123.43 | 2518 | 124.07 | 2517 | 124.55 | 2516 | 124.9 | 2515 |
| 125.29 | 2514 | 125.65 | 2513 | 126.06 | 2512 | 157.82 | 2512 | 170.57 | 2512 |
| 177.06 | 2512 | 195.06 | 2512 | 204.4 | 2511 | 233.6 | 2510 | 236.53 | 2509 |
| 246.62 | 2508 | 308.39 | 2508 | 310.98 | 2509 | 313.59 | 2510 | 316.17 | 2511 |
| 318.79 | 2512 | 321.47 | 2513 | 324.07 | 2514 | 326.78 | 2515 | 332.49 | 2516 |
| 340.64 | 2517 | 341.74 | 2518 | 342.88 | 2519 | 344.04 | 2520 | 345.21 | 2521 |
| 346.36 | 2522 | 347.43 | 2523 | 348.48 | 2524 | 349.49 | 2525 | 350.46 | 2526 |
| 351.5 | 2527 | 352.57 | 2528 | 353.69 | 2529 | 373.26 | 2530 | 375.56 | 2531 |
| 377.95 | 2532 | 387.41 | 2532 | 393.05 | 2531 | 400.12 | 2531 | 408.37 | 2532 |
| 412.67 | 2533 | 416.69 | 2534 | 420.58 | 2535 | 424.63 | 2536 | 449.9 | 2536 |
| 455.61 | 2535 | 485.24 | 2532 | 506.85 | 2533 | 526.58 | 2534 | 542.36 | 2535 |
| 586.79 | 2536 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 106.02 | .03 | 352.57 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
106.02 352.57 216.27 206.23 199.7 .1 .3

CROSS SECTION OUTPUT Profile #100 year
**********
* E.G. Elev (ft) * 2525.33 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 2.10 * Wt. n-Val. * * 0.030 * *
* W.S. Elev (ft) * 2523.23 * Reach Len. (ft) * 216.27 * 206.23 * 199.70 *
* Crit W.S. (ft) * * Flow Area (sq ft) * * 2752.84 * *
* E.G. Slope (ft/ft) *0.002113 * Area (sq ft) * * 2752.84 * *
* Q Total (cfs) *32000.00 * Flow (cfs) * *32000.00 * *
* Top Width (ft) * 227.80 * Top Width (ft) * * 227.80 * *
* Vel Total (ft/s) * 11.62 * Avg. Vel. (ft/s) * * 11.62 * *
* Max Chl Dpth (ft) * 15.23 * Hydr. Depth (ft) * * 12.08 * *
* Conv. Total (cfs) *696190.1 * Conv. (cfs) * *696190.1 * *
* Length Wtd. (ft) * 206.17 * Wetted Per. (ft) * * 238.60 * *
* Min Ch El (ft) * 2508.00 * Shear (lb/sq ft) * * 1.52 * *
* Alpha * 1.00 * Stream Power (lb/ft s) * * 17.69 * *
* Frctn Loss (ft) * 0.46 * Cum Volume (acre-ft) * * 252.51 * 1.01 *

* C & E Loss (ft)  *  0.03  * Cum SA (acres)  *  *  27.84  *  0.46  *
**********

CROSS SECTION

RIVER: River #1
REACH: Reach #1  RS: 900

INPUT
Description:
Station Elevation Data  num=  64
  Sta  Elev  Sta  Elev  Sta  Elev  Sta  Elev  Sta  Elev
**********
  0  2526  38.53  2525  40.82  2524  42.06  2523  43.14  2522
  44  2521  44.86  2520  45.71  2519  46.54  2518  47.32  2517
  50.44  2516  53.95  2515  57.37  2514  60.82  2513  64.96  2512
  69.51  2511  74  2510  100.27  2509  109.64  2508  121.4  2508
  125.06  2508  175.97  2507  196.48  2507  205.89  2508  209.07  2509
  212.28  2510  215.52  2511  218.89  2512  222.21  2513  227.35  2514
  234.08  2515  235.2  2516  236.25  2517  237.32  2518  238.4  2519
  239.49  2520  240.52  2521  241.56  2522  242.54  2523  243.58  2524
  244.55  2525  245.52  2526  258.04  2527  266.14  2528  268.5  2529
  270.88  2530  275.59  2530  280.72  2529  284.52  2528  287.88  2527
  291.14  2526  294.14  2525  297.09  2524  300.04  2523  303  2522
  306.01  2521  309.04  2520  311.64  2519  324.23  2518  378.07  2521
  379.48  2521  403.99  2522  421.08  2523  431.72  2524

Manning's n Values  num=  3
  Sta  n Val  Sta  n Val  Sta  n Val
**********
  0  .05  38.53  .03  245.52  .05

Bank Sta: Left  Right  Lengths: Left Channel  Right  Coeff Contr.  Expan.
  38.53  245.52  159.29  151.89  152.98  .1  .3

CROSS SECTION OUTPUT  Profile #100 year
**********
* E.G. Elev (ft)  * 2524.84  * Element  *  Left OB *  Channel * Right OB *
* Vel Head (ft)  *  2.43  * Wt. n-Val.  *  *  0.030  *  0.050  *
* W.S. Elev (ft)  * 2522.41  * Reach Len. (ft)  *  159.29  *  151.89  *  152.98  *
* Crit W.S. (ft)  *  * Flow Area (sq ft)  *  * 2486.20  *  247.88  *
* E.G. Slope (ft/ft)  *0.002357  * Area (sq ft)  *  * 2486.20  *  247.88  *
* Q Total (cfs)  *32000.00  * Flow (cfs)  *  *31385.04  *  614.96  *
* Top Width (ft)  *  308.46  * Top Width (ft)  *  *  199.26  *  109.19  *
* Vel Total (ft/s)  *  11.70  * Avg. Vel. (ft/s)  *  *  12.62  *  2.48  *
* Max Chl Dpth (ft)  *  15.41  * Hydr. Depth (ft)  *  *  12.48  *  2.27  *
* Conv. Total (cfs)  *659183.1  * Conv. (cfs)  *  *646515.3  * 12667.8  *
* Length Wtd. (ft)  *  151.90  * Wetted Per. (ft)  *  *  206.67  *  109.93  *
* Min Ch El (ft)  * 2507.00  * Shear (lb/sq ft)  *  *  1.77  *  0.33  *
* Alpha  *  1.14  * Stream Power (lb/ft s) *  *  22.34  *  0.82  *
* Frctn Loss (ft)  *  0.55  * Cum Volume (acre-ft)  *  *  240.11  *  0.44  *
* C & E Loss (ft)  *  0.25  * Cum SA (acres)  *  *  26.83  *  0.21  *
**********

Warning: Divided flow computed for this cross-section.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 875

INPUT
Description:
Station Elevation Data num= 45

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2525 | 71.61 | 2526 | 118.17 | 2524 | 119.09 | 2523 | 120.35 | 2522 |
| 121.74 | 2521 | 123.1 | 2520 | 124.07 | 2519 | 124.65 | 2518 | 125.19 | 2517 |
| 126.97 | 2516 | 130.2 | 2515 | 133.46 | 2514 | 136.74 | 2513 | 139.82 | 2512 |
| 142.79 | 2511 | 145.85 | 2510 | 148.99 | 2509 | 158.14 | 2508 | 213.52 | 2507 |
| 262.74 | 2507 | 266.82 | 2508 | 270.84 | 2509 | 274.77 | 2510 | 278.81 | 2511 |
| 282.97 | 2512 | 290.02 | 2513 | 297.92 | 2514 | 300.44 | 2515 | 302.03 | 2516 |
| 303.66 | 2517 | 305.24 | 2518 | 306.83 | 2519 | 308.38 | 2520 | 321.38 | 2521 |
| 327.87 | 2522 | 331.77 | 2523 | 335.68 | 2524 | 338.11 | 2525 | 339.93 | 2526 |
| 341.79 | 2527 | 343.82 | 2528 | 345.8 | 2529 | 348.47 | 2530 | 354.1 | 2530 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 71.61 | .03 | 348.47 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 71.61 | 348.47 | 143 | 143 | 143 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2524.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.93 | Wt. n-Val. | | 0.030 | |
| W.S. Elev (ft) | 2519.10 | Reach Len. (ft) | 143.00 | 143.00 | 143.00 |
| Crit W.S. (ft) | 2519.10 | Flow Area (sq ft) | | 1795.29 | |
| E.G. Slope (ft/ft) | 0.006381 | Area (sq ft) | | 1795.29 | |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 32000.00 | |
| Top Width (ft) | 183.02 | Top Width (ft) | | 183.02 | |
| Vel Total (ft/s) | 17.82 | Avg. Vel. (ft/s) | | 17.82 | |
| Max Chl Dpth (ft) | 12.10 | Hydr. Depth (ft) | | 9.81 | |
| Conv. Total (cfs) | 400590.1 | Conv. (cfs) | | 400590.1 | |
| Length Wtd. (ft) | 143.00 | Wetted Per. (ft) | | 187.76 | |
| Min Ch El (ft) | 2507.00 | Shear (lb/sq ft) | | 3.81 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 67.90 | |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | | 232.64 | 0.01 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | | 26.16 | 0.02 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 865

INPUT
Description:
Station Elevation Data num= 62

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2525 | 56.88 | 2524 | 72.57 | 2523 | 75.16 | 2522 | 76.62 | 2521 |
| 78.09 | 2520 | 79.47 | 2519 | 80.91 | 2518 | 82.17 | 2517 | 83.07 | 2516 |
| 84.02 | 2515 | 84.98 | 2514 | 85.99 | 2513 | 87.06 | 2512 | 88.26 | 2511 |
| 89.39 | 2510 | 90.59 | 2509 | 91.76 | 2508 | 94.22 | 2507 | 102.81 | 2507 |
| 108.87 | 2507 | 213.65 | 2507 | 215.2 | 2508 | 216.21 | 2509 | 216.67 | 2510 |
| 216.98 | 2511 | 248.46 | 2512 | 265.67 | 2513 | 270.14 | 2514 | 274.28 | 2515 |
| 278.9 | 2516 | 287.06 | 2517 | 295.14 | 2518 | 299.07 | 2519 | 310.97 | 2520 |
| 312.9 | 2521 | 315.34 | 2522 | 317.65 | 2523 | 319.58 | 2524 | 321.52 | 2525 |
| 323.5 | 2526 | 325.43 | 2527 | 328.41 | 2528 | 337.65 | 2528 | 342.68 | 2527 |
| 346.63 | 2526 | 349.83 | 2525 | 352.94 | 2524 | 355.98 | 2523 | 359.09 | 2522 |
| 362.16 | 2521 | 365.61 | 2520 | 371.65 | 2519 | 377.12 | 2518 | 434.01 | 2527 |
| 452.14 | 2527 | 471.63 | 2527 | 489.27 | 2526 | 504.43 | 2525 | 519.54 | 2524 |
| 534.64 | 2523 | 584.46 | 2523 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 56.88 | .03 | 321.52 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Left | Right | Left | Channel | Right | Coeff | Contr. | Expan. |
|---|---|---|---|---|---|---|---|
| 56.88 | 321.52 | 153 | 153 | 153 | .1 | | .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2522.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.41 | Wt. n-Val. | | 0.030 | 0.050 |
| W.S. Elev (ft) | 2518.51 | Reach Len. (ft) | 153.00 | 153.00 | 153.00 |
| Crit W.S. (ft) | 2518.51 | Flow Area (sq ft) | | 1899.65 | 1.55 |
| E.G. Slope (ft/ft) | 0.006684 | Area (sq ft) | | 1899.65 | 1.55 |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 31998.50 | 1.51 |
| Top Width (ft) | 223.03 | Top Width (ft) | | 216.98 | 6.05 |
| Vel Total (ft/s) | 16.83 | Avg. Vel. (ft/s) | | 16.84 | 0.97 |
| Max Chl Dpth (ft) | 11.51 | Hydr. Depth (ft) | | 8.75 | 0.26 |
| Conv. Total (cfs) | 391402.6 | Conv. (cfs) | | 391384.2 | 18.4 |
| Length Wtd. (ft) | 153.00 | Wetted Per. (ft) | | 223.92 | 6.13 |
| Min Ch El (ft) | 2507.00 | Shear (lb/sq ft) | | 3.54 | 0.11 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 59.63 | 0.10 |

```
* Frctn Loss (ft)        *    0.61  * Cum Volume (acre-ft)   *          *  226.58  *    0.00  *
* C & E Loss (ft)        *    0.74  * Cum SA (acres)        *          *   25.50  *    0.01  *
*********************************************************************************************
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 850

INPUT
Description:
Station Elevation Data num= 57

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2524 | 24.24 | 2523 | 28.38 | 2523 | 29.45 | 2523 | 30.29 | 2522 |
| 31.17 | 2521 | 32.11 | 2520 | 32.98 | 2519 | 33.85 | 2518 | 34.73 | 2517 |
| 35.6 | 2516 | 36.47 | 2515 | 37.5 | 2514 | 38.6 | 2513 | 39.75 | 2512 |
| 42.45 | 2511 | 45.17 | 2510 | 47.8 | 2509 | 50.47 | 2508 | 53.23 | 2507 |
| 57.48 | 2506 | 71.27 | 2506 | 142.85 | 2506 | 174.88 | 2506 | 176.5 | 2507 |
| 179.36 | 2508 | 181.83 | 2509 | 182.2 | 2510 | 189.66 | 2510 | 195.39 | 2510 |
| 195.84 | 2510 | 201.1 | 2510 | 211.88 | 2511 | 222.73 | 2511 | 227.64 | 2511 |
| 242.84 | 2512 | 244.94 | 2512 | 247.1 | 2511 | 247.98 | 2510 | 259.64 | 2509 |
| 259.73 | 2509 | 279.51 | 2510 | 292.26 | 2511 | 295.24 | 2511 | 297.97 | 2511 |
| 317.69 | 2512 | 328.44 | 2513 | 330.22 | 2514 | 332.2 | 2515 | 334.32 | 2516 |
| 335.53 | 2517 | 336.07 | 2518 | 336.63 | 2519 | 337.23 | 2520 | 337.75 | 2521 |
| 338.33 | 2522 | 346.1 | 2523 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 24.24 | .03 | 338.33 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
24.24 338.33 199.44 201.98 207.35 .1 .3

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)         * 2520.32  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.93  * Wt. n-Val.           *          *   0.030  *          *
* W.S. Elev (ft)         * 2518.39  * Reach Len. (ft)      *  199.44  *  201.98  *  207.35  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *          * 2870.84  *          *
* E.G. Slope (ft/ft)     *0.002612  * Area (sq ft)          *          * 2870.84  *          *
```

```
* Q Total (cfs)         *32000.00  * Flow (cfs)            *        *32000.00  *        *
* Top Width (ft)         *  302.77  * Top Width (ft)        *         *  302.77  *        *
* Vel Total (ft/s)       *   11.15  * Avg. Vel. (ft/s)      *        *   11.15  *        *
* Max Chl Dpth (ft)      *   12.39  * Hydr. Depth (ft)      *        *    9.48  *        *
* Conv. Total (cfs)      *626163.1  * Conv. (cfs)           *        *626163.1  *        *
* Length Wtd. (ft)       *  201.98  * Wetted Per. (ft)      *        *  310.67  *        *
* Min Ch El (ft)         * 2506.00  * Shear (lb/sq ft)      *        *    1.51  *        *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *        *   16.79  *        *
* Frctn Loss (ft)        *    0.53  * Cum Volume (acre-ft)   *        *  218.20  *        *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *        *   24.59  *        *
*********************************************************************************************************
```

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 825

INPUT
Description:
Station Elevation Data num= 44

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2523 | 4.12 | 2522 | 7.04 | 2521 | 7.67 | 2520 | 8.29 | 2519 |
| 8.94 | 2518 | 9.56 | 2517 | 10.13 | 2516 | 10.82 | 2515 | 14.25 | 2514 |
| 18.99 | 2513 | 31.7 | 2512 | 34.74 | 2511 | 37.73 | 2510 | 40.76 | 2509 |
| 43.72 | 2508 | 46.73 | 2507 | 51.23 | 2506 | 65.41 | 2505 | 73.45 | 2505 |
| 119.23 | 2505 | 166.54 | 2505 | 169.12 | 2506 | 172.54 | 2507 | 175.44 | 2508 |
| 179 | 2509 | 193.89 | 2510 | 199.48 | 2510 | 202.98 | 2510 | 215.64 | 2511 |
| 227.41 | 2511 | 241.79 | 2511 | 254.19 | 2511 | 311.61 | 2511 | 313.29 | 2512 |
| 314.96 | 2513 | 316.61 | 2514 | 334.91 | 2515 | 335.87 | 2516 | 336.85 | 2517 |
| 338.42 | 2518 | 343.25 | 2519 | 345.95 | 2520 | 357.95 | 2521 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 0 | .03 | 357.95 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 0 | 357.95 | 112.29 | 110.49 | 112.71 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************************
* E.G. Elev (ft)         * 2519.76  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.82  * Wt. n-Val.            *          *   0.030  *         *
* W.S. Elev (ft)         * 2517.93  * Reach Len. (ft)       *  112.29  *  110.49  *  112.71  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *          * 2952.84  *         *
* E.G. Slope (ft/ft)     *0.002628  * Area (sq ft)           *          * 2952.84  *         *
* Q Total (cfs)          *32000.00  * Flow (cfs)            *          *32000.00  *         *
* Top Width (ft)         *  329.33  * Top Width (ft)        *          *  329.33  *         *
* Vel Total (ft/s)       *   10.84  * Avg. Vel. (ft/s)      *          *   10.84  *         *
* Max Chl Dpth (ft)      *   12.93  * Hydr. Depth (ft)      *          *    8.97  *         *
* Conv. Total (cfs)      *624234.6  * Conv. (cfs)           *          *624234.6  *         *
* Length Wtd. (ft)       *  110.49  * Wetted Per. (ft)      *          *  334.88  *         *
* Min Ch El (ft)         * 2505.00  * Shear (lb/sq ft)      *          *    1.45  *         *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   15.68  *         *
```

```
* Frctn Loss (ft)       *    0.31  * Cum Volume (acre-ft)   *         *  204.70 *         *
* C & E Loss (ft)       *    0.03  * Cum SA (acres)        *         *   23.13 *         *
*********************************************************************************************
```

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 800

INPUT
Description:
Station Elevation Data num= 43

```
    Sta   Elev    Sta   Elev    Sta   Elev    Sta   Elev    Sta   Elev
*********************************************************************************
     0   2522  170.51   2521  172.24   2520  174.02   2519  176.16   2518
  178.3   2517   180.4   2516  182.61   2515  184.86   2514  187.19   2513
 204.24   2512  217.94   2511  239.26   2510  243.83   2509  244.77   2508
 245.68   2507  246.57   2506  247.46   2505  358.29   2505  361.49   2506
 365.45   2507  371.35   2508  383.87   2509  401.36   2509  405.68   2509
 409.47   2510  452.86   2510  462.76   2509  474.64   2509  476.05   2510
 476.64   2511  477.24   2512  477.89   2513  478.54   2514   479.1   2515
 479.72   2516  481.22   2517   485.5   2518  488.24   2519  496.98   2520
 554.82   2521  707.06   2522  733.08   2522
```

Manning's n Values num= 3

```
    Sta   n Val    Sta   n Val    Sta   n Val
*********************************************
     0    .05  170.51    .03  496.98    .05
```

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

