# APPENDIX A

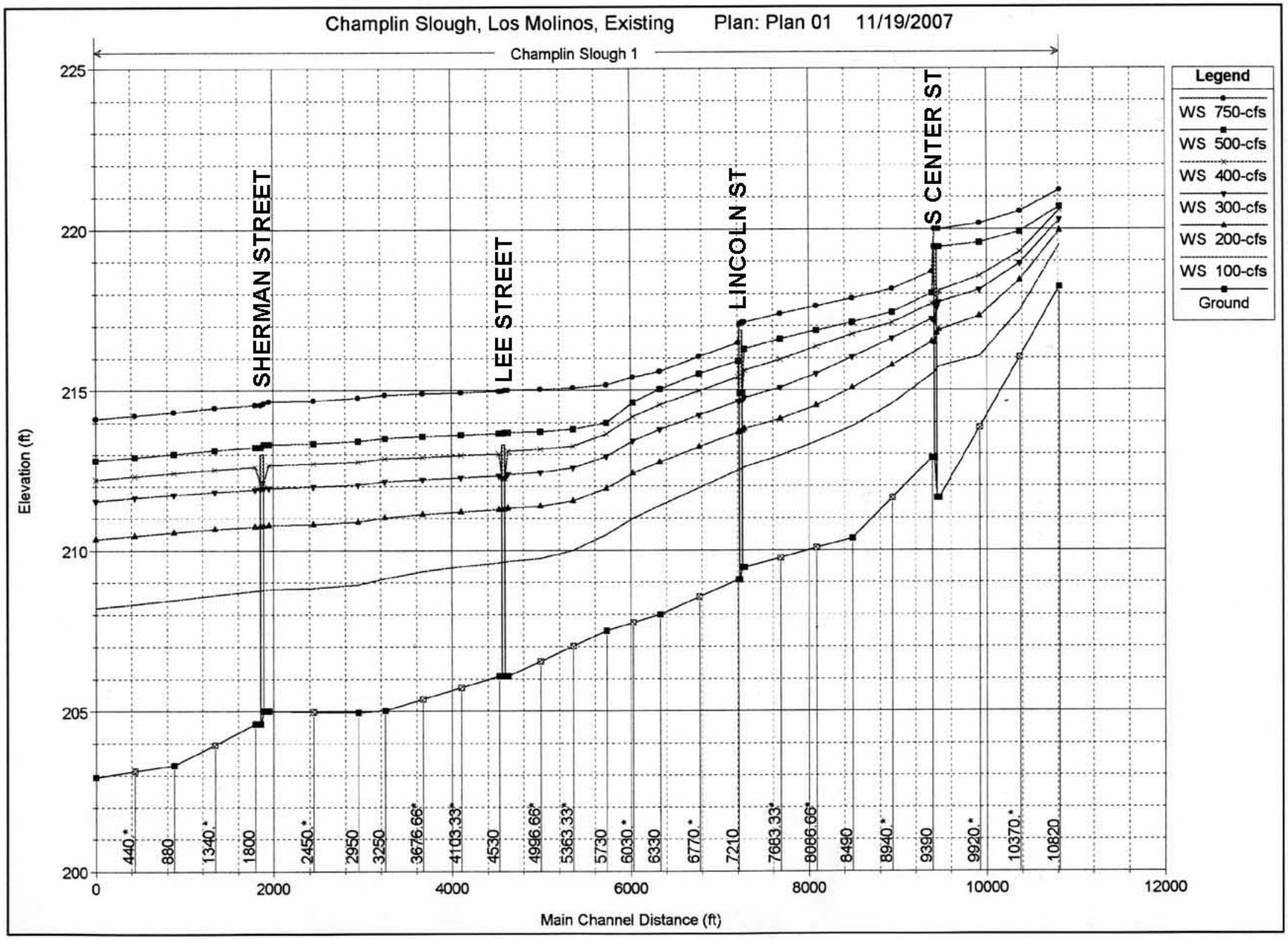
## Backwater Models

## Backwater Models

Backwater models were prepared to estimate the channel flow associated with incipient overtopping of the banks of Los Molinos Creek and Champlin Slough. The US Army Corps of Engineer's HEC-RAS backwater program was used for these models.