```
       170.51  496.98          269.66  259.43  283.94           .1       .3
```

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)        * 2519.41  * Element             *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    2.11  * Wt. n-Val.          *          *   0.030  *          *
* W.S. Elev (ft)        * 2517.30  * Reach Len. (ft)     *  269.66  *  259.43  *  283.94  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)    *          * 2742.08  *          *
* E.G. Slope (ft/ft)    *0.003065  * Area (sq ft)         *          * 2742.08  *          *
* Q Total (cfs)         *32000.00  * Flow (cfs)           *          *32000.00  *          *
* Top Width (ft)        *  304.82  * Top Width (ft)       *          *  304.82  *          *
* Vel Total (ft/s)      *   11.67  * Avg. Vel. (ft/s)     *          *   11.67  *          *
* Max Chl Dpth (ft)     *   12.30  * Hydr. Depth (ft)     *          *    9.00  *          *
* Conv. Total (cfs)     *578017.7  * Conv. (cfs)          *          *578017.7  *          *
* Length Wtd. (ft)      *  259.43  * Wetted Per. (ft)     *          *  312.32  *          *
* Min Ch El (ft)        * 2505.00  * Shear (lb/sq ft)     *          *    1.68  *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *        *   19.60  *          *
* Frctn Loss (ft)       *    0.85  * Cum Volume (acre-ft)  *          *  197.48  *          *
* C & E Loss (ft)       *    0.07  * Cum SA (acres)        *          *   22.32  *          *
*********************************************************************************************
```

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 750

INPUT
Description:
Station Elevation Data num= 40

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2518 | 80.49 | 2518 | 101.32 | 2517 | 102.41 | 2516 | 103.73 | 2515 |
| 106.69 | 2514 | 109.29 | 2513 | 111.62 | 2512 | 114.1 | 2511 | 116.42 | 2510 |
| 118.67 | 2509 | 124.7 | 2508 | 134.04 | 2507 | 151.21 | 2506 | 157.75 | 2506 |
| 187.77 | 2506 | 196.27 | 2506 | 207.09 | 2506 | 224.63 | 2505 | 227.06 | 2504 |
| 289.76 | 2503 | 291.55 | 2503 | 319.51 | 2504 | 322 | 2505 | 327.43 | 2506 |
| 330.32 | 2507 | 332.62 | 2508 | 334.77 | 2509 | 336.83 | 2510 | 338.79 | 2511 |
| 340.03 | 2512 | 341.28 | 2513 | 341.86 | 2514 | 342.4 | 2515 | 343.53 | 2516 |
| 346.86 | 2517 | 362.84 | 2518 | 363.83 | 2518 | 372.89 | 2518 | 382.01 | 2519 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 80.49 | .03 | 346.86 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 80.49 | 346.86 | 249.08 | 245.16 | 242.37 | .1 .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2518.49 | Element | Left OB | Channel Right OB |
| Vel Head (ft) | 2.79 | Wt. n-Val. | | 0.030 |
| W.S. Elev (ft) | 2515.69 | Reach Len. (ft) | 249.08 | 245.16 242.37 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 2385.26 |
| E.G. Slope (ft/ft) | 0.003542 | Area (sq ft) | | 2385.26 |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 32000.00 |
| Top Width (ft) | 240.37 | Top Width (ft) | | 240.37 |
| Vel Total (ft/s) | 13.42 | Avg. Vel. (ft/s) | | 13.42 |
| Max Chl Dpth (ft) | 12.69 | Hydr. Depth (ft) | | 9.92 |
| Conv. Total (cfs) | 537679.1 | Conv. (cfs) | | 537679.1 |
| Length Wtd. (ft) | 245.16 | Wetted Per. (ft) | | 245.68 |
| Min Ch El (ft) | 2503.00 | Shear (lb/sq ft) | | 2.15 |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 28.80 |
| Frctn Loss (ft) | 0.71 | Cum Volume (acre-ft) | | 182.21 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | | 20.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 700

INPUT

Description:
Station Elevation Data num= 34

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2518 | 77.32 | 2517 | 124.8 | 2516 | 125.91 | 2515 | 126.87 | 2514 |
| 127.71 | 2513 | 128.79 | 2512 | 131.3 | 2511 | 133.72 | 2510 | 136.08 | 2509 |
| 142.22 | 2508 | 151.85 | 2507 | 157.56 | 2506 | 165.59 | 2505 | 230.6 | 2504 |
| 246.35 | 2503 | 298.8 | 2502 | 318.49 | 2502 | 347.67 | 2503 | 351.36 | 2504 |
| 354.52 | 2505 | 357.56 | 2506 | 360.86 | 2507 | 366.7 | 2508 | 370.19 | 2509 |
| 371.55 | 2510 | 372.11 | 2511 | 372.65 | 2512 | 373.24 | 2513 | 374.1 | 2514 |
| 381.1 | 2515 | 386.42 | 2516 | 402.46 | 2517 | 548.15 | 2518 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 124.8 | .03 | 386.42 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 124.8 | 386.42 | 293.91 | 294.12 | 299.31 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 2517.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.10 | Wt. n-Val. | | 0.030 | |
| W.S. Elev (ft) | 2515.47 | Reach Len. (ft) | 293.91 | 294.12 | 299.31 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 2751.07 | |
| E.G. Slope (ft/ft) | *0.002424 | Area (sq ft) | | 2751.07 | |
| Q Total (cfs) | *32000.00 | Flow (cfs) | | *32000.00 | |
| Top Width (ft) | 258.19 | Top Width (ft) | | 258.19 | |
| Vel Total (ft/s) | 11.63 | Avg. Vel. (ft/s) | | 11.63 | |
| Max Chl Dpth (ft) | 13.47 | Hydr. Depth (ft) | | 10.66 | |
| Conv. Total (cfs) | *649974.1 | Conv. (cfs) | | *649974.1 | |
| Length Wtd. (ft) | 294.12 | Wetted Per. (ft) | | 264.07 | |
| Min Ch El (ft) | 2502.00 | Shear (lb/sq ft) | | 1.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 18.34 | |
| Frctn Loss (ft) | 1.13 | Cum Volume (acre-ft) | | 167.75 | |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | | 19.29 | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 650

INPUT
Description:
Station Elevation Data num= 38

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

```
*****************************************************************************
     0   2516   43.8   2516  100.74   2516  103.75   2515  105.42   2514
 107.04   2513  109.56   2512  112.67   2511  117.37   2510  138.39   2510
 142.33   2511  145.43   2511  152.29   2510  171.67   2509  183.41   2508
 192.93   2507  199.77   2506  203.68   2505  206.88   2504  211.64   2503
 216.79   2502  254.88   2501  323.52   2501  326.73   2502  329.61   2503
 338.94   2504  348.29   2505   354.7   2506  359.91   2507  365.85   2508
  371.3   2509  376.53   2510     382   2511  406.12   2512  415.37   2513
 428.98   2514  447.53   2515   461.5   2516

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
     0     .05  100.74     .03  447.53     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       100.74  447.53           225.88  219.62  226.45            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*************************************************************************************************
* E.G. Elev (ft)        * 2516.29  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.53  * Wt. n-Val.           *         *   0.030  *         *
* W.S. Elev (ft)        * 2512.76  * Reach Len. (ft)       *  225.88  *  219.62  *  226.45  *
* Crit W.S. (ft)        * 2512.76  * Flow Area (sq ft)      *         * 2123.45  *         *
* E.G. Slope (ft/ft)     *0.007050  * Area (sq ft)          *         * 2123.45  *         *
* Q Total (cfs)         *32000.00  * Flow (cfs)            *         *32000.00  *         *
* Top Width (ft)         *  305.54  * Top Width (ft)        *         *  305.54  *         *
* Vel Total (ft/s)       *   15.07  * Avg. Vel. (ft/s)      *         *   15.07  *         *
* Max Chl Dpth (ft)      *   11.76  * Hydr. Depth (ft)      *         *    6.95  *         *
* Conv. Total (cfs)      *381105.8  * Conv. (cfs)           *         *381105.8  *         *
* Length Wtd. (ft)       *  219.62  * Wetted Per. (ft)      *         *  307.86  *         *
* Min Ch El (ft)         * 2501.00  * Shear (lb/sq ft)      *         *    3.04  *         *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   45.75  *         *
* Frctn Loss (ft)        *    1.54  * Cum Volume (acre-ft)   *         *  151.30  *         *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *         *   17.39  *         *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
      program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
      section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
      depth, the calculated water surface came back below critical depth.  This indicates that there
      is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 600

INPUT
Description:
Station Elevation Data    num=      44
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
```

```
    0   2516   5.03   2515   7.53   2514   8.86   2514  39.93   2515
 54.49   2516  74.68   2516  80.26   2515  82.96   2514  86.05   2513
 98.03   2512 107.53   2511 113.92   2510  122.5   2509  132.6   2508
141.36   2507 155.96   2506 160.39   2505 162.59   2505 163.11   2505
219.17   2504 225.91   2503 229.77   2502 232.25   2501 296.95   2500
307.44   2500 361.87   2501 364.95   2502 372.73   2503 379.08   2504
385.41   2505 391.28   2506 396.72   2507 401.68   2508 405.71   2509
409.61   2510 412.76   2511 421.34   2512 423.01   2512 446.66   2512
488.33   2513 504.23   2514 673.38   2515 815.39   2516

Manning's n Values        num=       3
   Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
    0     .05   80.26     .03  412.76     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       80.26  412.76          296.17  292.59  291.63            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*********************************************************************************************
* E.G. Elev (ft)        * 2513.97  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.58  * Wt. n-Val.           *         *   0.030  *         *
* W.S. Elev (ft)        * 2510.40  * Reach Len. (ft)       *  296.17  *  292.59  *  291.63  *
* Crit W.S. (ft)        * 2510.40  * Flow Area (sq ft)     *         * 2108.65  *         *
* E.G. Slope (ft/ft)     *0.007009  * Area (sq ft)          *         * 2108.65  *         *
* Q Total (cfs)         *32000.00  * Flow (cfs)            *         *32000.00  *         *
* Top Width (ft)         *  299.45  * Top Width (ft)        *         *  299.45  *         *
* Vel Total (ft/s)       *   15.18  * Avg. Vel. (ft/s)      *         *   15.18  *         *
* Max Chl Dpth (ft)      *   10.39  * Hydr. Depth (ft)      *         *    7.04  *         *
* Conv. Total (cfs)      *382236.0  * Conv. (cfs)           *         *382236.0  *         *
* Length Wtd. (ft)       *  292.59  * Wetted Per. (ft)      *         *  301.18  *         *
* Min Ch El (ft)         * 2500.00  * Shear (lb/sq ft)      *         *    3.06  *         *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   46.49  *         *
* Frctn Loss (ft)        *    1.79  * Cum Volume (acre-ft)   *         *  140.63  *         *
* C & E Loss (ft)        *    0.10  * Cum SA (acres)         *         *   15.87  *         *
*********************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
      program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
      section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
      depth, the calculated water surface came back below critical depth.  This indicates that there
      is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 550

INPUT
Description:
Station Elevation Data    num=      45
   Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************
```

```
     0   2515   61.52    2515  103.09    2514  105.64    2513  107.96    2512
  109.8    2511  111.38    2510  112.99    2509   120.6    2508  121.48    2507
 122.11    2506  122.58    2505  123.13    2504  123.74    2503  124.32    2502
 136.57    2501  143.07    2501  157.07    2501  158.17    2500  159.37    2499
    161    2498  165.46    2498  212.67    2499  223.04    2500  239.88    2500
 261.37    2499  282.55    2499  296.92    2499  324.79    2499  332.76    2500
 337.66    2500  361.05    2500  377.07    2501  382.16    2502  385.36    2503
 388.56    2504  391.19    2505  392.44    2506  393.71    2507  395.64    2508
  397.6    2509  399.56    2510  425.74    2511  455.31    2512  497.23    2513

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
      0     .05  103.09     .03   397.6     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       103.09   397.6           174.17  170.22  169.02            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*********************************************************************************************
* E.G. Elev (ft)         * 2511.19  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.23  * Wt. n-Val.           *          *   0.030  *          *
* W.S. Elev (ft)         * 2507.96  * Reach Len. (ft)      *  174.17  *  170.22  *  169.02  *
* Crit W.S. (ft)         * 2507.33  * Flow Area (sq ft)    *          * 2219.50  *          *
* E.G. Slope (ft/ft)     *0.005387  * Area (sq ft)         *          * 2219.50  *          *
* Q Total (cfs)          *32000.00  * Flow (cfs)           *          *32000.00  *          *
* Top Width (ft)         *  274.92  * Top Width (ft)       *          *  274.92  *          *
* Vel Total (ft/s)       *   14.42  * Avg. Vel. (ft/s)     *          *   14.42  *          *
* Max Chl Dpth (ft)      *    9.96  * Hydr. Depth (ft)     *          *    8.07  *          *
* Conv. Total (cfs)      *435977.7  * Conv. (cfs)          *          *435977.7  *          *
* Length Wtd. (ft)       *  170.22  * Wetted Per. (ft)     *          *  281.03  *          *
* Min Ch El (ft)         * 2498.00  * Shear (lb/sq ft)     *          *    2.66  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *        *   38.30  *          *
* Frctn Loss (ft)        *    0.89  * Cum Volume (acre-ft)  *          *  126.09  *          *
* C & E Loss (ft)        *    0.05  * Cum SA (acres)        *          *   13.94  *          *
*********************************************************************************************

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 500

INPUT
Description:
Station Elevation Data    num=      49
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
***************************************************************************
     0   2515   25.13    2514   48.43    2513   49.79    2512   51.21    2511
  52.21    2510    53.2    2509   59.88    2508   62.32    2507   63.01    2506
  63.65    2505   64.29    2504   64.96    2503   65.59    2502   66.25    2501
  67.93    2500   73.52    2499   85.42    2499    95.5    2500   113.3    2500
 114.49    2499  116.18    2498  126.76    2498  130.68    2498  189.03    2498
 237.06    2498  277.79    2498  290.46    2499  311.38    2500  320.95    2501
 325.83    2502  330.22    2503  331.83    2504  333.61    2505  335.32    2506
 337.13    2507  349.82    2508   362.9    2509  366.79    2510  371.25    2511
```

```
 402.18   2512  409.65   2512  433.25   2511   454.4   2511  482.62   2513
 540.62   2513  626.61   2513  750.39   2514  852.01   2515

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
      0     .05   48.43     .03  371.25     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        48.43  371.25           312.56  311.97  314.78            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*********************************************************************************************
* E.G. Elev (ft)        * 2510.25  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    3.07  * Wt. n-Val.           *         *   0.030  *         *
* W.S. Elev (ft)        * 2507.18  * Reach Len. (ft)      *  312.56  *  311.97  *  314.78  *
* Crit W.S. (ft)        * 2506.38  * Flow Area (sq ft)    *         * 2273.98  *         *
* E.G. Slope (ft/ft)    *0.005021  * Area (sq ft)         *         * 2273.98  *         *
* Q Total (cfs)         *32000.00  * Flow (cfs)           *         *32000.00  *         *
* Top Width (ft)        *  277.51  * Top Width (ft)       *         *  277.51  *         *
* Vel Total (ft/s)      *   14.07  * Avg. Vel. (ft/s)     *         *   14.07  *         *
* Max Chl Dpth (ft)     *    9.18  * Hydr. Depth (ft)     *         *    8.19  *         *
* Conv. Total (cfs)     *451580.2  * Conv. (cfs)          *         *451580.2  *         *
* Length Wtd. (ft)      *  311.97  * Wetted Per. (ft)     *         *  283.25  *         *
* Min Ch El (ft)        * 2498.00  * Shear (lb/sq ft)     *         *    2.52  *         *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *       *   35.42  *         *
* Frctn Loss (ft)       *    1.27  * Cum Volume (acre-ft)  *         *  117.31  *         *
* C & E Loss (ft)       *    0.27  * Cum SA (acres)        *         *   12.86  *         *
*********************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
        additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
        section.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 450

INPUT
Description:
Station Elevation Data    num=      47
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
      0   2513   35.18    2512   47.41    2511   50.12    2510   51.27    2509
   52.21    2508   53.19    2507   54.73    2506   58.43    2505   59.31    2504
    59.8    2503   60.31    2502   60.86    2501   61.39    2500   61.95    2499
   62.48    2498   63.05    2497   90.78    2497   98.69    2498  154.41    2498
  157.97    2497  175.21    2496  235.57    2496  265.57    2496  268.23    2496
   269.1    2496  285.18    2496   287.4    2497  288.94    2498  289.48    2499
  300.47    2499   308.4    2499  311.24    2499  335.75    2499  341.39    2500
  345.18    2501  347.74    2502  350.19    2503  352.69    2504  355.19    2505
   357.6    2506  360.03    2506  366.14    2506  370.97    2507  379.33    2508
  386.29    2509  427.13    2510
```

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
**********
0 .05 35.18 .03 386.29 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
35.18 386.29 276.48 275.96 282 .1 .3

CROSS SECTION OUTPUT Profile #100 year
**********

| | | | | | |
|---|---|---|---|---|---|
| * E.G. Elev (ft) | * 2508.71 | * Element | * Left OB | * Channel | * Right OB * |
| * Vel Head (ft) | * 2.19 | * Wt. n-Val. | * | * 0.030 | * * |
| * W.S. Elev (ft) | * 2506.53 | * Reach Len. (ft) | * 276.48 | * 275.96 | * 282.00 * |
| * Crit W.S. (ft) | * | * Flow Area (sq ft) | * | * 2695.67 | * * |
| * E.G. Slope (ft/ft) | *0.003383 | * Area (sq ft) | * | * 2695.67 | * * |
| * Q Total (cfs) | *32000.00 | * Flow (cfs) | * | *32000.00 | * * |
| * Top Width (ft) | * 314.76 | * Top Width (ft) | * | * 314.76 | * * |
| * Vel Total (ft/s) | * 11.87 | * Avg. Vel. (ft/s) | * | * 11.87 | * * |
| * Max Chl Dpth (ft) | * 10.53 | * Hydr. Depth (ft) | * | * 8.56 | * * |
| * Conv. Total (cfs) | *550180.4 | * Conv. (cfs) | * | *550180.4 | * * |
| * Length Wtd. (ft) | * 275.96 | * Wetted Per. (ft) | * | * 322.27 | * * |
| * Min Ch El (ft) | * 2496.00 | * Shear (lb/sq ft) | * | * 1.77 | * * |
| * Alpha | * 1.00 | * Stream Power (lb/ft s) | * | * 20.97 | * * |
| * Frctn Loss (ft) | * 0.89 | * Cum Volume (acre-ft) | * | * 99.52 | * * |
| * C & E Loss (ft) | * 0.02 | * Cum SA (acres) | * | * 10.74 | * * |

**********

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 400

INPUT
Description:
Station Elevation Data num= 53
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
**********
0 2512 9.62 2513 19.24 2514 74.73 2515 222.35 2515
290.86 2513 325.73 2512 328.66 2511 331.67 2510 334.05 2509
335.22 2508 336.46 2507 339.73 2506 340.45 2505 341.16 2504
341.89 2503 342.61 2502 343.36 2501 344.05 2500 344.77 2499
345.54 2498 346.2 2497 346.91 2496 425.67 2496 431.37 2496
434.48 2495 439.38 2494 464.1 2494 470.41 2494 515.23 2494
518.26 2495 519.77 2496 521.2 2497 535.25 2498 563.96 2498
574.25 2497 599.37 2497 601.57 2497 607.93 2497 613.69 2498
616.49 2499 618.69 2500 620.67 2501 622.69 2502 624.72 2503
641.03 2504 644.27 2505 646.88 2506 649.35 2507 651.69 2508
690.61 2508 784.38 2509 870.86 2510