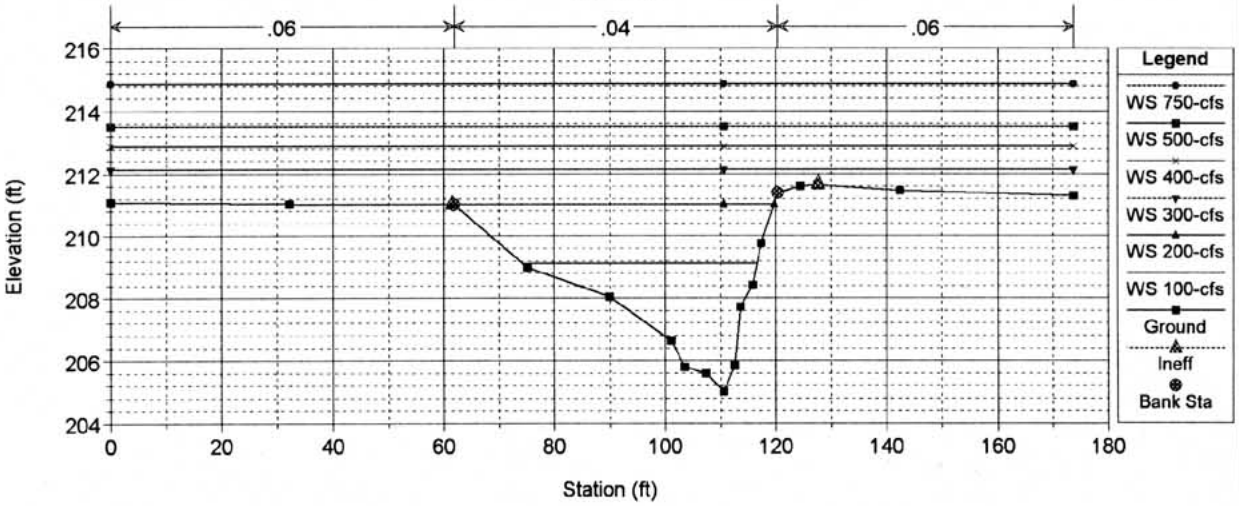
Geometric data for the Champlin Slough data were from surveyed cross-section and bridge data. For the purpose of estimating channel capacity the overbank areas some of the cross-section were assumed ineffective for conveying flow. Manning's roughness coefficients of ? and ? were used to represent the channel and overbanks respectively. These roughness coefficients were estimated by observation and comparison to similar channels identified in "Roughness Characteristics of Natural Channels". At some locations the roughness coefficients used in the model may be lower than supported by observed conditions but the values are generally representative of observed conditions as a whole. Contraction and expansion coefficients of 0.1 and 0.3 were used to represent the natural channel. In the vicinity of bridges, these coefficients were raised to 0.3 and 0.5 respectively. All bridges were modeled using pressure and weir flow methods (reverts to energy method if energy grade is below the bridge soffit). Interpolated cross-sections were inserted where appropriate to improve the performance of the model. These cross-sections were checked for interpolation error. The backwater model was run for a range of flows ranging from flow well contained in the channel to flow well above incipient overtopping for most of the channel reach. Water surface elevation data above the overtopping flow are not accurate and were not relied upon because the model does not fully represent the conveyance of overbank areas. Plotted flood profiles and selected cross-sections are included on the following pages along with a summary output table.

Geometric data for the Los Molinos Creek channel were estimated from surveyed bridge deck elevations, bridge opening dimensions estimated in the field, and assumed deck thicknesses. Channels were assumed to be near prismatic between bridges. Manning's roughness coefficients of ? and ? were used to represent the channel and overbanks respectively. These roughness coefficients were estimated by observation and comparison to similar channels identified in "Roughness Characteristics of Natural Channels". At some locations the roughness coefficients used in the model may be lower than supported by observed conditions but the values are generally representative of observed conditions as a whole. Contraction and expansion coefficients of 0.1 and 0.3 were used to represent the natural channel. In the vicinity of bridges, these coefficients were raised to 0.5 and 0.7 respectively. All bridges were modeled using culvert routines. Interpolated cross-sections were inserted where appropriate to improve the performance of the model. The backwater model was run for a range of flows ranging from flow well contained in the channel to flow above incipient overtopping for most of the channel reach. Water surface elevation data above the overtopping flow are not accurate and were not relied upon because the model does not fully represent the conveyance of overbank areas. Plotted flood profiles and selected cross-sections are included on the following pages along with a summary output table.