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
**********
0 .05 325.73 .03 651.69 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
325.73 651.69 248.4 246.38 244.38 .1 .3

CROSS SECTION OUTPUT Profile #100 year
**********
* E.G. Elev (ft) * 2507.80 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 2.11 * Wt. n-Val. * * 0.030 * *
* W.S. Elev (ft) * 2505.69 * Reach Len. (ft) * 248.40 * 246.38 * 244.38 *
* Crit W.S. (ft) * * Flow Area (sq ft) * * 2748.01 * *
* E.G. Slope (ft/ft) *0.003061 * Area (sq ft) * * 2748.01 * *
* Q Total (cfs) *32000.00 * Flow (cfs) * *32000.00 * *
* Top Width (ft) * 306.13 * Top Width (ft) * * 306.13 * *
* Vel Total (ft/s) * 11.64 * Avg. Vel. (ft/s) * * 11.64 * *
* Max Chl Dpth (ft) * 11.69 * Hydr. Depth (ft) * * 8.98 * *
* Conv. Total (cfs) *578379.0 * Conv. (cfs) * *578379.0 * *
* Length Wtd. (ft) * 246.38 * Wetted Per. (ft) * * 313.72 * *
* Min Ch El (ft) * 2494.00 * Shear (lb/sq ft) * * 1.67 * *
* Alpha * 1.00 * Stream Power (lb/ft s) * * 19.49 * *
* Frctn Loss (ft) * 0.69 * Cum Volume (acre-ft) * * 82.27 * *
* C & E Loss (ft) * 0.03 * Cum SA (acres) * * 8.77 * *
**********

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 350

INPUT
Description:
Station Elevation Data num= 49
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
**********
0 2512 51.45 2511 59.82 2510 62.17 2509 64.45 2508
66.67 2507 68.88 2506 71.09 2505 73.26 2504 74.24 2503
75.08 2502 75.87 2501 76.66 2500 77.43 2499 78.2 2498
78.96 2497 79.69 2496 80.44 2495 81.23 2494 82.02 2493
89.6 2493 104.48 2494 113.11 2494 115.6 2493 130.4 2492
187.99 2492 190.03 2493 190.67 2494 191.29 2495 191.93 2496
192.51 2497 243.88 2497 268.93 2496 327.12 2495 337.24 2495
339.98 2496 343.13 2497 345.16 2498 346.46 2499 347.34 2500
348.29 2501 349.28 2502 350.24 2503 351.21 2504 352.45 2505
354.2 2506 355.99 2507 357.95 2508 410.83 2509

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
**********
0 .05 51.45 .03 357.95 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
51.45 357.95 102 102 102 .1 .3

CROSS SECTION OUTPUT Profile #100 year
**********
* E.G. Elev (ft) * 2507.08 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 2.00 * Wt. n-Val. * * 0.030 * *

```
* W.S. Elev (ft)       * 2505.08  * Reach Len. (ft)       *  102.00  *  102.00  *  102.00  *
* Crit W.S. (ft)       *          * Flow Area (sq ft)     *         * 2819.05  *          *
* E.G. Slope (ft/ft)   *0.002571  * Area (sq ft)          *         * 2819.05  *          *
* Q Total (cfs)        *32000.00  * Flow (cfs)           *         *32000.00  *          *
* Top Width (ft)       *  281.66  * Top Width (ft)       *         *  281.66  *          *
* Vel Total (ft/s)     *   11.35  * Avg. Vel. (ft/s)     *         *   11.35  *          *
* Max Chl Dpth (ft)    *   13.08  * Hydr. Depth (ft)     *         *   10.01  *          *
* Conv. Total (cfs)    *631088.5  * Conv. (cfs)          *         *631088.5  *          *
* Length Wtd. (ft)     *  102.00  * Wetted Per. (ft)     *         *  293.38  *          *
* Min Ch El (ft)       * 2492.00  * Shear (lb/sq ft)     *         *    1.54  *          *
* Alpha                *    1.00  * Stream Power (lb/ft s) *       *   17.51  *          *
* Frctn Loss (ft)      *    0.31  * Cum Volume (acre-ft)  *         *   66.53  *          *
* C & E Loss (ft)      *    0.06  * Cum SA (acres)        *         *    7.11  *          *
*********************************************************************************************
```

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 325

INPUT
Description:
Station Elevation Data num= 62

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2513 | 22.25 | 2513 | 32.72 | 2512 | 71.44 | 2511 | 79.59 | 2510 |
| 89.4 | 2509 | 96.55 | 2508 | 98.58 | 2507 | 100.47 | 2506 | 102.47 | 2505 |
| 104.44 | 2504 | 106.33 | 2503 | 107.96 | 2502 | 108.57 | 2501 | 109.23 | 2500 |
| 109.82 | 2499 | 110.51 | 2498 | 111.08 | 2497 | 111.72 | 2496 | 112.35 | 2495 |
| 112.98 | 2494 | 113.63 | 2493 | 114.26 | 2492 | 182.76 | 2492 | 184.85 | 2493 |
| 186.67 | 2494 | 188.28 | 2495 | 190.72 | 2496 | 248.41 | 2496 | 258.75 | 2496 |
| 263.65 | 2496 | 287.03 | 2495 | 291.15 | 2494 | 313.36 | 2494 | 315.02 | 2494 |
| 323.84 | 2493 | 324.44 | 2493 | 331.16 | 2494 | 346.56 | 2494 | 349.58 | 2494 |
| 353.97 | 2495 | 356.18 | 2496 | 356.79 | 2497 | 357.41 | 2498 | 357.99 | 2499 |
| 358.59 | 2500 | 359.18 | 2501 | 359.78 | 2502 | 359.99 | 2503 | 362.6 | 2504 |
| 365.32 | 2505 | 368.01 | 2506 | 370.7 | 2507 | 374.19 | 2508 | 379.86 | 2509 |
| 385.53 | 2510 | 393.68 | 2511 | 400.54 | 2513 | 440.52 | 2513 | 445.44 | 2513 |
| 549.07 | 2513 | 595.08 | 2512 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 71.44 | .03 | 393.68 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
71.44 393.68 128 128 128 .1 .3

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)       * 2506.71  * Element             *  Left OB *  Channel * Right OB *
* Vel Head (ft)        *    2.61  * Wt. n-Val.          *          *   0.030  *          *
* W.S. Elev (ft)       * 2504.10  * Reach Len. (ft)     *  128.00  *  128.00  *  128.00  *
```

```
* Crit W.S. (ft)        *         * Flow Area (sq ft)      *         * 2468.15  *         *
* E.G. Slope (ft/ft)    *0.003597  * Area (sq ft)          *         * 2468.15  *         *
* Q Total (cfs)         *32000.00  * Flow (cfs)            *         *32000.00  *         *
* Top Width (ft)        *  258.62  * Top Width (ft)        *         *  258.62  *         *
* Vel Total (ft/s)      *   12.97  * Avg. Vel. (ft/s)      *         *   12.97  *         *
* Max Chl Dpth (ft)     *   12.10  * Hydr. Depth (ft)      *         *    9.54  *         *
* Conv. Total (cfs)     *533579.7  * Conv. (cfs)           *         *533579.7  *         *
* Length Wtd. (ft)      *  128.00  * Wetted Per. (ft)      *         *  270.67  *         *
* Min Ch El (ft)        * 2492.00  * Shear (lb/sq ft)      *         *    2.05  *         *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *         *   26.55  *         *
* Frctn Loss (ft)       *    0.44  * Cum Volume (acre-ft)   *         *   60.34  *         *
* C & E Loss (ft)       *    0.01  * Cum SA (acres)         *         *    6.48  *         *
*********************************************************************************************
```

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 300

INPUT
Description:
Station Elevation Data num= 50

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2511 | 1.7 | 2510 | 3.44 | 2509 | 7.08 | 2508 | 9.07 | 2507 |
| 10.95 | 2506 | 12.9 | 2505 | 14.77 | 2504 | 16.73 | 2503 | 18.58 | 2502 |
| 20.48 | 2501 | 22.41 | 2500 | 23.93 | 2499 | 24.45 | 2498 | 24.99 | 2497 |
| 25.5 | 2496 | 26.01 | 2495 | 26.53 | 2494 | 27.1 | 2493 | 27.64 | 2492 |
| 28.18 | 2491 | 86.62 | 2491 | 92.75 | 2492 | 94.29 | 2493 | 95.93 | 2494 |
| 97.57 | 2495 | 138.02 | 2495 | 153.47 | 2494 | 167.76 | 2493 | 193.55 | 2493 |
| 247.74 | 2494 | 249.98 | 2495 | 252.25 | 2496 | 255.15 | 2497 | 257.57 | 2498 |
| 258.71 | 2499 | 259.87 | 2500 | 261 | 2501 | 262.6 | 2502 | 264.44 | 2503 |
| 266.27 | 2504 | 268.02 | 2505 | 269.83 | 2506 | 271.59 | 2507 | 273.38 | 2508 |
| 275.21 | 2509 | 277.12 | 2510 | 283.77 | 2511 | 302.46 | 2512 | 326.78 | 2512 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 0 | .03 | 283.77 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
0 283.77 142.87 142.74 142.86 .1 .3

CROSS SECTION OUTPUT Profile #100 year

```
*********************************************************************************************
* E.G. Elev (ft)        * 2506.25  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    2.59  * Wt. n-Val.           *         *   0.030  *         *
* W.S. Elev (ft)        * 2503.67  * Reach Len. (ft)      *    1.00 *    1.00  *    1.00  *
* Crit W.S. (ft)        * 2501.60  * Flow Area (sq ft)    *         * 2477.95  *         *
* E.G. Slope (ft/ft)    *0.003362  * Area (sq ft)         *         * 2477.95  *         *
* Q Total (cfs)         *32000.00  * Flow (cfs)           *         *32000.00  *         *
* Top Width (ft)        *  250.23  * Top Width (ft)       *         *  250.23  *         *
* Vel Total (ft/s)      *   12.91  * Avg. Vel. (ft/s)     *         *   12.91  *         *
* Max Chl Dpth (ft)     *   12.66  * Hydr. Depth (ft)     *         *    9.90  *         *
* Conv. Total (cfs)     *551875.3  * Conv. (cfs)          *         *551875.3  *         *
```

```
* Length Wtd. (ft)       *    1.00  * Wetted Per. (ft)       *         *  259.88  *         *
* Min Ch El (ft)         * 2491.00  * Shear (lb/sq ft)       *         *    2.00  *         *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   25.85  *         *
* Frctn Loss (ft)        *    0.00  * Cum Volume (acre-ft)   *         *   53.07  *         *
* C & E Loss (ft)        *    0.07  * Cum SA (acres)         *         *    5.73  *         *
*********************************************************************************************
```

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

BRIDGE

RIVER: River #1
REACH: Reach #1 RS: 295

INPUT
Description:
Distance from Upstream XS = 1
Deck/Roadway Width = 136
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 10

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| -45.78 | 2511.91 | 2511.91 | 0 | 2511.91 | 2510.16 | 42.5 | 2511.86 | 2510.11 |
| 85 | 2511.81 | 2510.06 | 127.5 | 2511.76 | 2510.01 | 170 | 2511.71 | 2509.96 |
| 212.5 | 2511.66 | 2509.91 | 265 | 2511.61 | 2509.86 | 276.12 | 2511.61 | 2509.86 |
| 295.19 | 2511.61 | 2511.61 | | | | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 50

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2511 | 1.7 | 2510 | 3.44 | 2509 | 7.08 | 2508 | 9.07 | 2507 |
| 10.95 | 2506 | 12.9 | 2505 | 14.77 | 2504 | 16.73 | 2503 | 18.58 | 2502 |
| 20.48 | 2501 | 22.41 | 2500 | 23.93 | 2499 | 24.45 | 2498 | 24.99 | 2497 |
| 25.5 | 2496 | 26.01 | 2495 | 26.53 | 2494 | 27.1 | 2493 | 27.64 | 2492 |
| 28.18 | 2491 | 86.62 | 2491 | 92.75 | 2492 | 94.29 | 2493 | 95.93 | 2494 |
| 97.57 | 2495 | 138.02 | 2495 | 153.47 | 2494 | 167.76 | 2493 | 193.55 | 2493 |
| 247.74 | 2494 | 249.98 | 2495 | 252.25 | 2496 | 255.15 | 2497 | 257.57 | 2498 |
| 258.71 | 2499 | 259.87 | 2500 | 261 | 2501 | 262.6 | 2502 | 264.44 | 2503 |
| 266.27 | 2504 | 268.02 | 2505 | 269.83 | 2506 | 271.59 | 2507 | 273.38 | 2508 |
| 275.21 | 2509 | 277.12 | 2510 | 283.77 | 2511 | 302.46 | 2512 | 326.78 | 2512 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 0 | .03 | 283.77 | .05 |

Bank Sta: Left Right Coeff Contr. Expan.
0 283.77 .1 .3

Downstream Deck/Roadway Coordinates
num= 10

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|

```
*****************************************************************************
    -17 2511.91 2511.91       0 2511.91 2510.16    42.5 2511.86 2510.11
     85 2511.81 2510.06   127.5 2511.76 2510.01     170 2511.71 2509.96
  212.5 2511.66 2509.91     265 2511.61 2509.86  295.19 2511.61 2509.86
 296.11 2511.61 2511.61

Downstream Bridge Cross Section Data
Station Elevation Data    num=      47
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
      0    2511    5.21    2510   10.08    2509   15.67    2508   20.42    2507
  21.51    2506   22.64    2505    23.8    2504   24.89    2503   26.06    2502
   27.1    2501   28.06    2500   28.81    2499   29.34    2498   29.85    2497
  30.24    2496   30.82    2495   31.32    2494   31.77    2493   32.76    2492
     34    2491   35.16    2490   87.52    2490   91.54    2491  185.72    2492
 190.12    2493   238.6    2493  242.56    2493  250.25    2494  253.63    2495
 256.73    2496   259.9    2497  263.08    2498  265.91    2499  268.27    2500
 270.54    2501   273.6    2502  277.89    2503  280.77    2504  282.48    2505
 284.14    2506  285.85    2507  291.86    2508  294.96    2509  296.11    2510
 308.44    2510  313.58    2510

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
      0    .045       0     .03  296.11     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           0  296.11            .1       .3

Upstream Embankment side slope             =     1.5 horiz. to 1.0 vertical
Downstream Embankment side slope           =     1.5 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         = 2512.19
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  3

Pier Data
Pier Station     Upstream=   69.45    Downstream=    78.8
Upstream     num=       2
   Width   Elev    Width   Elev
*********************************
      3    2490       3 2511.91
Downstream     num=       2
   Width   Elev    Width   Elev
*********************************
      3    2490       3 2511.91

Pier Data
Pier Station     Upstream=  138.97    Downstream=  148.04
Upstream     num=       2
   Width   Elev    Width   Elev
*********************************
      3    2490       3 2511.91
```

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 2490 | 3 | 2511.91 |

Pier Data

Pier Station Upstream= 208.52 Downstream= 217.6

Upstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 2490 | 3 | 2511.91 |

Downstream num= 2

| Width | Elev | Width | Elev |
|---|---|---|---|
| 3 | 2490 | 3 | 2511.91 |

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Energy Only

Additional Bridge Parameters

Add Friction component to Momentum

Do not add Weight component to Momentum

Class B flow critical depth computations use critical depth inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #100 year

| | | | | | |
|---|---|---|---|---|---|
| E.G. US. (ft) | 2506.25 | Element | | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 2503.67 | E.G. Elev (ft) | | 2506.18 | 2505.27 |
| Q Total (cfs) | 32000.00 | W.S. Elev (ft) | | 2502.89 | 2502.63 |
| Q Bridge (cfs) | 32000.00 | Crit W.S. (ft) | | 2501.89 | 2500.52 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | | 11.89 | 12.63 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | | 14.57 | 13.04 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | | 2196.40 | 2454.81 |
| Weir Submerg | | Froude # Chl | | 0.85 | 0.72 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | | 25277.32 | 26304.31 |
| Min El Weir Flow (ft) | 2512.19 | Hydr Depth (ft) | | 9.22 | 10.14 |
| Min El Prs (ft) | 2510.16 | W.P. Total (ft) | | 306.49 | 316.73 |
| Delta EG (ft) | 1.09 | Conv. Total (cfs) | | 404370.3 | 476190.1 |
| Delta WS (ft) | 0.86 | Top Width (ft) | | 238.30 | 241.98 |
| BR Open Area (sq ft) | 3987.31 | Frctn Loss (ft) | | 0.72 | 0.02 |
| BR Open Vel (ft/s) | 14.57 | C & E Loss (ft) | | 0.20 | 0.09 |
| Coef of Q | | Shear Total (lb/sq ft) | | 2.80 | 2.19 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | | 40.82 | 28.48 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 290

INPUT
Description:
Station Elevation Data num= 47

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2511 | 5.21 | 2510 | 10.08 | 2509 | 15.67 | 2508 | 20.42 | 2507 |
| 21.51 | 2506 | 22.64 | 2505 | 23.8 | 2504 | 24.89 | 2503 | 26.06 | 2502 |
| 27.1 | 2501 | 28.06 | 2500 | 28.81 | 2499 | 29.34 | 2498 | 29.85 | 2497 |
| 30.24 | 2496 | 30.82 | 2495 | 31.32 | 2494 | 31.77 | 2493 | 32.76 | 2492 |
| 34 | 2491 | 35.16 | 2490 | 87.52 | 2490 | 91.54 | 2491 | 185.72 | 2492 |
| 190.12 | 2493 | 238.6 | 2493 | 242.56 | 2493 | 250.25 | 2494 | 253.63 | 2495 |
| 256.73 | 2496 | 259.9 | 2497 | 263.08 | 2498 | 265.91 | 2499 | 268.27 | 2500 |
| 270.54 | 2501 | 273.6 | 2502 | 277.89 | 2503 | 280.77 | 2504 | 282.48 | 2505 |
| 284.14 | 2506 | 285.85 | 2507 | 291.86 | 2508 | 294.96 | 2509 | 296.11 | 2510 |
| 308.44 | 2510 | 313.58 | 2510 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .045 | 0 | .03 | 296.11 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 0 | 296.11 | 85 | 85 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2505.16 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.35 | Wt. n-Val. | | 0.030 | |
| W.S. Elev (ft) | 2502.81 | Reach Len. (ft) | 85.00 | 85.00 | 85.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 2599.80 | |
| E.G. Slope (ft/ft) | 0.002870 | Area (sq ft) | | 2599.80 | |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 32000.00 | |
| Top Width (ft) | 251.96 | Top Width (ft) | | 251.96 | |
| Vel Total (ft/s) | 12.31 | Avg. Vel. (ft/s) | | 12.31 | |
| Max Chl Dpth (ft) | 12.81 | Hydr. Depth (ft) | | 10.32 | |
| Conv. Total (cfs) | 597333.9 | Conv. (cfs) | | 597333.9 | |
| Length Wtd. (ft) | 85.00 | Wetted Per. (ft) | | 260.22 | |
| Min Ch El (ft) | 2490.00 | Shear (lb/sq ft) | | 1.79 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 22.03 | |
| Frctn Loss (ft) | 0.28 | Cum Volume (acre-ft) | | 45.42 | |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | | 4.94 | |

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 275

INPUT
Description:
Station Elevation Data num= 44

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2509 | 4.38 | 2508 | 8.49 | 2507 | 14.17 | 2506 | 20.74 | 2505 |
| 25.94 | 2504 | 27.67 | 2503 | 29.32 | 2502 | 31.07 | 2501 | 32.8 | 2500 |
| 34.51 | 2499 | 36.1 | 2498 | 37.23 | 2497 | 38.29 | 2496 | 39.39 | 2495 |
| 47.81 | 2494 | 48.26 | 2493 | 48.76 | 2492 | 49.23 | 2491 | 49.67 | 2490 |
| 100.19 | 2490 | 139.75 | 2491 | 143.78 | 2491 | 149.91 | 2491 | 191.56 | 2492 |
| 209.91 | 2493 | 233.94 | 2493 | 237.76 | 2492 | 243.01 | 2492 | 248.61 | 2493 |
| 252.8 | 2494 | 258.22 | 2495 | 260.2 | 2496 | 261.13 | 2497 | 261.96 | 2498 |
| 263.03 | 2499 | 265.21 | 2500 | 267.57 | 2501 | 270.36 | 2502 | 272.15 | 2503 |
| 273.91 | 2504 | 275.67 | 2505 | 278.33 | 2506 | 316.55 | 2507 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .045 | 14.17 | .03 | 278.33 | .04 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 14.17 | 278.33 | 264 | 264 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2504.83 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.84 | Wt. n-Val. | | 0.030 | |
| W.S. Elev (ft) | 2502.00 | Reach Len. (ft) | 264.00 | 264.00 | 264.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 2367.30 | |
| E.G. Slope (ft/ft) | 0.003688 | Area (sq ft) | | 2367.30 | |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 32000.00 | |
| Top Width (ft) | 241.03 | Top Width (ft) | | 241.03 | |
| Vel Total (ft/s) | 13.52 | Avg. Vel. (ft/s) | | 13.52 | |
| Max Chl Dpth (ft) | 12.00 | Hydr. Depth (ft) | | 9.82 | |
| Conv. Total (cfs) | 526914.8 | Conv. (cfs) | | 526914.8 | |
| Length Wtd. (ft) | 264.00 | Wetted Per. (ft) | | 248.50 | |
| Min Ch El (ft) | 2490.00 | Shear (lb/sq ft) | | 2.19 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 29.65 | |
| Frctn Loss (ft) | 1.28 | Cum Volume (acre-ft) | | 40.58 | |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | | 4.46 | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 200

INPUT
Description:
Station Elevation Data num= 47

```
   Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
     0    2507    89.5    2507  275.72    2505     298    2504  311.14    2503
  313.65    2502  316.05    2501  317.97    2500   319.5    2499  321.04    2498
  321.43    2497   321.7    2496  321.97    2495  322.27    2494  322.55    2493
  323.82    2492  346.56    2491  347.62    2490  348.66    2489  354.47    2489
  368.48    2489   402.4    2488  436.93    2488  441.55    2489  445.47    2490
  493.09    2490  496.05    2489  507.63    2489  510.34    2490  512.96    2491
  515.67    2492  518.42    2493  521.15    2494  521.76    2495  522.31    2496
  522.88    2497  523.51    2498  525.04    2499     527    2500  529.15    2501
  533.05    2502  559.95    2503  605.45    2504  846.35    2511  859.53    2512
  882.51    2513  914.95    2514

Manning's n Values        num=       3
   Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
     0    .045  311.14     .03  533.05     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       311.14  533.05           273.87  293.94  300.79            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*************************************************************************************************
* E.G. Elev (ft)        * 2503.38  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    4.58  * Wt. n-Val.           *         *   0.030  *         *
* W.S. Elev (ft)        * 2498.80  * Reach Len. (ft)      *  273.87  *  293.94  *  300.79  *
* Crit W.S. (ft)        * 2498.80  * Flow Area (sq ft)    *         * 1863.60  *         *
* E.G. Slope (ft/ft)    *0.006703  * Area (sq ft)         *         * 1863.60  *         *
* Q Total (cfs)         *32000.00  * Flow (cfs)           *         *32000.00  *         *
* Top Width (ft)        *  204.92  * Top Width (ft)       *         *  204.92  *         *
* Vel Total (ft/s)      *   17.17  * Avg. Vel. (ft/s)     *         *   17.17  *         *
* Max Chl Dpth (ft)     *   10.80  * Hydr. Depth (ft)     *         *    9.09  *         *
* Conv. Total (cfs)     *390862.9  * Conv. (cfs)          *         *390862.9  *         *
* Length Wtd. (ft)      *  293.94  * Wetted Per. (ft)     *         *  213.87  *         *
* Min Ch El (ft)        * 2488.00  * Shear (lb/sq ft)     *         *    3.65  *         *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *       *   62.61  *         *
* Frctn Loss (ft)       *    1.71  * Cum Volume (acre-ft)  *         *   27.76  *         *
* C & E Loss (ft)       *    0.31  * Cum SA (acres)        *         *    3.11  *         *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
      program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
      additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
      section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
      depth, the calculated water surface came back below critical depth.  This indicates that there
      is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 150
```

INPUT
Description:
Station Elevation Data num= 45

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2502 | 5.17 | 2502 | 78.66 | 2501 | 80.48 | 2500 | 82.44 | 2499 |
| 84.42 | 2498 | 86.47 | 2497 | 88.46 | 2496 | 89.72 | 2495 | 90.74 | 2494 |
| 91.74 | 2493 | 92.69 | 2492 | 93.73 | 2491 | 94.75 | 2490 | 98.28 | 2490 |
| 121.34 | 2490 | 132.11 | 2489 | 166.11 | 2488 | 187.4 | 2487 | 202.02 | 2487 |
| 223.82 | 2488 | 232.74 | 2488 | 240.06 | 2487 | 247.43 | 2486 | 277.52 | 2486 |
| 287.44 | 2486 | 306.44 | 2486 | 307.2 | 2487 | 308.07 | 2488 | 308.9 | 2489 |
| 309.76 | 2490 | 310.62 | 2491 | 311.49 | 2492 | 312.38 | 2493 | 313.3 | 2494 |
| 314.16 | 2495 | 315.65 | 2496 | 318.39 | 2497 | 320.97 | 2498 | 323.2 | 2499 |
| 325.71 | 2500 | 331.93 | 2501 | 340.78 | 2502 | 358.61 | 2502 | 358.9 | 2502 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 78.66 | .03 | 340.78 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 78.66 | 340.78 | 283 | 287.45 | 289.16 | .1 | .3 |

CROSS SECTION OUTPUT Profile #100 year

| | | | | |
|---|---|---|---|---|
| E.G. Elev (ft) | 2500.77 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.55 | Wt. n-Val. | | 0.030 | |
| W.S. Elev (ft) | 2497.22 | Reach Len. (ft) | 283.00 | 287.45 | 289.16 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 2117.85 | |
| E.G. Slope (ft/ft) | 0.005119 | Area (sq ft) | | 2117.85 | |
| Q Total (cfs) | 32000.00 | Flow (cfs) | | 32000.00 | |
| Top Width (ft) | 232.94 | Top Width (ft) | | 232.94 | |
| Vel Total (ft/s) | 15.11 | Avg. Vel. (ft/s) | | 15.11 | |
| Max Chl Dpth (ft) | 11.22 | Hydr. Depth (ft) | | 9.09 | |
| Conv. Total (cfs) | 447262.3 | Conv. (cfs) | | 447262.3 | |
| Length Wtd. (ft) | 287.45 | Wetted Per. (ft) | | 240.55 | |
| Min Ch El (ft) | 2486.00 | Shear (lb/sq ft) | | 2.81 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 42.51 | |
| Frctn Loss (ft) | 1.45 | Cum Volume (acre-ft) | | 14.32 | |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | | 1.63 | |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 44

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

```
     0   2501   59.43    2500   74.75    2499   76.67    2498    78.5    2497
  84.73    2496   90.07    2495   93.09    2494   95.46    2493   97.85    2492
 100.17    2491   102.5    2490  112.09    2489  135.78    2488  158.68    2487
 184.75    2487  186.54    2487  239.34    2486  254.14    2486   259.3    2487
 261.93    2487  262.97    2486   265.1    2485  284.74    2484  320.02    2484
 320.83    2485  321.62    2486  322.41    2487  324.25    2488  325.51    2489
 326.78    2490  328.08    2491  329.34    2492  330.57    2493  331.84    2494
 336.11    2495  345.88    2496  348.18    2497  350.24    2498  351.98    2499
 353.85    2500  408.32    2501     453    2502  457.38    2502

Manning's n Values        num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
     0    .045   59.43     .03  353.85     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
        59.43  353.85            .1       .3

CROSS SECTION OUTPUT  Profile #100 year
*************************************************************************************************
* E.G. Elev (ft)         * 2499.21  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.22  * Wt. n-Val.            *          *   0.030  *          *
* W.S. Elev (ft)         * 2496.00  * Reach Len. (ft)       *          *          *          *
* Crit W.S. (ft)         * 2495.07  * Flow Area (sq ft)     *          * 2223.50  *          *
* E.G. Slope (ft/ft)     *0.005001  * Area (sq ft)          *          * 2223.50  *          *
* Q Total (cfs)          *32000.00  * Flow (cfs)            *          *32000.00  *          *
* Top Width (ft)         *  261.12  * Top Width (ft)        *          *  261.12  *          *
* Vel Total (ft/s)       *   14.39  * Avg. Vel. (ft/s)      *          *   14.39  *          *
* Max Chl Dpth (ft)      *   12.00  * Hydr. Depth (ft)      *          *    8.52  *          *
* Conv. Total (cfs)      *452480.5  * Conv. (cfs)           *          *452480.5  *          *
* Length Wtd. (ft)       *          * Wetted Per. (ft)      *          *  267.00  *          *
* Min Ch El (ft)         * 2484.00  * Shear (lb/sq ft)      *          *    2.60  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   37.42  *          *
* Frctn Loss (ft)        *          * Cum Volume (acre-ft)  *          *          *          *
* C & E Loss (ft)        *          * Cum SA (acres)        *          *          *          *
*************************************************************************************************