Champlin Slough, Los Molinos, Existing Plan: Plan 01 11/19/2007
Champlin Slough 1
SHERMAN STREET
LEE STREET
LINCOLN ST
S CENTER ST
Legend
WS 750-cfs
WS 500-cfs
WS 400-cfs
WS 300-cfs
WS 200-cfs
WS 100-cfs
Ground
Elevation (ft)
Main Channel Distance (ft)
225
220
215
210
205
200
0
2000
4000
6000
8000
10000
12000
440.*
880
1340.*
1800
2450.*
2950
3250
3676.66*
4103.33*
4530
4996.66*
5363.33*
5730
6030.*
6330
6770.*
7210
7663.33*
8066.66*
8490
8940.*
9390
9920.*
10370.*
10820

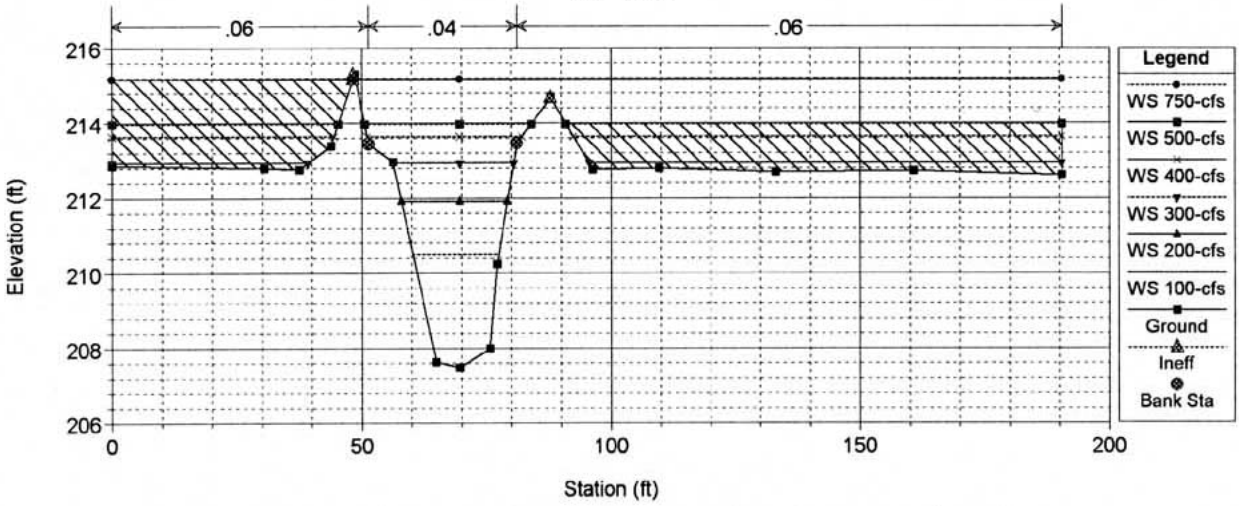
Champlin Slough, Los Molinos, Existing Plan: Plan 01 11/19/2007