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

SUMMARY OF MANNING'S N VALUES

River:River #1
*****************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *
*****************************************************************
*Reach #1        *    1600        *    .055*     .03*     .55*
*Reach #1        *    1500        *    .055*     .03*    .055*
*Reach #1        *    1450        *    .055*     .03*    .055*
*Reach #1        *    1400        *    .055*     .03*    .055*
*Reach #1        *    1350        *    .055*     .03*    .055*
*Reach #1        *    1325        *Bridge   *       *       *
*Reach #1        *    1300        *    .055*     .03*    .055*
*Reach #1        *    1230        *     .05*     .03*     .05*
*Reach #1        *    1220        *     .05*     .03*     .05*
*Reach #1        *    1200        *     .05*     .03*     .05*
*Reach #1        *    1120        *     .05*     .03*     .05*
```

| | | | | | | |
|---|---|---|---|---|---|---|
| *Reach #1 | * | 1110 | * | .05* | .03* | .05* |
| *Reach #1 | * | 1100 | * | .05* | .03* | .05* |
| *Reach #1 | * | 1050 | * | .05* | .03* | .05* |
| *Reach #1 | * | 1010 | * | .05* | .03* | .05* |
| *Reach #1 | * | 1000 | * | .05* | .03* | .05* |
| *Reach #1 | * | 990 | * | .05* | .03* | .05* |
| *Reach #1 | * | 975 | * | .05* | .03* | .05* |
| *Reach #1 | * | 965 | * | .05* | .03* | .05* |
| *Reach #1 | * | 950 | * | .05* | .03* | .05* |
| *Reach #1 | * | 900 | * | .05* | .03* | .05* |
| *Reach #1 | * | 875 | * | .05* | .03* | .05* |
| *Reach #1 | * | 865 | * | .05* | .03* | .05* |
| *Reach #1 | * | 850 | * | .05* | .03* | .05* |
| *Reach #1 | * | 825 | * | .05* | .03* | .05* |
| *Reach #1 | * | 800 | * | .05* | .03* | .05* |
| *Reach #1 | * | 750 | * | .05* | .03* | .05* |
| *Reach #1 | * | 700 | * | .05* | .03* | .05* |
| *Reach #1 | * | 650 | * | .05* | .03* | .05* |
| *Reach #1 | * | 600 | * | .05* | .03* | .05* |
| *Reach #1 | * | 550 | * | .05* | .03* | .05* |
| *Reach #1 | * | 500 | * | .05* | .03* | .05* |
| *Reach #1 | * | 450 | * | .05* | .03* | .05* |
| *Reach #1 | * | 400 | * | .05* | .03* | .05* |
| *Reach #1 | * | 350 | * | .05* | .03* | .05* |
| *Reach #1 | * | 325 | * | .05* | .03* | .05* |
| *Reach #1 | * | 300 | * | .05* | .03* | .05* |
| *Reach #1 | * | 295 | *Bridge | * | * | * |
| *Reach #1 | * | 290 | * | .045* | .03* | .04* |
| *Reach #1 | * | 275 | * | .045* | .03* | .04* |
| *Reach #1 | * | 200 | * | .045* | .03* | .04* |
| *Reach #1 | * | 150 | * | .05* | .03* | .05* |
| *Reach #1 | * | 100 | * | .045* | .03* | .04* |

SUMMARY OF REACH LENGTHS

River: River #1

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| *Reach #1 | * 1600 | * 714.82* | 679.46* | 667.01* |
| *Reach #1 | * 1500 | * 249.54* | 214.53* | 208.71* |
| *Reach #1 | * 1450 | * 208.29* | 198.71* | 196.74* |
| *Reach #1 | * 1400 | * 208.05* | 211.15* | 211.03* |
| *Reach #1 | * 1350 | * 267.52* | 277.24* | 286.29* |
| *Reach #1 | * 1325 | *Bridge * | * | * |
| *Reach #1 | * 1300 | * 385.44* | 383.38* | 385.44* |
| *Reach #1 | * 1230 | * 47.48* | 47.44* | 47.31* |
| *Reach #1 | * 1220 | * 415.98* | 411.79* | 408.49* |
| *Reach #1 | * 1200 | * 57.6* | 56.56* | 56.61* |
| *Reach #1 | * 1120 | * 440.13* | 443.73* | 447.38* |
| *Reach #1 | * 1110 | * 46.86* | 36.39* | 42.45* |
| *Reach #1 | * 1100 | * 294* | 294* | 294* |
| *Reach #1 | * 1050 | * 162* | 162* | 162* |

| | | | | | |
|---|---|---|---|---|---|
| *Reach #1 | * | 1010 | * | 111.18* | 71.92* | 89.39* |
| *Reach #1 | * | 1000 | * | 147* | 147* | 147* |
| *Reach #1 | * | 990 | * | 168* | 168* | 168* |
| *Reach #1 | * | 975 | * | 151* | 151* | 151* |
| *Reach #1 | * | 965 | * | 148* | 148* | 148* |
| *Reach #1 | * | 950 | * | 216.27* | 206.23* | 199.7* |
| *Reach #1 | * | 900 | * | 159.29* | 151.89* | 152.98* |
| *Reach #1 | * | 875 | * | 143* | 143* | 143* |
| *Reach #1 | * | 865 | * | 153* | 153* | 153* |
| *Reach #1 | * | 850 | * | 199.44* | 201.98* | 207.35* |
| *Reach #1 | * | 825 | * | 112.29* | 110.49* | 112.71* |
| *Reach #1 | * | 800 | * | 269.66* | 259.43* | 283.94* |
| *Reach #1 | * | 750 | * | 249.08* | 245.16* | 242.37* |
| *Reach #1 | * | 700 | * | 293.91* | 294.12* | 299.31* |
| *Reach #1 | * | 650 | * | 225.88* | 219.62* | 226.45* |
| *Reach #1 | * | 600 | * | 296.17* | 292.59* | 291.63* |
| *Reach #1 | * | 550 | * | 174.17* | 170.22* | 169.02* |
| *Reach #1 | * | 500 | * | 312.56* | 311.97* | 314.78* |
| *Reach #1 | * | 450 | * | 276.48* | 275.96* | 282* |
| *Reach #1 | * | 400 | * | 248.4* | 246.38* | 244.38* |
| *Reach #1 | * | 350 | * | 102* | 102* | 102* |
| *Reach #1 | * | 325 | * | 128* | 128* | 128* |
| *Reach #1 | * | 300 | * | 142.87* | 142.74* | 142.86* |
| *Reach #1 | * | 295 | *Bridge | * | * | * |
| *Reach #1 | * | 290 | * | 85* | 85* | 85* |
| *Reach #1 | * | 275 | * | 264* | 264* | 264* |
| *Reach #1 | * | 200 | * | 273.87* | 293.94* | 300.79* |
| *Reach #1 | * | 150 | * | 283* | 287.45* | 289.16* |
| *Reach #1 | * | 100 | * | * | * | * |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| *Reach #1 | * 1600 | * .1* | .3* |
| *Reach #1 | * 1500 | * .1* | .3* |
| *Reach #1 | * 1450 | * .1* | .3* |
| *Reach #1 | * 1400 | * .1* | .3* |
| *Reach #1 | * 1350 | * .1* | .3* |
| *Reach #1 | * 1325 | *Bridge * | * |
| *Reach #1 | * 1300 | * .1* | .3* |
| *Reach #1 | * 1230 | * .1* | .3* |
| *Reach #1 | * 1220 | * .1* | .3* |
| *Reach #1 | * 1200 | * .1* | .3* |
| *Reach #1 | * 1120 | * .1* | .3* |
| *Reach #1 | * 1110 | * .1* | .3* |
| *Reach #1 | * 1100 | * .1* | .3* |
| *Reach #1 | * 1050 | * .1* | .3* |
| *Reach #1 | * 1010 | * .1* | .3* |
| *Reach #1 | * 1000 | * .1* | .3* |
| *Reach #1 | * 990 | * .1* | .3* |

*Reach #1 * 975 * .1* .3*
*Reach #1 * 965 * .1* .3*
*Reach #1 * 950 * .1* .3*
*Reach #1 * 900 * .1* .3*
*Reach #1 * 875 * .1* .3*
*Reach #1 * 865 * .1* .3*
*Reach #1 * 850 * .1* .3*
*Reach #1 * 825 * .1* .3*
*Reach #1 * 800 * .1* .3*
*Reach #1 * 750 * .1* .3*
*Reach #1 * 700 * .1* .3*
*Reach #1 * 650 * .1* .3*
*Reach #1 * 600 * .1* .3*