RS = 3250



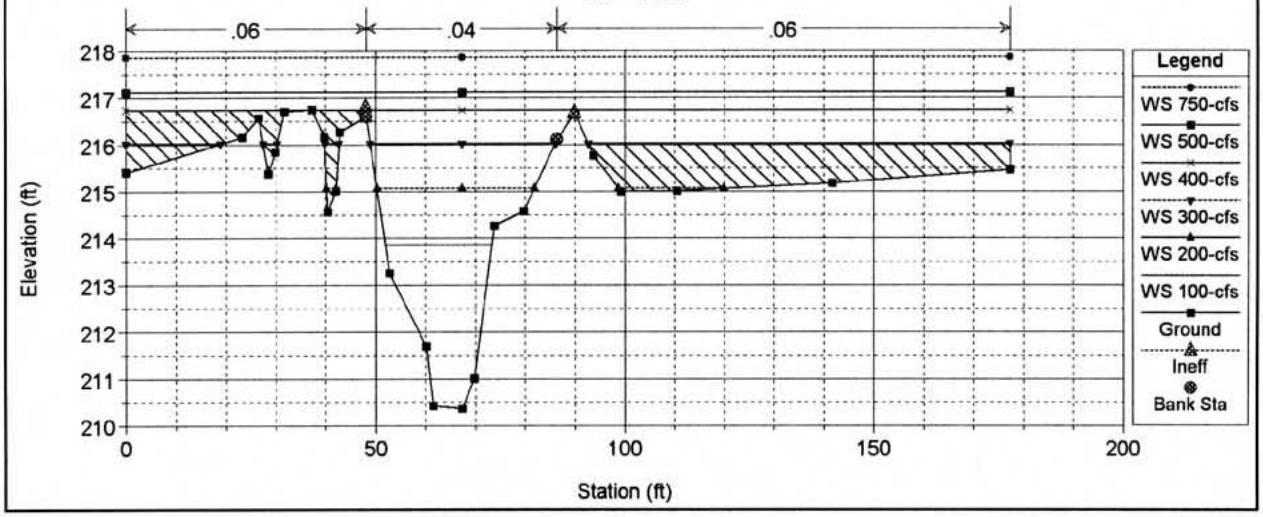

Champlin Slough, Los Molinos, Existing Plan: Plan 01 11/19/2007

RS = 5730




Champlin Slough, Los Molinos, Existing Plan: Plan 01 11/19/2007

RS = 8490



HEC-RAS Plan: Plan 01 River: Champlin Slough Reach: 1

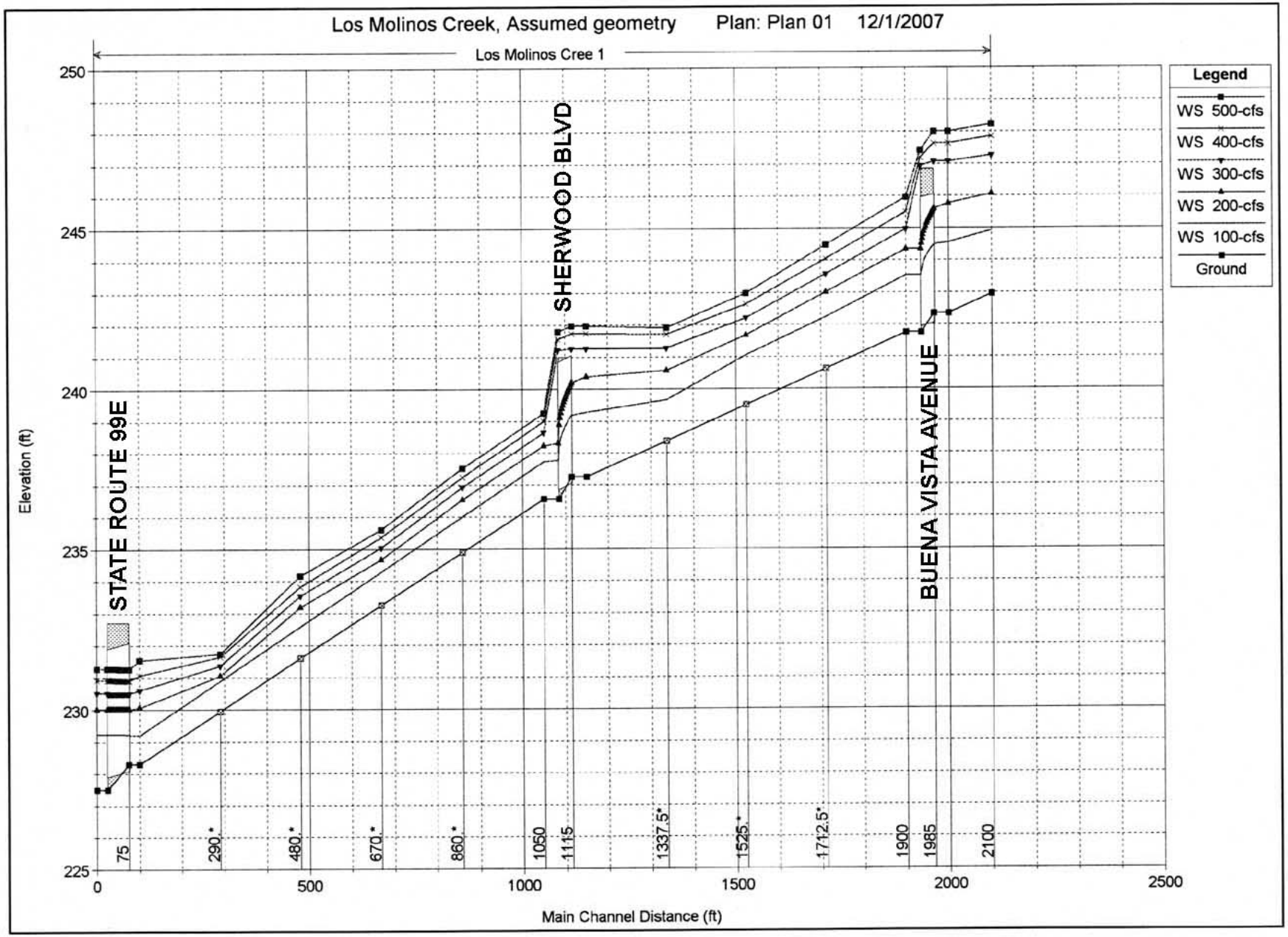
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 1 | 10820 | 200-cfs | 200.00 | 218.22 | 219.96 | 219.37 | 220.04 | 0.002981 | 2.44 | 94.02 | 224.41 | 0.37 |
| 1 | 10820 | 300-cfs | 300.00 | 218.22 | 220.29 | 219.58 | 220.40 | 0.003007 | 2.84 | 124.35 | 240.92 | 0.39 |
| 1 | 10820 | 400-cfs | 400.00 | 218.22 | 220.59 | 219.76 | 220.72 | 0.002912 | 3.13 | 154.20 | 253.14 | 0.39 |
| 1 | 10820 | 500-cfs | 500.00 | 218.22 | 220.69 | 219.92 | 220.76 | 0.001955 | 2.65 | 302.24 | 256.31 | 0.33 |
| 1 | 10820 | 750-cfs | 750.00 | 218.22 | 221.21 | 220.28 | 221.28 | 0.001536 | 2.73 | 436.37 | 263.35 | 0.30 |
| | | | | | | | | | | | | |
| 1 | 10370.* | 200-cfs | 200.00 | 216.02 | 218.41 | 217.52 | 218.54 | 0.003704 | 2.89 | 72.31 | 63.46 | 0.42 |
| 1 | 10370.* | 300-cfs | 300.00 | 216.02 | 218.93 | 217.93 | 219.07 | 0.002889 | 3.05 | 109.64 | 107.52 | 0.39 |
| 1 | 10370.* | 400-cfs | 400.00 | 216.02 | 219.29 | 218.28 | 219.45 | 0.002757 | 3.34 | 139.69 | 135.37 | 0.39 |
| 1 | 10370.* | 500-cfs | 500.00 | 216.02 | 219.92 | 218.52 | 220.02 | 0.001412 | 2.81 | 263.41 | 193.27 | 0.29 |
| 1 | 10370.* | 750-cfs | 750.00 | 216.02 | 220.55 | 218.99 | 220.65 | 0.001256 | 3.02 | 400.22 | 239.61 | 0.28 |
| | | | | | | | | | | | | |
| 1 | 9920.* | 200-cfs | 200.00 | 213.83 | 217.29 | 215.50 | 217.39 | 0.001839 | 2.49 | 80.90 | 51.02 | 0.31 |
| 1 | 9920.* | 300-cfs | 300.00 | 213.83 | 218.12 | 215.94 | 218.21 | 0.001319 | 2.54 | 132.69 | 113.43 | 0.27 |
| 1 | 9920.* | 400-cfs | 400.00 | 213.83 | 218.54 | 216.35 | 218.64 | 0.001210 | 2.68 | 197.74 | 130.50 | 0.27 |