*Reach #1 * 550 * .1* .3*
*Reach #1 * 500 * .1* .3*
*Reach #1 * 450 * .1* .3*
*Reach #1 * 400 * .1* .3*
*Reach #1 * 350 * .1* .3*
*Reach #1 * 325 * .1* .3*
*Reach #1 * 300 * .1* .3*
*Reach #1 * 295 *Bridge * *
*Reach #1 * 290 * .1* .3*
*Reach #1 * 275 * .1* .3*
*Reach #1 * 200 * .1* .3*
*Reach #1 * 150 * .1* .3*
*Reach #1 * 100 * .1* .3*
**********

Profile Output Table - Standard Table 1
**********
**********
* Reach * River Sta * Profile * Q Total * Min Ch El * W.S. Elev * Crit W.S. * E.G. Elev * E.G. Slope * Vel Chnl * Flow Area * Top Width * Froude # Chl *
* * * * (cfs) * (ft) * (ft) * (ft) * (ft) * (ft/ft) * (ft/s) * (sq ft) * (ft) * *
**********
**********
* Reach #1 * 1600 * 100 year * 32000.00 * 2540.00 * 2562.66 * * 2562.92 * 0.000147 * 4.13 * 7902.08 * 449.02 * 0.17 *
* Reach #1 * 1500 * 100 year * 32000.00 * 2532.00 * 2562.73 * * 2562.82 * 0.000044 * 2.62 * 15774.28 * 873.22 * 0.10 *
* Reach #1 * 1450 * 100 year * 32000.00 * 2531.00 * 2562.61 * * 2562.80 * 0.000073 * 3.52 * 9633.26 * 391.36 * 0.12 *
* Reach #1 * 1400 * 100 year * 32000.00 * 2530.00 * 2562.62 * * 2562.78 * 0.000057 * 3.38 * 11722.12 * 810.24 * 0.11 *
* Reach #1 * 1350 * 100 year * 32000.00 * 2530.00 * 2562.57 * 2540.43 * 2562.76 * 0.000066 * 3.56 * 9443.47 * 348.11 * 0.12 *
* Reach #1 * 1325 * * Bridge * * * * * * * * *
* Reach #1 * 1300 * 100 year * 32000.00 * 2529.00 * 2562.49 * * 2562.63 * 0.000051 * 3.17 * 11937.77 * 506.55 * 0.10 *
* Reach #1 * 1230 * 100 year * 32000.00 * 2529.00 * 2562.49 * * 2562.61 * 0.000037 * 3.01 * 14090.96 * 522.09 * 0.09 *
* Reach #1 * 1220 * 100 year * 32000.00 * 2527.00 * 2562.50 * * 2562.60 * 0.000032 * 2.85 * 14793.73 * 514.10 * 0.09 *
* Reach #1 * 1200 * 100 year * 32000.00 * 2526.00 * 2562.48 * * 2562.59 * 0.000030 * 2.85 * 13575.14 * 443.87 * 0.08 *

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| * Reach #1 | * 1120 | * 100 year | * 32000.00 | * 2524.00 | * 2562.53 | * | * 2562.57 | * 0.000013 | * 1.95 | * 24666.61 | * 868.76 | * 0.06 * |
| * Reach #1 | * 1110 | * 100 year | * 32000.00 | * 2523.00 | * 2562.49 | * | * 2562.56 | * 0.000019 | * 2.43 | * 18435.67 | * 590.04 | * 0.07 * |
| * Reach #1 | * 1100 | * 100 year | * 32000.00 | * 2520.00 | * 2547.50 | * 2547.50 | * 2561.19 | * 0.004332 | * 29.70 | * 1077.55 | * 527.91 | * 1.00 * |
| * Reach #1 | * 1050 | * 100 year | * 32000.00 | * 2519.00 | * 2528.34 | * 2528.34 | * 2532.29 | * 0.006777 | * 15.94 | * 2008.14 | * 254.74 | * 1.00 * |
| * Reach #1 | * 1010 | * 100 year | * 32000.00 | * 2519.00 | * 2526.64 | * 2526.64 | * 2530.12 | * 0.006991 | * 14.97 | * 2137.81 | * 307.34 | * 1.00 * |
| * Reach #1 | * 1000 | * 100 year | * 32000.00 | * 2513.00 | * 2524.83 | * | * 2527.07 | * 0.003073 | * 12.01 | * 2664.29 | * 287.00 | * 0.69 * |
| * Reach #1 | * 990 | * 100 year | * 32000.00 | * 2509.00 | * 2524.55 | * | * 2526.62 | * 0.002502 | * 11.54 | * 2773.44 | * 268.36 | * 0.63 * |
| * Reach #1 | * 975 | * 100 year | * 32000.00 | * 2508.00 | * 2523.80 | * | * 2526.14 | * 0.002863 | * 12.28 | * 2606.25 | * 250.34 | * 0.67 * |
| * Reach #1 | * 965 | * 100 year | * 32000.00 | * 2508.00 | * 2523.80 | * | * 2525.65 | * 0.001834 | * 10.90 | * 2935.87 | * 243.44 | * 0.55 * |
| * Reach #1 | * 950 | * 100 year | * 32000.00 | * 2508.00 | * 2523.23 | * | * 2525.33 | * 0.002113 | * 11.62 | * 2752.84 | * 227.80 | * 0.59 * |
| * Reach #1 | * 900 | * 100 year | * 32000.00 | * 2507.00 | * 2522.41 | * | * 2524.84 | * 0.002357 | * 12.62 | * 2734.08 | * 308.46 | * 0.63 * |
| * Reach #1 | * 875 | * 100 year | * 32000.00 | * 2507.00 | * 2519.10 | * 2519.10 | * 2524.04 | * 0.006381 | * 17.82 | * 1795.29 | * 183.02 | * 1.00 * |
| * Reach #1 | * 865 | * 100 year | * 32000.00 | * 2507.00 | * 2518.51 | * 2518.51 | * 2522.92 | * 0.006684 | * 16.84 | * 1901.20 | * 223.03 | * 1.00 * |
| * Reach #1 | * 850 | * 100 year | * 32000.00 | * 2506.00 | * 2518.39 | * | * 2520.32 | * 0.002612 | * 11.15 | * 2870.84 | * 302.77 | * 0.64 * |
| * Reach #1 | * 825 | * 100 year | * 32000.00 | * 2505.00 | * 2517.93 | * | * 2519.76 | * 0.002628 | * 10.84 | * 2952.84 | * 329.33 | * 0.64 * |
| * Reach #1 | * 800 | * 100 year | * 32000.00 | * 2505.00 | * 2517.30 | * | * 2519.41 | * 0.003065 | * 11.67 | * 2742.08 | * 304.82 | * 0.69 * |
| * Reach #1 | * 750 | * 100 year | * 32000.00 | * 2503.00 | * 2515.69 | * | * 2518.49 | * 0.003542 | * 13.42 | * 2385.26 | * 240.37 | * 0.75 * |
| * Reach #1 | * 700 | * 100 year | * 32000.00 | * 2502.00 | * 2515.47 | * | * 2517.57 | * 0.002424 | * 11.63 | * 2751.07 | * 258.19 | * 0.63 * |
| * Reach #1 | * 650 | * 100 year | * 32000.00 | * 2501.00 | * 2512.76 | * 2512.76 | * 2516.29 | * 0.007050 | * 15.07 | * 2123.45 | * 305.54 | * 1.01 * |
| * Reach #1 | * 600 | * 100 year | * 32000.00 | * 2500.00 | * 2510.40 | * 2510.40 | * 2513.97 | * 0.007009 | * 15.18 | * 2108.65 | * 299.45 | * 1.01 * |
| * Reach #1 | * 550 | * 100 year | * 32000.00 | * 2498.00 | * 2507.96 | * 2507.33 | * 2511.19 | * 0.005387 | * 14.42 | * 2219.50 | * 274.92 | * 0.89 * |
| * Reach #1 | * 500 | * 100 year | * 32000.00 | * 2498.00 | * 2507.18 | * 2506.38 | * 2510.25 | * 0.005021 | * 14.07 | * 2273.98 | * 277.51 | * 0.87 * |
| * Reach #1 | * 450 | * 100 year | * 32000.00 | * 2496.00 | * 2506.53 | * | * 2508.71 | * 0.003383 | * 11.87 | * 2695.67 | * 314.76 | * 0.71 * |
| * Reach #1 | * 400 | * 100 year | * 32000.00 | * 2494.00 | * 2505.69 | * | * 2507.80 | * 0.003061 | * 11.64 | * 2748.01 | * 306.13 | * 0.68 * |
| * Reach #1 | * 350 | * 100 year | * 32000.00 | * 2492.00 | * 2505.08 | * | * 2507.08 | * 0.002571 | * 11.35 | * 2819.05 | * 281.66 | * 0.63 * |
| * Reach #1 | * 325 | * 100 year | * 32000.00 | * 2492.00 | * 2504.10 | * | * 2506.71 | * 0.003597 | * 12.97 | * 2468.15 | * 258.62 | * 0.74 * |
| * Reach #1 | * 300 | * 100 year | * 32000.00 | * 2491.00 | * 2503.67 | * 2501.60 | * 2506.25 | * 0.003362 | * 12.91 | * 2477.95 | * 250.23 | * 0.72 * |
| * Reach #1 | * 295 | * | * Bridge | * | * | * | * | * | * | * | * | * |