| 1 | 9920.* | 500-cfs | 500.00 | 213.83 | 219.58 | 216.78 | 219.64 | 0.000528 | 2.14 | 351.10 | 175.87 | 0.18 |
| 1 | 9920.* | 750-cfs | 750.00 | 213.83 | 220.18 | 217.59 | 220.25 | 0.000636 | 2.57 | 470.91 | 229.99 | 0.21 |
| | | | | | | | | | | | | |
| 1 | 9470 | 200-cfs | 200.00 | 211.63 | 216.87 | 213.54 | 216.92 | 0.000636 | 1.86 | 108.31 | 77.94 | 0.19 |
| 1 | 9470 | 300-cfs | 300.00 | 211.63 | 217.73 | 214.04 | 217.81 | 0.000638 | 2.16 | 139.88 | 119.95 | 0.19 |
| 1 | 9470 | 400-cfs | 400.00 | 211.63 | 218.08 | 214.48 | 218.19 | 0.000855 | 2.65 | 152.50 | 123.86 | 0.23 |
| 1 | 9470 | 500-cfs | 500.00 | 211.63 | 219.44 | 214.91 | 219.47 | 0.000242 | 1.70 | 479.83 | 219.48 | 0.13 |
| 1 | 9470 | 750-cfs | 750.00 | 211.63 | 220.00 | 216.06 | 220.04 | 0.000331 | 2.11 | 604.14 | 230.37 | 0.15 |
| | | | | | | | | | | | | |
| 1 | 9445 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 9390 | 200-cfs | 200.00 | 212.89 | 216.50 | 214.96 | 216.61 | 0.001630 | 2.64 | 75.70 | 90.90 | 0.30 |
| 1 | 9390 | 300-cfs | 300.00 | 212.89 | 217.21 | 215.37 | 217.35 | 0.001618 | 3.05 | 98.32 | 99.54 | 0.31 |
| 1 | 9390 | 400-cfs | 400.00 | 212.89 | 217.68 | 215.73 | 217.88 | 0.001820 | 3.51 | 113.96 | 102.68 | 0.33 |
| 1 | 9390 | 500-cfs | 500.00 | 212.89 | 218.01 | 216.05 | 218.26 | 0.002130 | 4.01 | 124.73 | 114.64 | 0.37 |
| 1 | 9390 | 750-cfs | 750.00 | 212.89 | 218.67 | 216.71 | 219.08 | 0.002778 | 5.11 | 146.97 | 159.71 | 0.43 |
| | | | | | | | | | | | | |
| 1 | 8940.* | 200-cfs | 200.00 | 211.63 | 215.77 | 214.03 | 215.88 | 0.001610 | 2.60 | 76.92 | 54.49 | 0.30 |
| 1 | 8940.* | 300-cfs | 300.00 | 211.63 | 216.61 | 214.53 | 216.70 | 0.001197 | 2.59 | 146.76 | 115.52 | 0.26 |
| 1 | 8940.* | 400-cfs | 400.00 | 211.63 | 217.09 | 214.93 | 217.19 | 0.001150 | 2.76 | 192.77 | 165.88 | 0.26 |
| 1 | 8940.* | 500-cfs | 500.00 | 211.63 | 217.42 | 215.25 | 217.52 | 0.001082 | 2.85 | 275.29 | 182.67 | 0.26 |
| 1 | 8940.* | 750-cfs | 750.00 | 211.63 | 218.14 | 215.96 | 218.24 | 0.000952 | 3.00 | 407.58 | 182.67 | 0.25 |
| | | | | | | | | | | | | |
| 1 | 8490 | 200-cfs | 200.00 | 210.37 | 215.07 | 212.89 | 215.17 | 0.001527 | 2.54 | 78.82 | 54.66 | 0.28 |
| 1 | 8490 | 300-cfs | 300.00 | 210.37 | 216.02 | 213.44 | 216.13 | 0.001339 | 2.69 | 111.57 | 146.56 | 0.27 |
| 1 | 8490 | 400-cfs | 400.00 | 210.37 | 216.74 | 213.86 | 216.79 | 0.000650 | 2.12 | 270.78 | 177.19 | 0.20 |
| 1 | 8490 | 500-cfs | 500.00 | 210.37 | 217.11 | 214.25 | 217.16 | 0.000572 | 2.12 | 371.01 | 177.35 | 0.19 |
| 1 | 8490 | 750-cfs | 750.00 | 210.37 | 217.85 | 215.19 | 217.90 | 0.000561 | 2.35 | 502.25 | 177.35 | 0.19 |
| | | | | | | | | | | | | |
| 1 | 8086.66* | 200-cfs | 200.00 | 210.07 | 214.52 | 212.46 | 214.61 | 0.001233 | 2.45 | 81.75 | 29.49 | 0.26 |
| 1 | 8086.66* | 300-cfs | 300.00 | 210.07 | 215.51 | 212.95 | 215.61 | 0.001238 | 2.59 | 116.00 | 107.81 | 0.26 |
| 1 | 8086.66* | 400-cfs | 400.00 | 210.07 | 216.35 | 213.32 | 216.46 | 0.001060 | 2.64 | 151.63 | 184.53 | 0.25 |
| 1 | 8086.66* | 500-cfs | 500.00 | 210.07 | 216.86 | 213.65 | 216.92 | 0.000610 | 2.19 | 348.25 | 199.06 | 0.19 |
| 1 | 8086.66* | 750-cfs | 750.00 | 210.07 | 217.62 | 214.40 | 217.68 | 0.000564 | 2.36 | 498.74 | 199.06 | 0.19 |
| | | | | | | | | | | | | |
| 1 | 7683.33* | 200-cfs | 200.00 | 209.76 | 214.10 | 212.05 | 214.18 | 0.000929 | 2.19 | 91.19 | 31.44 | 0.23 |
| 1 | 7683.33* | 300-cfs | 300.00 | 209.76 | 215.07 | 212.49 | 215.16 | 0.000996 | 2.42 | 123.85 | 38.58 | 0.24 |
| 1 | 7683.33* | 400-cfs | 400.00 | 209.76 | 215.95 | 212.83 | 216.05 | 0.000970 | 2.47 | 162.20 | 152.24 | 0.24 |
| 1 | 7683.33* | 500-cfs | 500.00 | 209.76 | 216.59 | 213.12 | 216.66 | 0.000678 | 2.29 | 299.12 | 220.77 | 0.20 |