* Reach #1 * 290 * 100 year * 32000.00 * 2490.00 * 2502.81 * * 2505.16 * 0.002870 * 12.31 * 2599.80 * 251.96 * 0.68 *
* Reach #1 * 275 * 100 year * 32000.00 * 2490.00 * 2502.00 * * 2504.83 * 0.003688 * 13.52 * 2367.30 * 241.03 * 0.76 *
* Reach #1 * 200 * 100 year * 32000.00 * 2488.00 * 2498.80 * 2498.80 * 2503.38 * 0.006703 * 17.17 * 1863.60 * 204.92 * 1.00 *
* Reach #1 * 150 * 100 year * 32000.00 * 2486.00 * 2497.22 * * 2500.77 * 0.005119 * 15.11 * 2117.85 * 232.94 * 0.88 *
* Reach #1 * 100 * 100 year * 32000.00 * 2484.00 * 2496.00 * 2495.07 * 2499.21 * 0.005001 * 14.39 * 2223.50 * 261.12 * 0.87 *
**********

Profile Output Table - Standard Table 2
**********
* Reach * River Sta * Profile * E.G. Elev * W.S. Elev * Vel Head * Frctn Loss * C & E Loss * Q Left * Q Channel * Q Right * Top Width *
* * * * (ft) * (ft) * (ft) * (ft) * (ft) * (cfs) * (cfs) * (cfs) * (ft) *
**********
* Reach #1 * 1600 * 100 year * 2562.92 * 2562.66 * 0.27 * 0.05 * 0.05 * 11.23 * 31972.83 * 15.94 * 449.02 *
* Reach #1 * 1500 * 100 year * 2562.82 * 2562.73 * 0.09 * 0.01 * 0.01 * 4059.37 * 26652.39 * 1288.24 * 873.22 *
* Reach #1 * 1450 * 100 year * 2562.80 * 2562.61 * 0.19 * 0.01 * 0.01 * 1066.86 * 30933.14 * * 391.36 *
* Reach #1 * 1400 * 100 year * 2562.78 * 2562.62 * 0.16 * 0.01 * 0.00 * * 27921.17 * 4078.83 * 810.24 *
* Reach #1 * 1350 * 100 year * 2562.76 * 2562.57 * 0.19 * 0.01 * 0.01 * * 31209.65 * 790.35 * 348.11 *
* Reach #1 * 1325 * * Bridge * * * * * * * * *
* Reach #1 * 1300 * 100 year * 2562.63 * 2562.49 * 0.14 * 0.02 * 0.01 * * 28989.55 * 3010.45 * 506.55 *
* Reach #1 * 1230 * 100 year * 2562.61 * 2562.49 * 0.11 * 0.00 * 0.00 * 3109.80 * 24057.41 * 4832.80 * 522.09 *
* Reach #1 * 1220 * 100 year * 2562.60 * 2562.50 * 0.10 * 0.01 * 0.00 * 1679.21 * 23762.21 * 6558.58 * 514.10 *
* Reach #1 * 1200 * 100 year * 2562.59 * 2562.48 * 0.11 * 0.00 * 0.02 * 3425.58 * 27609.92 * 964.50 * 443.87 *
* Reach #1 * 1120 * 100 year * 2562.57 * 2562.53 * 0.04 * 0.01 * 0.00 * 6290.10 * 18847.12 * 6862.78 * 868.76 *
* Reach #1 * 1110 * 100 year * 2562.56 * 2562.49 * 0.07 * 0.00 * 1.36 * 4810.65 * 22323.52 * 4865.83 * 590.04 *
* Reach #1 * 1100 * 100 year * 2561.19 * 2547.50 * 13.69 * 1.57 * 2.93 * * 32000.00 * * 527.91 *
* Reach #1 * 1050 * 100 year * 2532.29 * 2528.34 * 3.94 * 1.12 * 0.14 * * 32000.00 * * 254.74 *
* Reach #1 * 1010 * 100 year * 2530.12 * 2526.64 * 3.48 * 0.32 * 0.37 * * 32000.00 * * 307.34 *
* Reach #1 * 1000 * 100 year * 2527.07 * 2524.83 * 2.24 * 0.41 * 0.05 * * 32000.00 * * 287.00 *
* Reach #1 * 990 * 100 year * 2526.62 * 2524.55 * 2.07 * 0.45 * 0.03 * * 32000.00 * * 268.36 *
* Reach #1 * 975 * 100 year * 2526.14 * 2523.80 * 2.34 * 0.34 * 0.15 * * 32000.00 * * 250.34 *

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| * Reach #1 | * 965 | * 100 year * | 2525.65 * | 2523.80 * | 1.84 * | 0.29 * | 0.03 * | * 32000.00 * | * 243.44 * | |
| * Reach #1 | * 950 | * 100 year * | 2525.33 * | 2523.23 * | 2.10 * | 0.46 * | 0.03 * | * 32000.00 * | * 227.80 * | |
| * Reach #1 | * 900 | * 100 year * | 2524.84 * | 2522.41 * | 2.43 * | 0.55 * | 0.25 * | * 31385.04 * | 614.96 * | 308.46 * |
| * Reach #1 | * 875 | * 100 year * | 2524.04 * | 2519.10 * | 4.93 * | 0.93 * | 0.16 * | * 32000.00 * | * 183.02 * | |
| * Reach #1 | * 865 | * 100 year * | 2522.92 * | 2518.51 * | 4.41 * | 0.61 * | 0.74 * | * 31998.50 * | 1.51 * | 223.03 * |
| * Reach #1 | * 850 | * 100 year * | 2520.32 * | 2518.39 * | 1.93 * | 0.53 * | 0.03 * | * 32000.00 * | * 302.77 * | |
| * Reach #1 | * 825 | * 100 year * | 2519.76 * | 2517.93 * | 1.82 * | 0.31 * | 0.03 * | * 32000.00 * | * 329.33 * | |
| * Reach #1 | * 800 | * 100 year * | 2519.41 * | 2517.30 * | 2.11 * | 0.85 * | 0.07 * | * 32000.00 * | * 304.82 * | |
| * Reach #1 | * 750 | * 100 year * | 2518.49 * | 2515.69 * | 2.79 * | 0.71 * | 0.21 * | * 32000.00 * | * 240.37 * | |
| * Reach #1 | * 700 | * 100 year * | 2517.57 * | 2515.47 * | 2.10 * | 1.13 * | 0.14 * | * 32000.00 * | * 258.19 * | |
| * Reach #1 | * 650 | * 100 year * | 2516.29 * | 2512.76 * | 3.53 * | 1.54 * | 0.00 * | * 32000.00 * | * 305.54 * | |
| * Reach #1 | * 600 | * 100 year * | 2513.97 * | 2510.40 * | 3.58 * | 1.79 * | 0.10 * | * 32000.00 * | * 299.45 * | |
| * Reach #1 | * 550 | * 100 year * | 2511.19 * | 2507.96 * | 3.23 * | 0.89 * | 0.05 * | * 32000.00 * | * 274.92 * | |
| * Reach #1 | * 500 | * 100 year * | 2510.25 * | 2507.18 * | 3.07 * | 1.27 * | 0.27 * | * 32000.00 * | * 277.51 * | |
| * Reach #1 | * 450 | * 100 year * | 2508.71 * | 2506.53 * | 2.19 * | 0.89 * | 0.02 * | * 32000.00 * | * 314.76 * | |
| * Reach #1 | * 400 | * 100 year * | 2507.80 * | 2505.69 * | 2.11 * | 0.69 * | 0.03 * | * 32000.00 * | * 306.13 * | |
| * Reach #1 | * 350 | * 100 year * | 2507.08 * | 2505.08 * | 2.00 * | 0.31 * | 0.06 * | * 32000.00 * | * 281.66 * | |
| * Reach #1 | * 325 | * 100 year * | 2506.71 * | 2504.10 * | 2.61 * | 0.44 * | 0.01 * | * 32000.00 * | * 258.62 * | |
| * Reach #1 | * 300 | * 100 year * | 2506.25 * | 2503.67 * | 2.59 * | 0.00 * | 0.07 * | * 32000.00 * | * 250.23 * | |
| * Reach #1 | * 295 | * | * Bridge * | * | * | * | * | * | * | * |
| * Reach #1 | * 290 | * 100 year * | 2505.16 * | 2502.81 * | 2.35 * | 0.28 * | 0.05 * | * 32000.00 * | * 251.96 * | |
| * Reach #1 | * 275 | * 100 year * | 2504.83 * | 2502.00 * | 2.84 * | 1.28 * | 0.17 * | * 32000.00 * | * 241.03 * | |
| * Reach #1 | * 200 | * 100 year * | 2503.38 * | 2498.80 * | 4.58 * | 1.71 * | 0.31 * | * 32000.00 * | * 204.92 * | |
| * Reach #1 | * 150 | * 100 year * | 2500.77 * | 2497.22 * | 3.55 * | 1.45 * | 0.10 * | * 32000.00 * | * 232.94 * | |
| * Reach #1 | * 100 | * 100 year * | 2499.21 * | 2496.00 * | 3.22 * | * | * | * 32000.00 * | * 261.12 * | |

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Existing

River: River #1  Reach: Reach #1  RS: 1600  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1  RS: 1500  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: River #1  Reach: Reach #1  RS: 1450  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: River #1  Reach: Reach #1  RS: 1400  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: River #1  Reach: Reach #1  RS: 1350  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1  RS: 1325  Profile: 100 year Downstream
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1  RS: 1300  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: River #1  Reach: Reach #1  RS: 1230  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: River #1  Reach: Reach #1  RS: 1220  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: River #1  Reach: Reach #1  RS: 1200  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1  RS: 1120  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: River #1  Reach: Reach #1  RS: 1110  Profile: 100 year
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
the need for additional cross sections.
River: River #1  Reach: Reach #1  RS: 1100  Profile: 100 year
Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
for the water surface and continued on with the calculations.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning:The cross section had to be extended vertically during the critical depth calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 1050 Profile: 100 year
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 1010 Profile: 100 year
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 900 Profile: 100 year
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 875 Profile: 100 year
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 865 Profile: 100 year
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: River #1 Reach: Reach #1 RS: 800 Profile: 100 year

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

River: River #1 Reach: Reach #1 RS: 750 Profile: 100 year

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

River: River #1 Reach: Reach #1 RS: 700 Profile: 100 year

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

River: River #1 Reach: Reach #1 RS: 650 Profile: 100 year

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: River #1 Reach: Reach #1 RS: 600 Profile: 100 year

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: River #1 Reach: Reach #1 RS: 500 Profile: 100 year

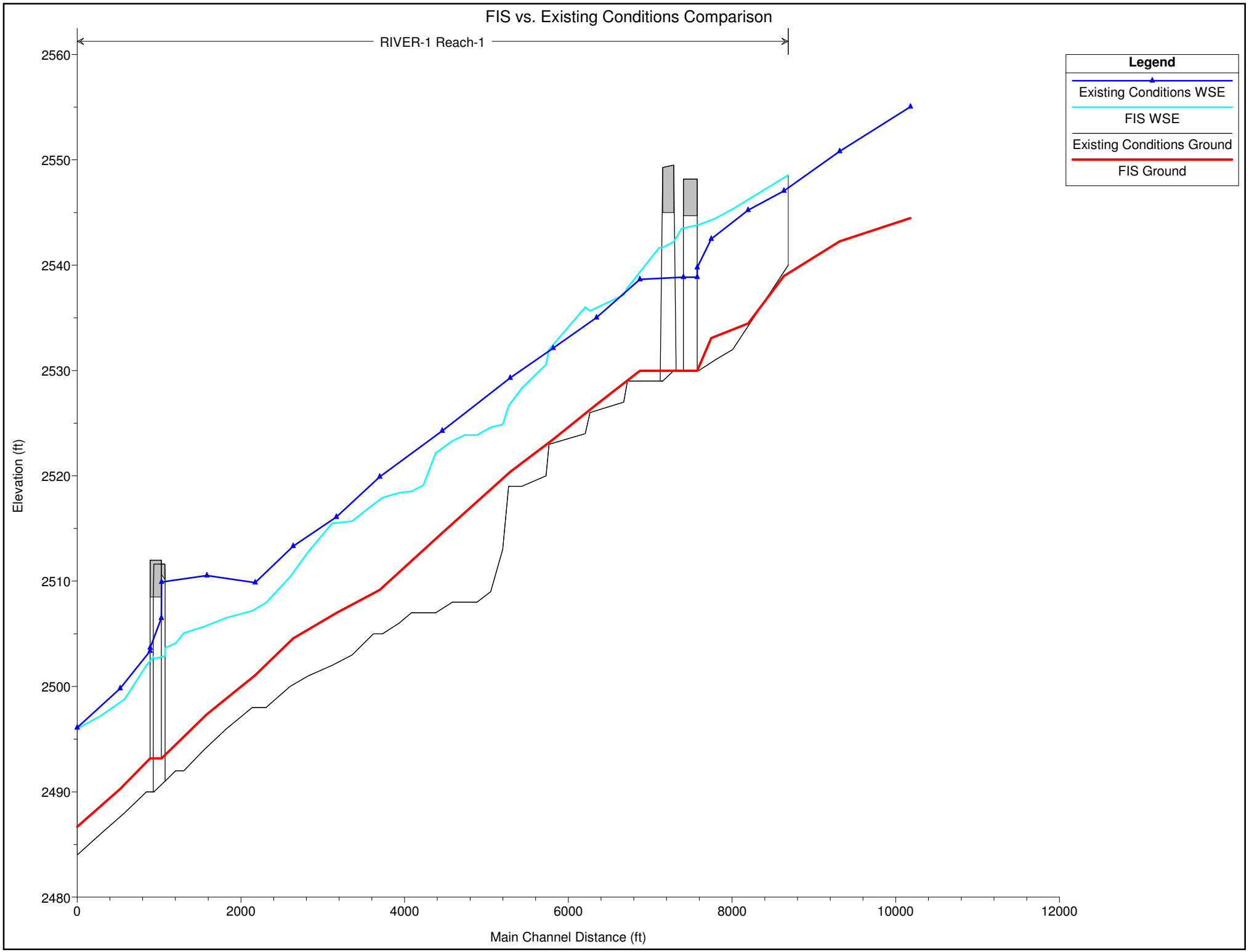
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

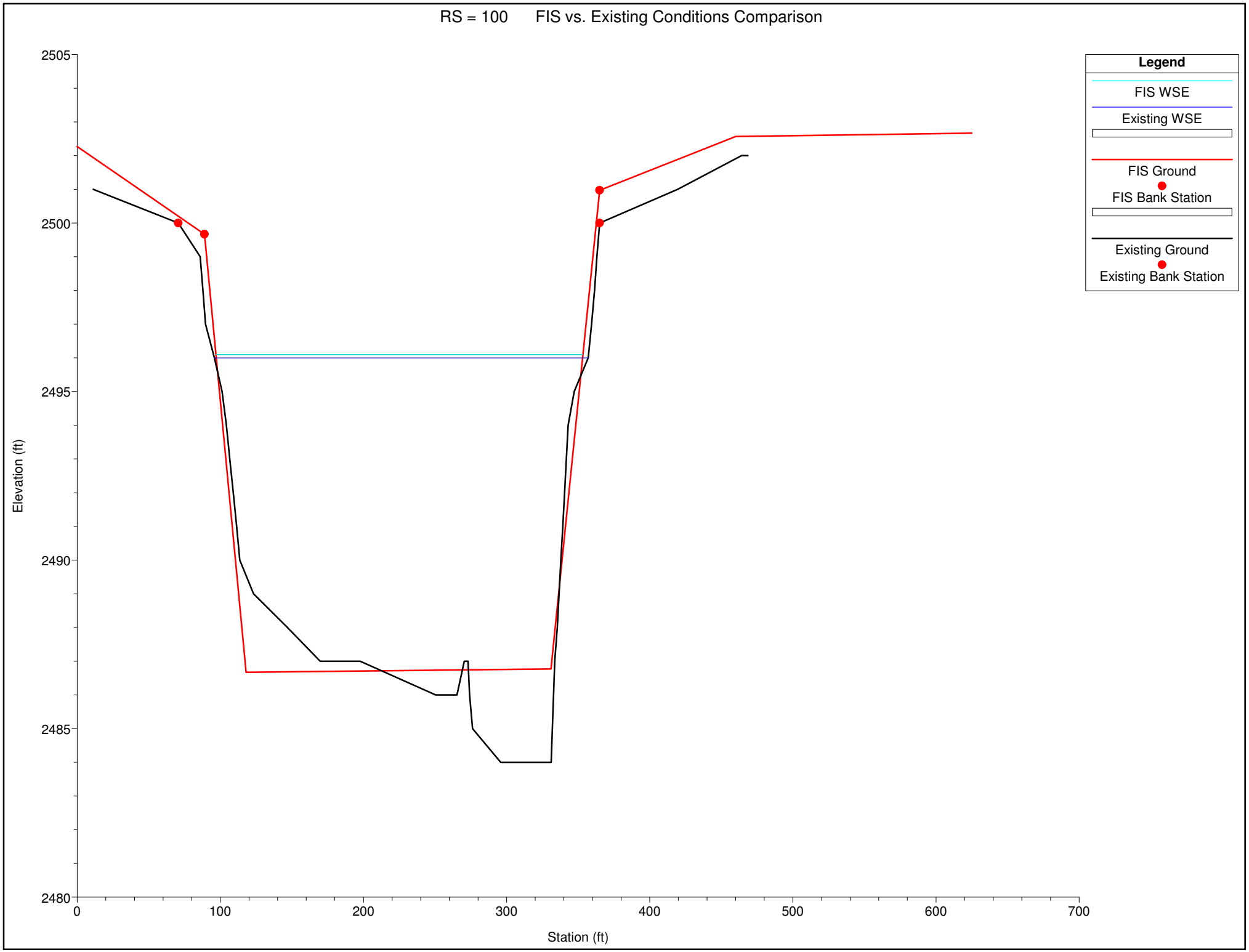
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

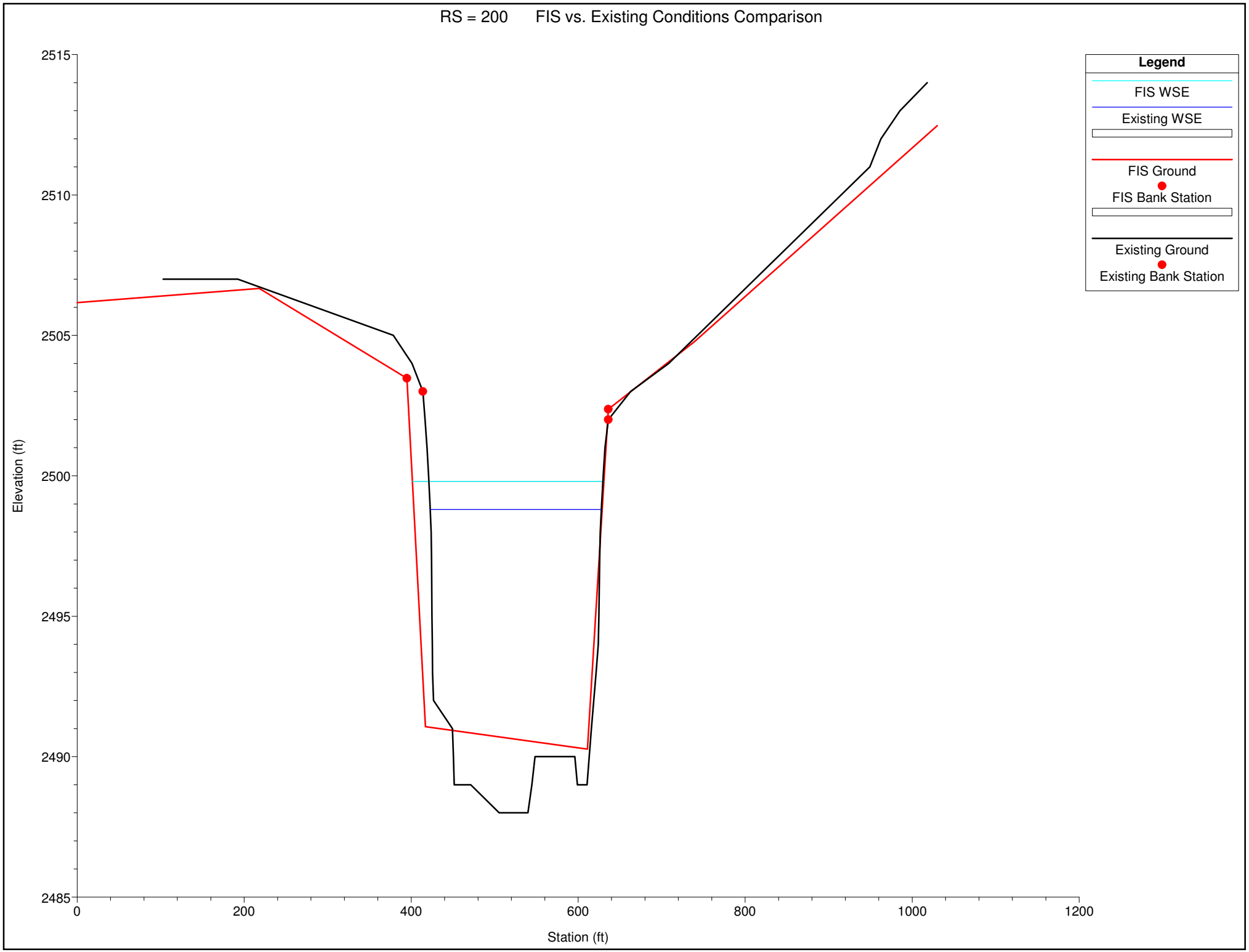
River: River #1 Reach: Reach #1 RS: 350 Profile: 100 year

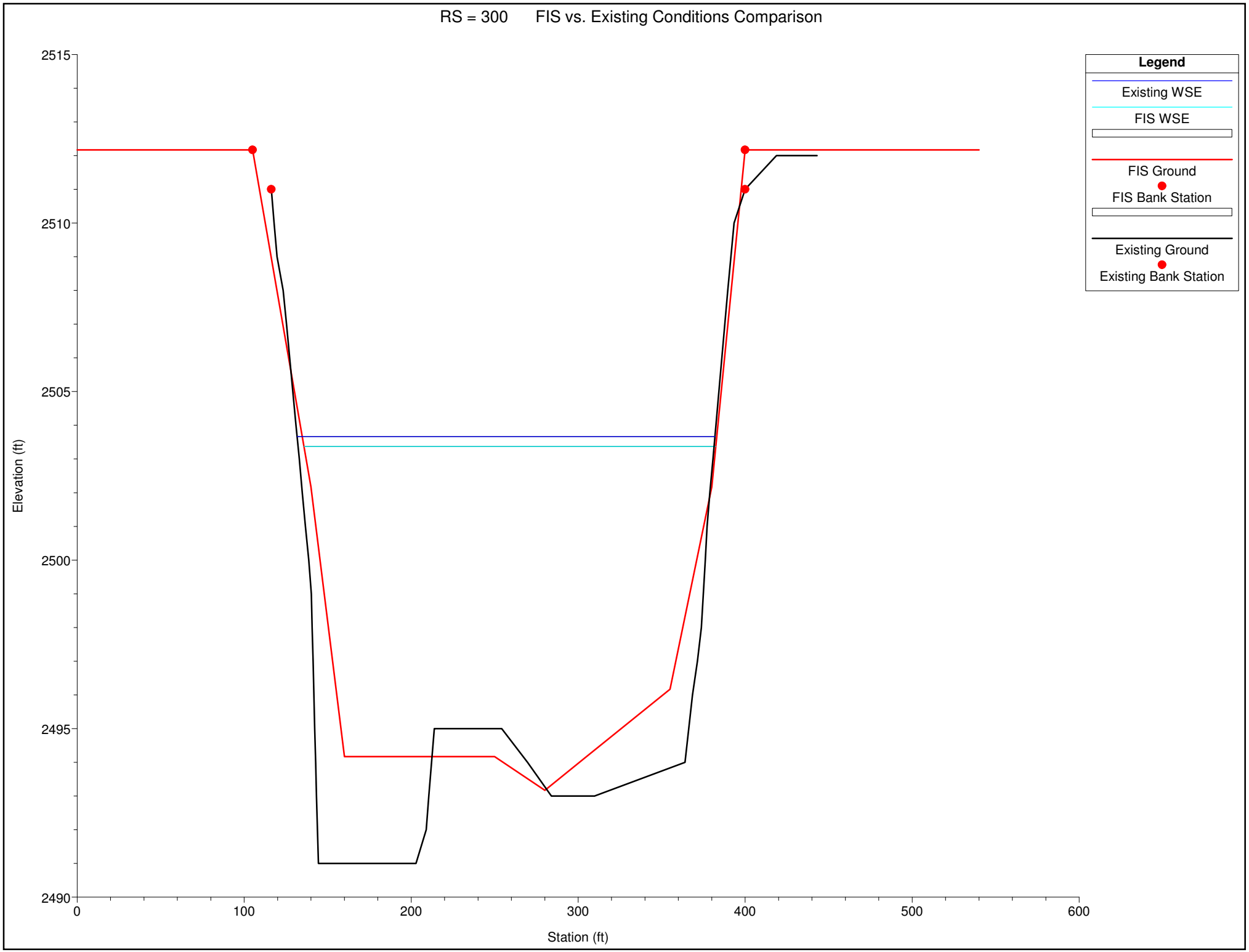
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 300 Profile: 100 year
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 295 Profile: 100 year
Warning:Pier drag coefficient of 2.0 assumed for Class B flow.
River: River #1 Reach: Reach #1 RS: 295 Profile: 100 year Upstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 275 Profile: 100 year
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 200 Profile: 100 year
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: 100 year
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

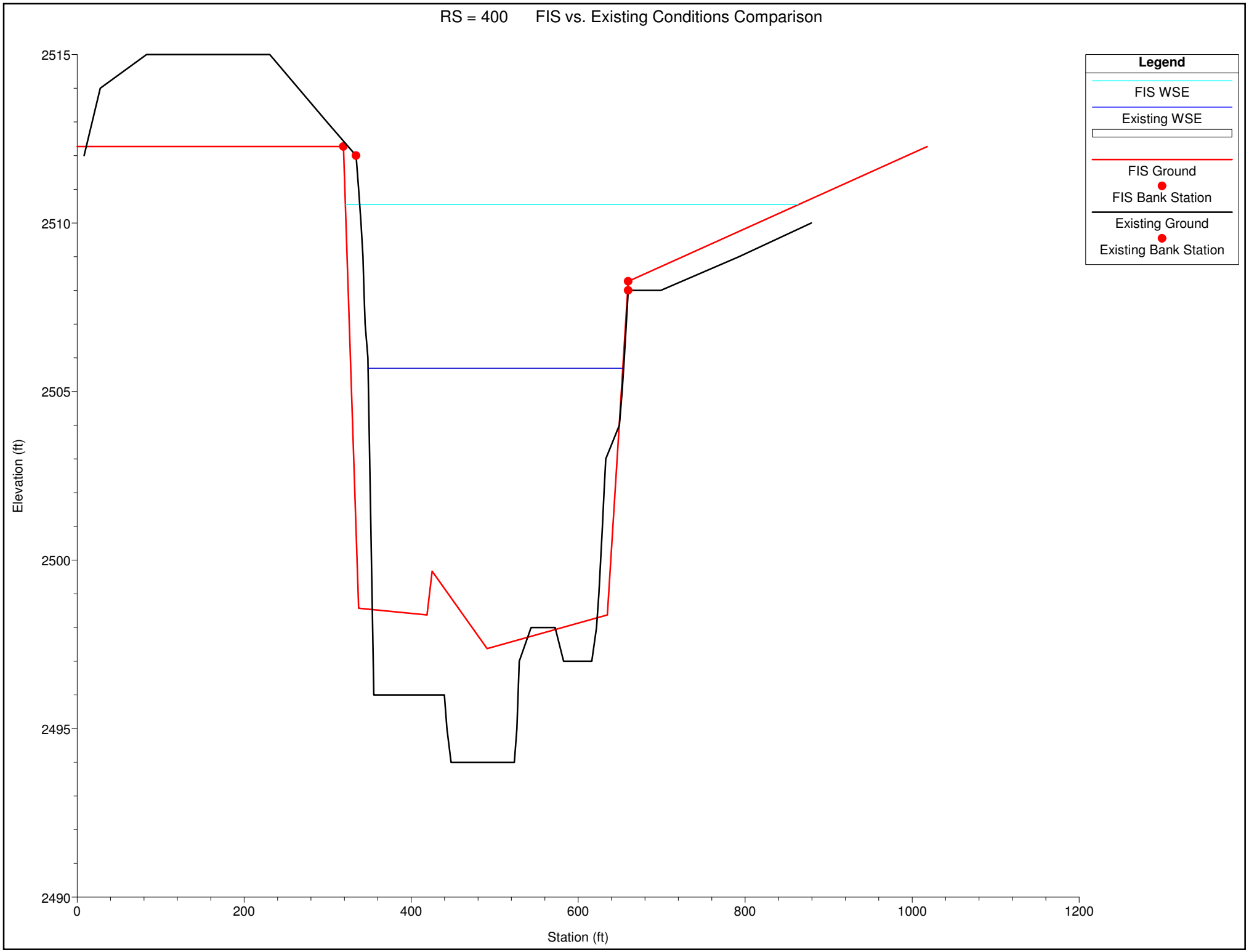
# APPENDIX E.2
# CROSS-SECTION AND PROFILE PLOTS

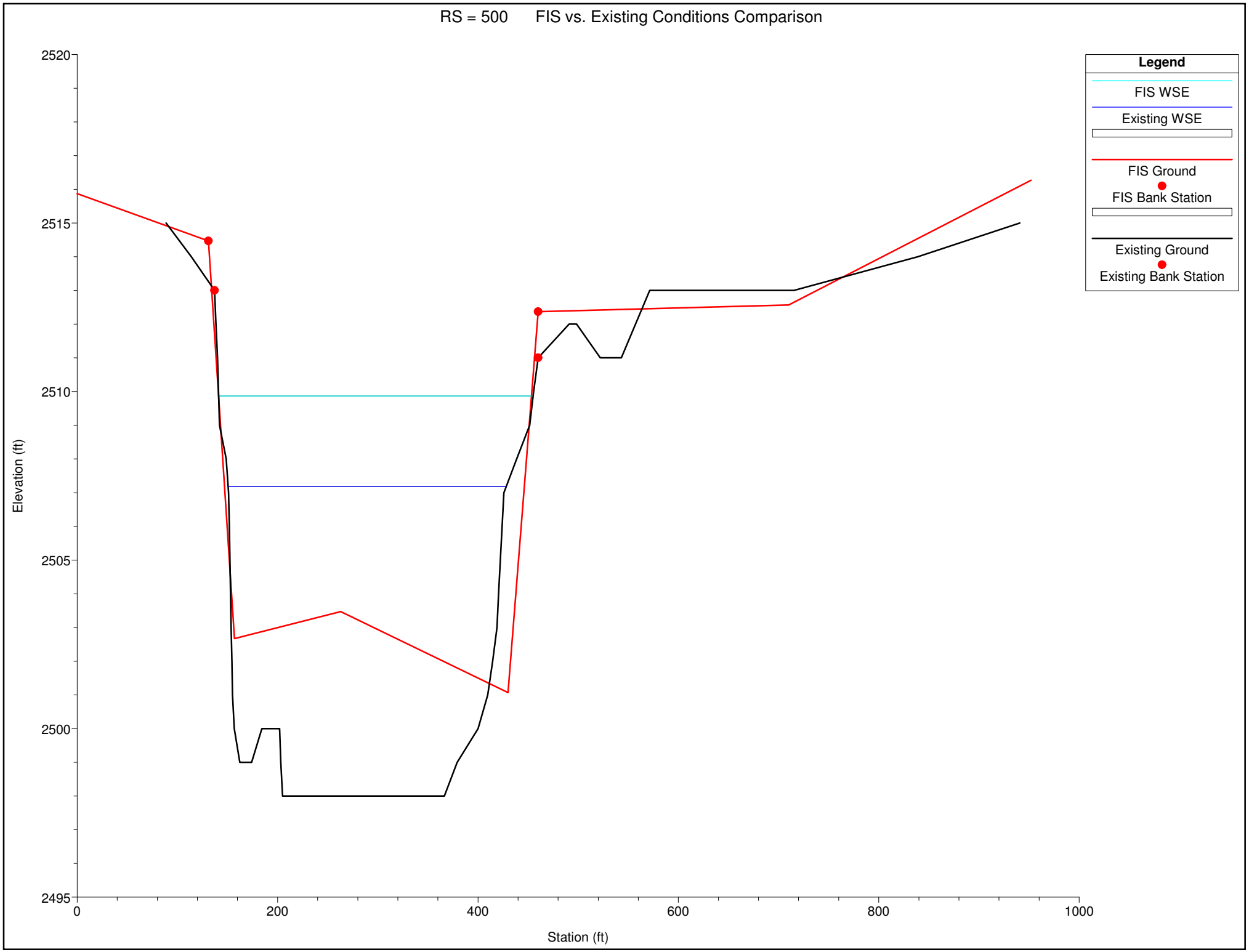

FIS vs. Existing Conditions Comparison
RIVER-1 Reach-1
Legend
Existing Conditions WSE
FIS WSE
Existing Conditions Ground
FIS Ground
Elevation (ft)
2560
2550
2540
2530
2520
2510
2500
2490
2480
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)

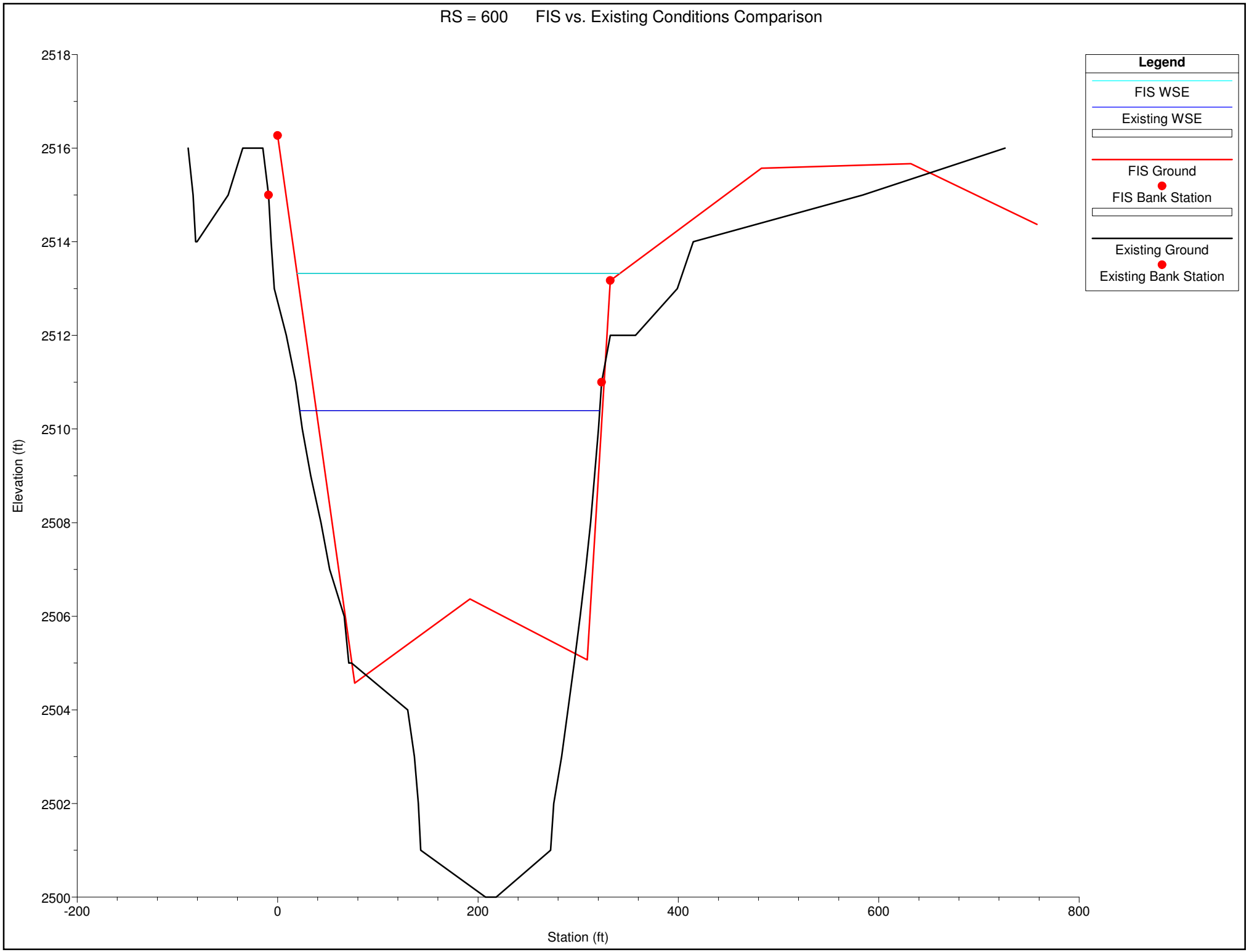

RS = 100 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2505
2500
2495
2490
2485
2480
0
100
200
300
400
500
600
700

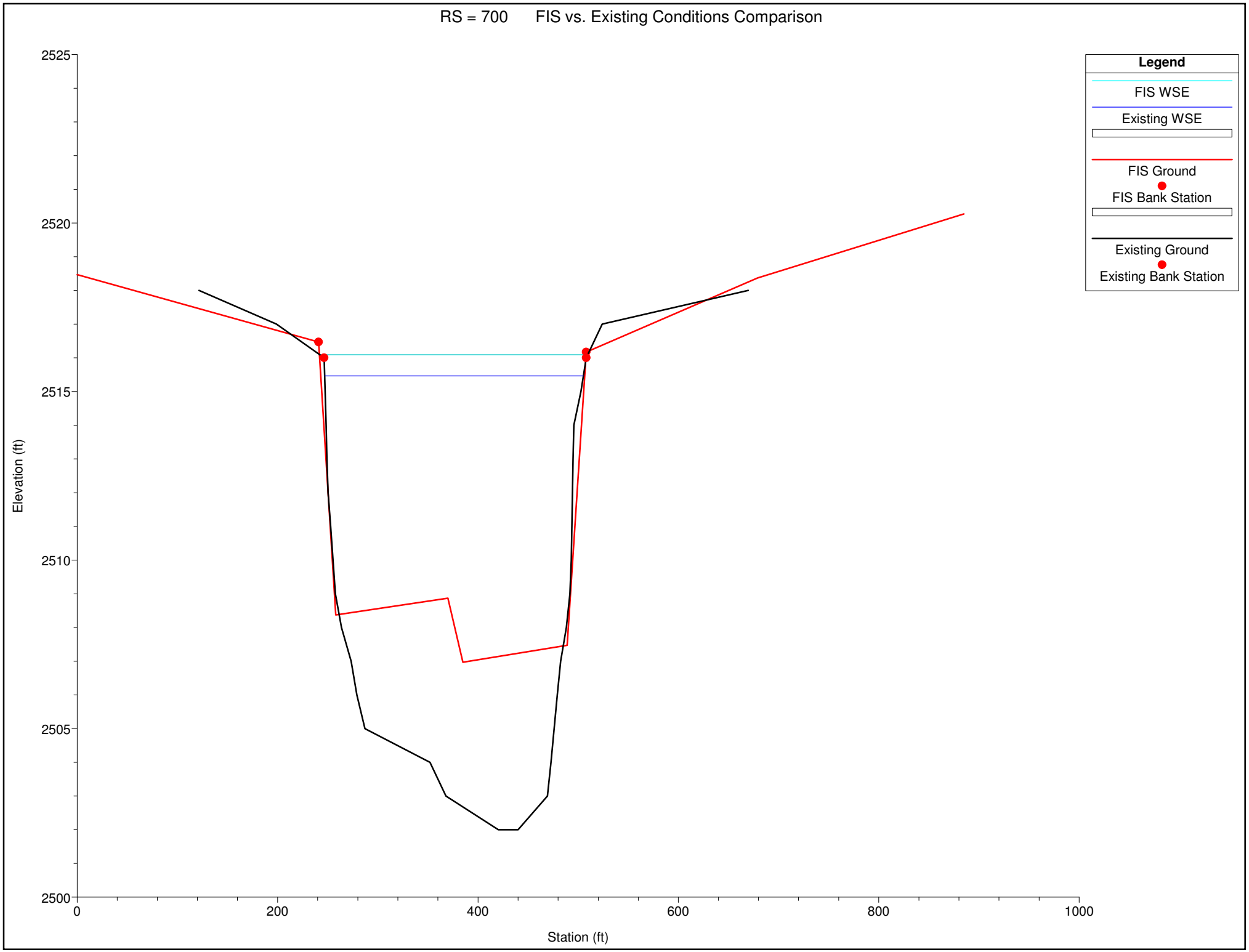

RS = 200 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2515
2510
2505
2500
2495
2490
2485
0
200
400
600
800
1000
1200


RS = 300 FIS vs. Existing Conditions Comparison
Legend
Existing WSE
FIS WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2515
2510
2505
2500
2495
2490
0
100
200
300
400
500
600

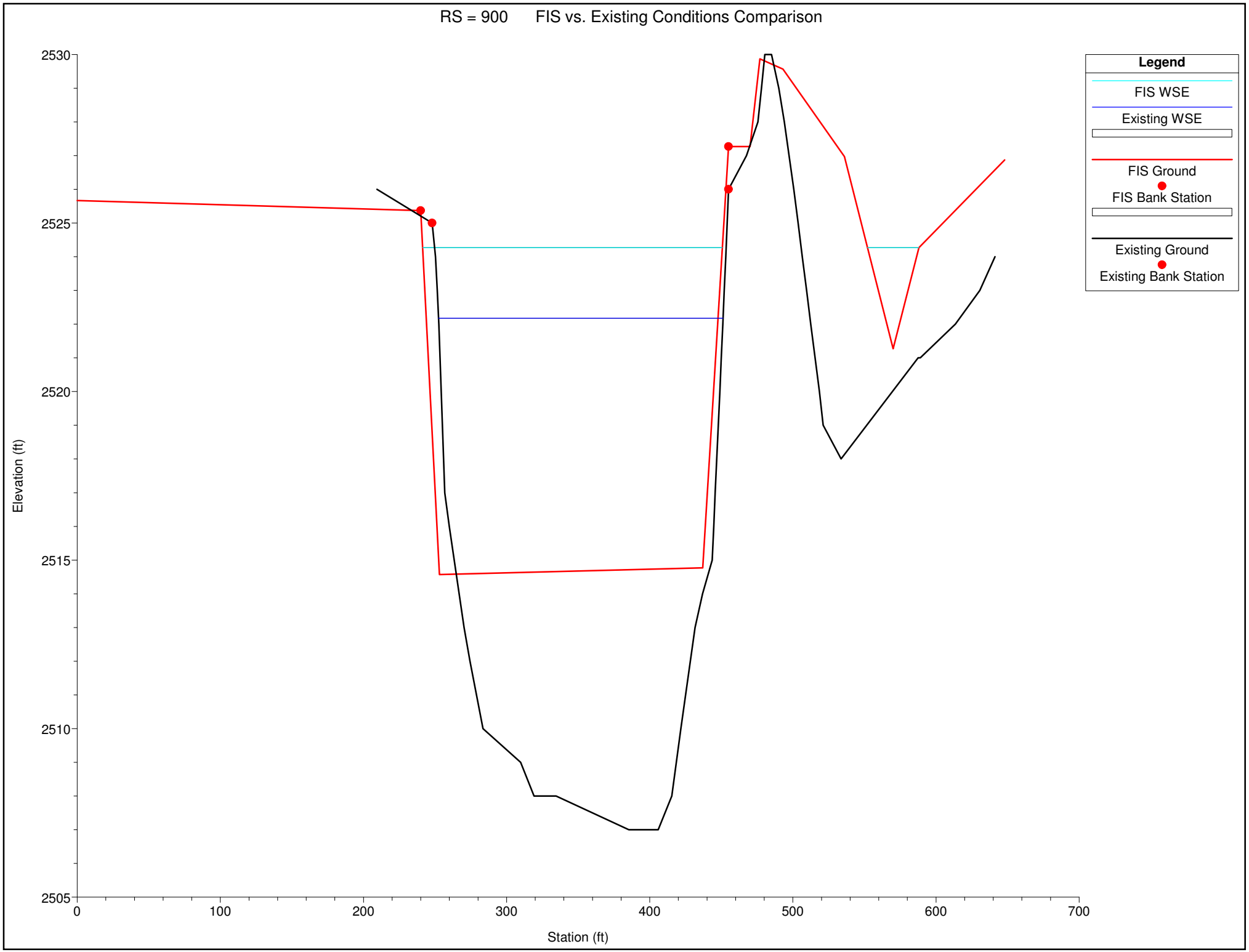

RS = 400 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
2515
2510
2505
2500
2495
2490
0
200
400
600
800
1000
1200
Station (ft)

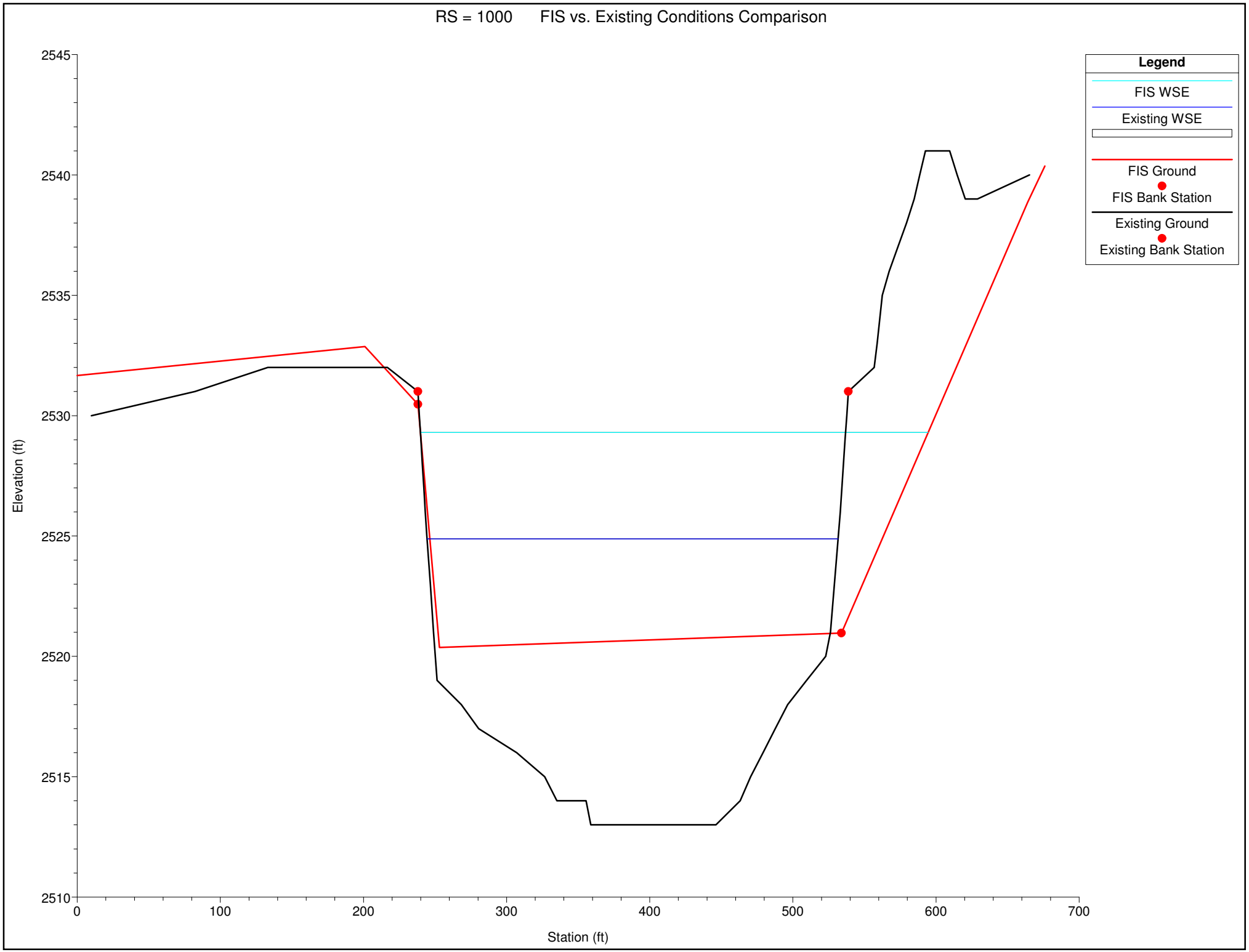

RS = 500 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
2520
2515
2510
2505
2500
2495
0
200
400
600
800
1000
Station (ft)

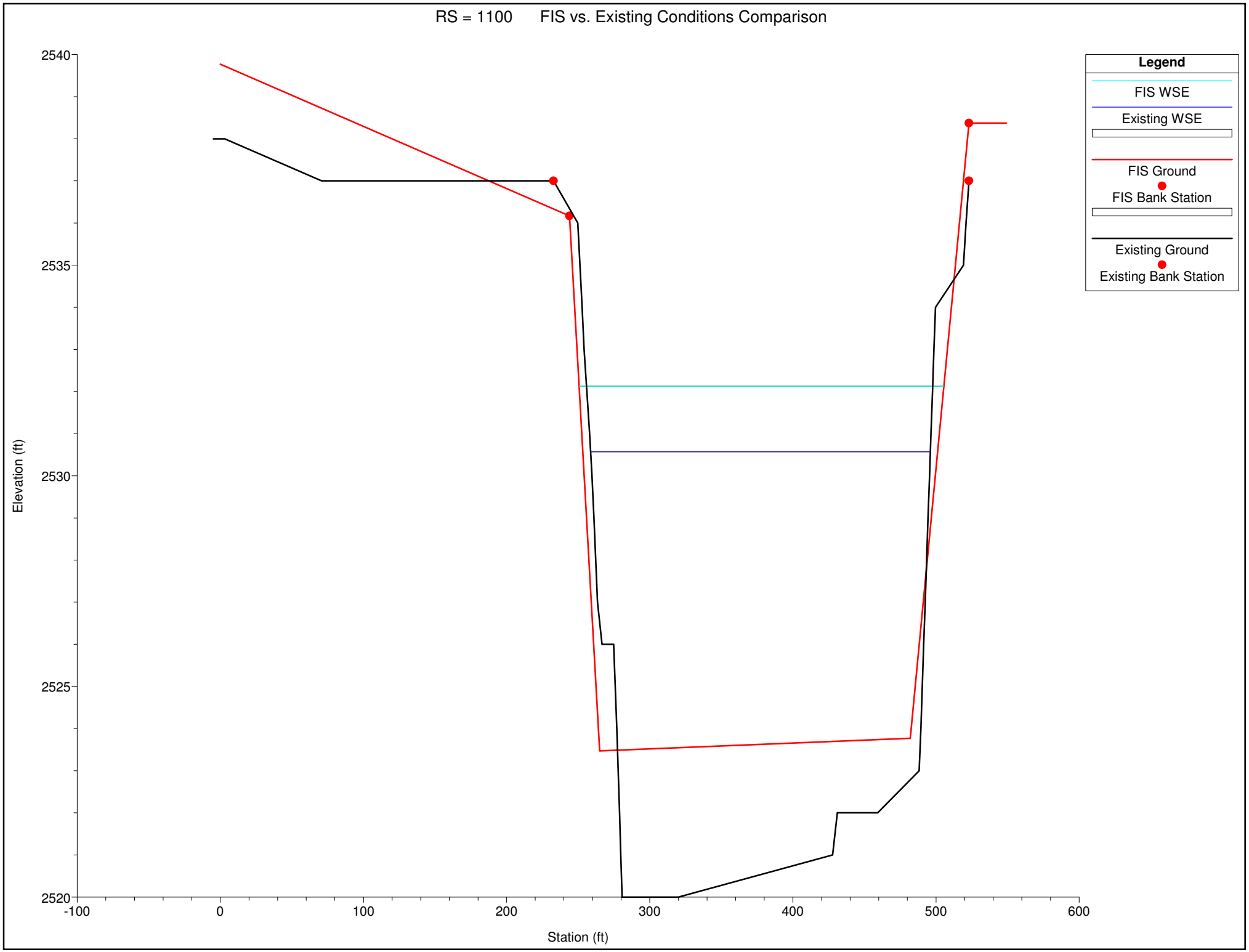

RS = 600 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2518
2516
2514
2512
2510
2508
2506
2504
2502
2500
-200
0
200
400
600
800

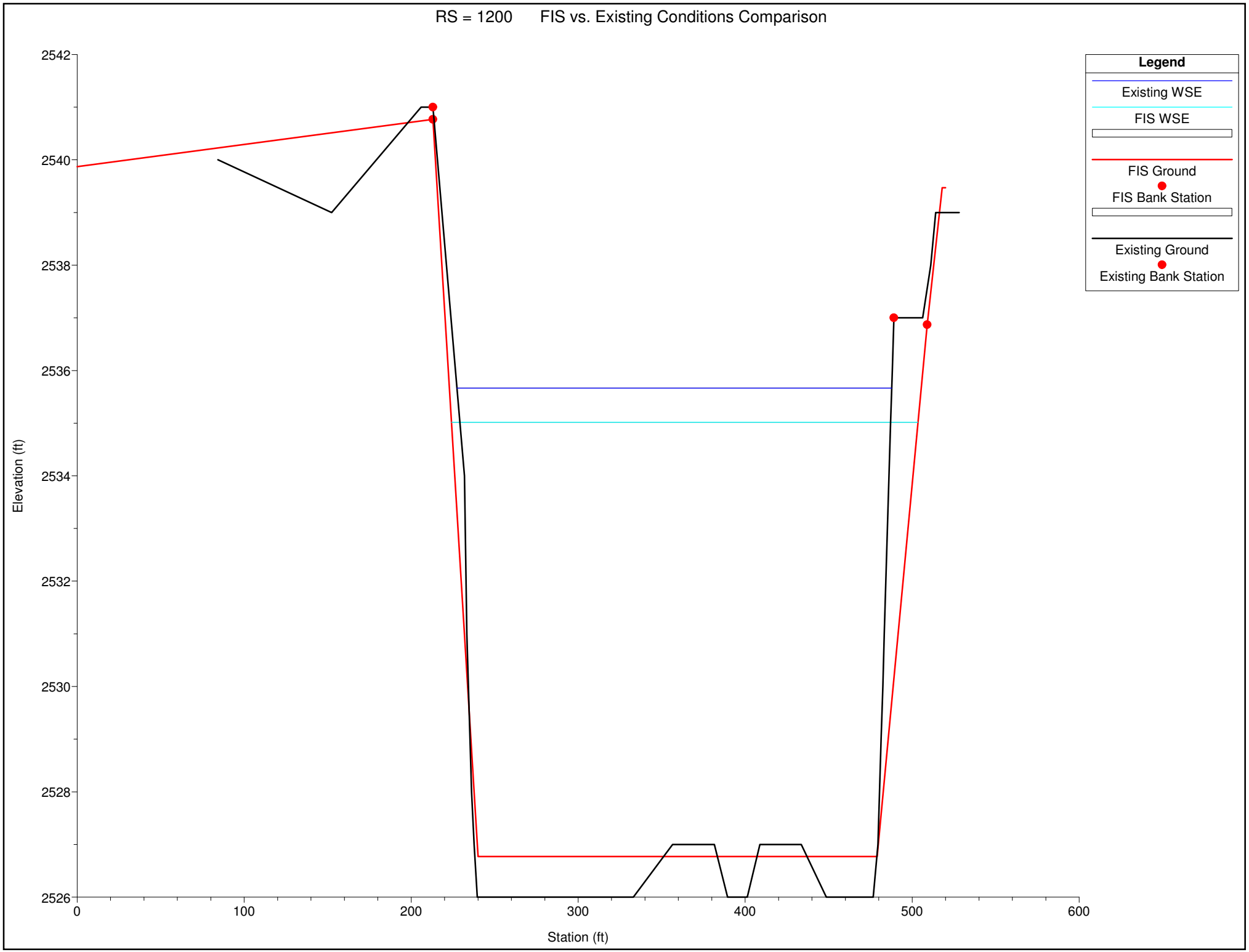

RS = 700 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
2525
2520
2515
2510
2505
2500
0
200
400
600
800
1000
Station (ft)


RS = 800 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
2525
2520
2515
2510
2505
0
200
400
600
800
1000
Station (ft)

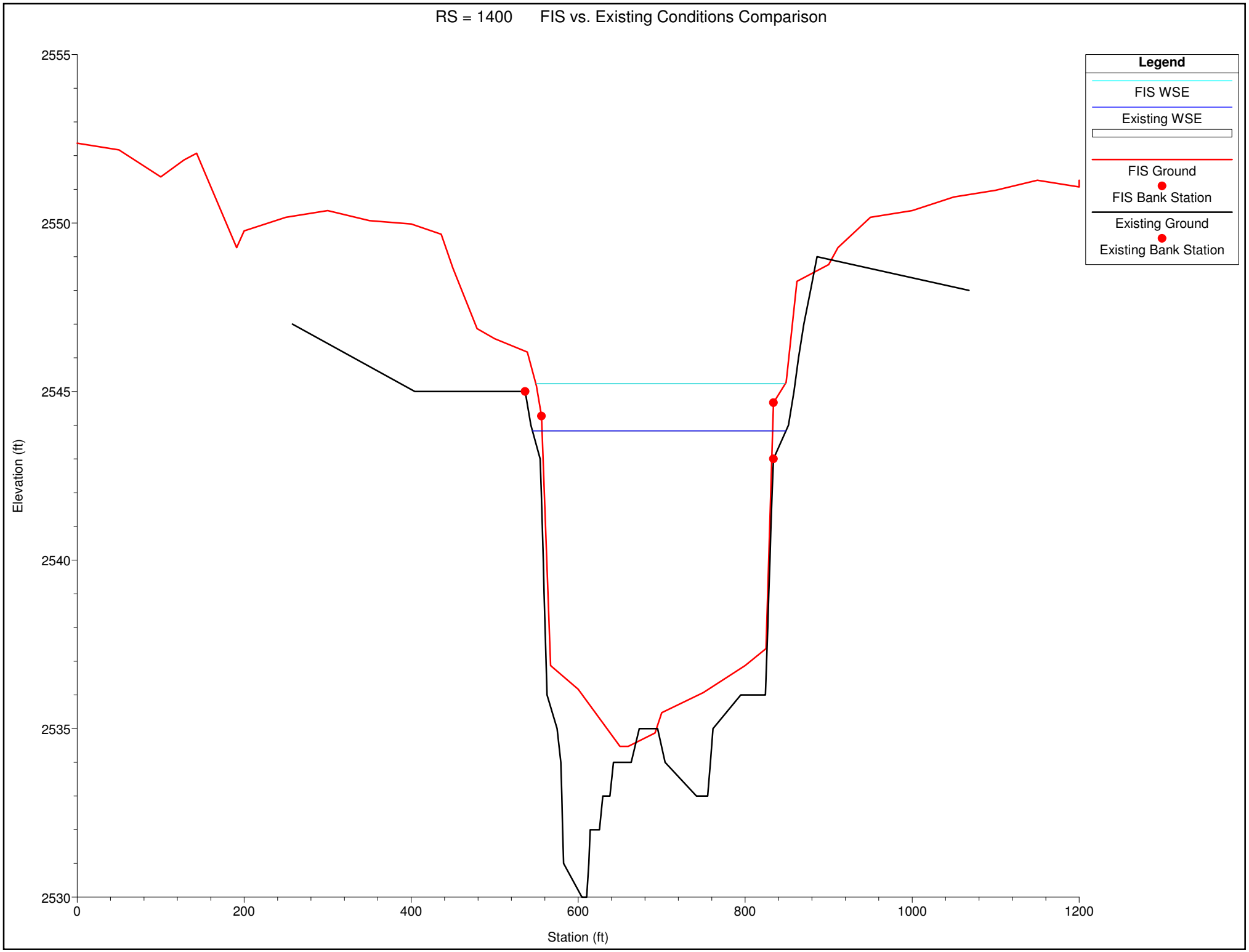

RS = 900 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
2530
2525
2520
2515
2510
2505
Station (ft)
0
100
200
300
400
500
600
700


RS = 1000 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2545
2540
2535
2530
2525
2520
2515
2510
0
100
200
300
400
500
600
700

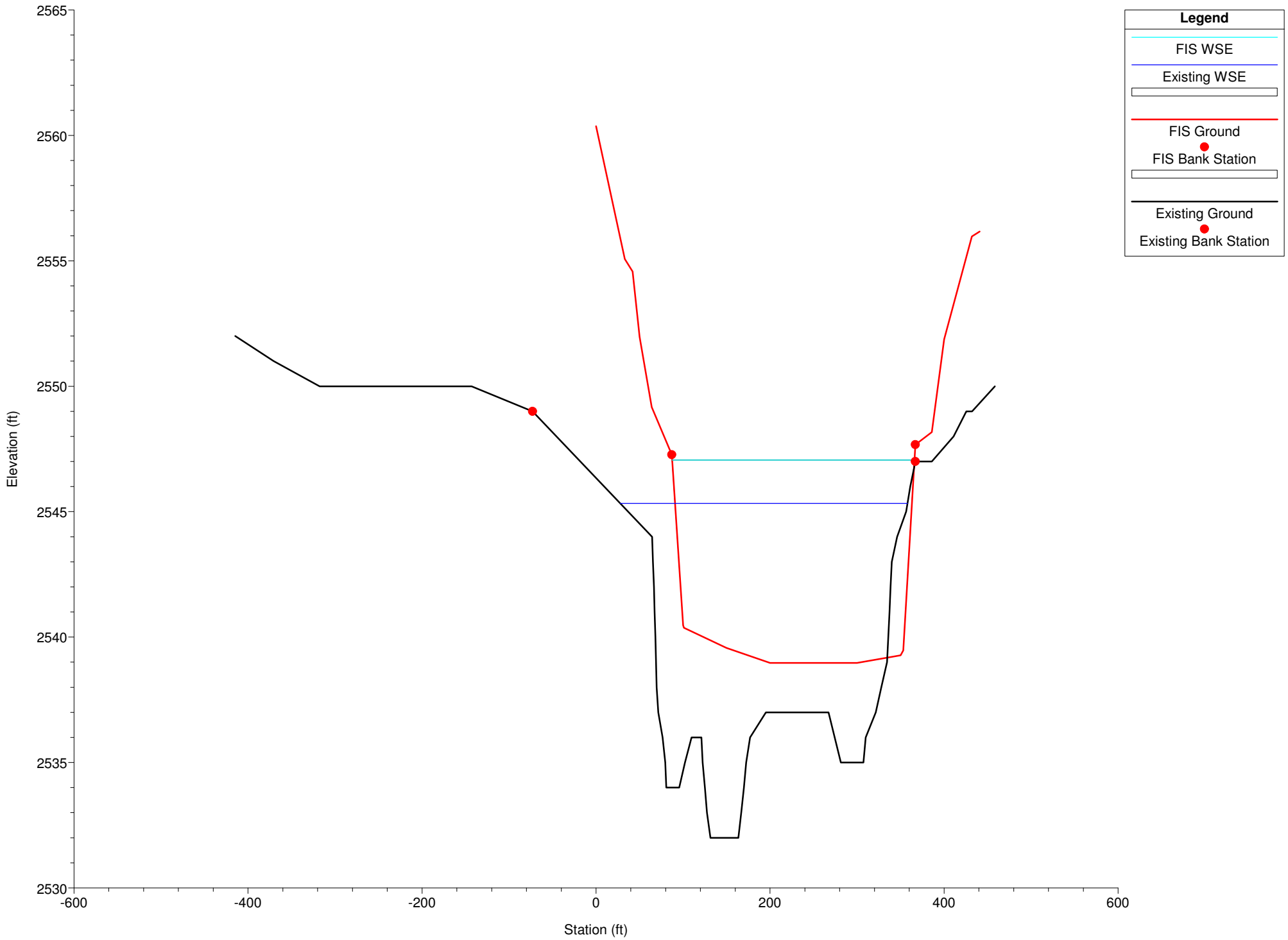

RS = 1100 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
2540
2535
2530
2525
2520
Station (ft)
-100
0
100
200
300
400
500
600

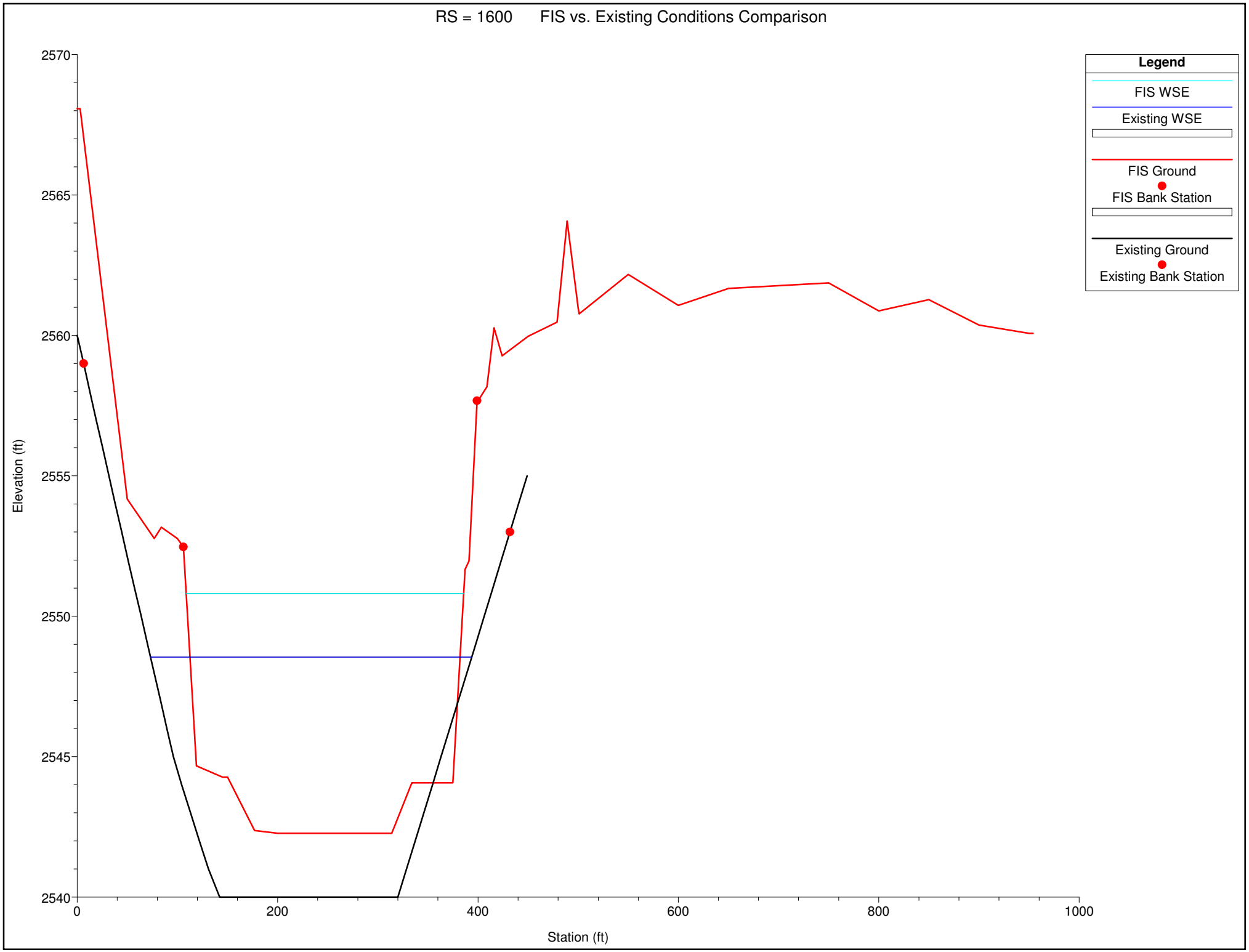

RS = 1200 FIS vs. Existing Conditions Comparison
Legend
Existing WSE
FIS WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2542
2540
2538
2536
2534
2532
2530
2528
2526
0
100
200
300
400
500
600


RS = 1300 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2550
2545
2540
2535
2530
2525
0
200
400
600
800
1000


RS = 1400 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2555
2550
2545
2540
2535
2530
0
200
400
600
800
1000
1200

RS = 1500 FIS vs. Existing Conditions Comparison




RS = 1600 FIS vs. Existing Conditions Comparison
Legend
FIS WSE
Existing WSE
FIS Ground
FIS Bank Station
Existing Ground
Existing Bank Station
Elevation (ft)
Station (ft)
2570
2565
2560
2555
2550
2545
2540
0
200
400
600
800
1000