| 1 | 7683.33* | 750-cfs | 750.00 | 209.76 | 217.37 | 213.79 | 217.44 | 0.000601 | 2.43 | 472.07 | 220.77 | 0.20 |
| | | | | | | | | | | | | |
| 1 | 7280 | 200-cfs | 200.00 | 209.46 | 213.79 | 211.65 | 213.85 | 0.000708 | 1.93 | 103.81 | 35.45 | 0.20 |
| 1 | 7280 | 300-cfs | 300.00 | 209.46 | 214.76 | 212.05 | 214.83 | 0.000664 | 2.16 | 138.77 | 37.10 | 0.20 |
| 1 | 7280 | 400-cfs | 400.00 | 209.46 | 215.61 | 212.37 | 215.69 | 0.000781 | 2.28 | 175.77 | 49.63 | 0.21 |
| 1 | 7280 | 500-cfs | 500.00 | 209.46 | 216.28 | 212.64 | 216.37 | 0.000749 | 2.36 | 211.64 | 167.22 | 0.21 |
| 1 | 7280 | 750-cfs | 750.00 | 209.46 | 217.10 | 213.24 | 217.19 | 0.000663 | 2.52 | 419.64 | 242.48 | 0.21 |
| | | | | | | | | | | | | |
| 1 | 7260 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 7210 | 200-cfs | 200.00 | 209.08 | 213.69 | 211.63 | 213.76 | 0.000941 | 2.15 | 93.23 | 34.08 | 0.23 |
| 1 | 7210 | 300-cfs | 300.00 | 209.08 | 214.65 | 212.06 | 214.73 | 0.000861 | 2.35 | 127.57 | 37.64 | 0.23 |
| 1 | 7210 | 400-cfs | 400.00 | 209.08 | 215.40 | 212.41 | 215.50 | 0.000826 | 2.56 | 156.17 | 38.37 | 0.22 |
| 1 | 7210 | 500-cfs | 500.00 | 209.08 | 215.91 | 212.72 | 216.04 | 0.000896 | 2.84 | 178.64 | 60.69 | 0.23 |
| 1 | 7210 | 750-cfs | 750.00 | 209.08 | 216.47 | 213.39 | 216.66 | 0.001262 | 3.62 | 270.93 | 218.75 | 0.28 |
| | | | | | | | | | | | | |
| 1 | 6770.* | 200-cfs | 200.00 | 208.54 | 213.23 | 211.12 | 213.31 | 0.001085 | 2.35 | 85.10 | 30.21 | 0.25 |
| 1 | 6770.* | 300-cfs | 300.00 | 208.54 | 214.22 | 211.59 | 214.32 | 0.000999 | 2.57 | 116.86 | 33.86 | 0.24 |
| 1 | 6770.* | 400-cfs | 400.00 | 208.54 | 214.98 | 211.97 | 215.10 | 0.000990 | 2.79 | 143.67 | 186.23 | 0.25 |
| 1 | 6770.* | 500-cfs | 500.00 | 208.54 | 215.51 | 212.32 | 215.63 | 0.000946 | 2.92 | 206.52 | 219.14 | 0.24 |
| 1 | 6770.* | 750-cfs | 750.00 | 208.54 | 216.04 | 213.07 | 216.15 | 0.000894 | 3.04 | 412.39 | 222.51 | 0.24 |

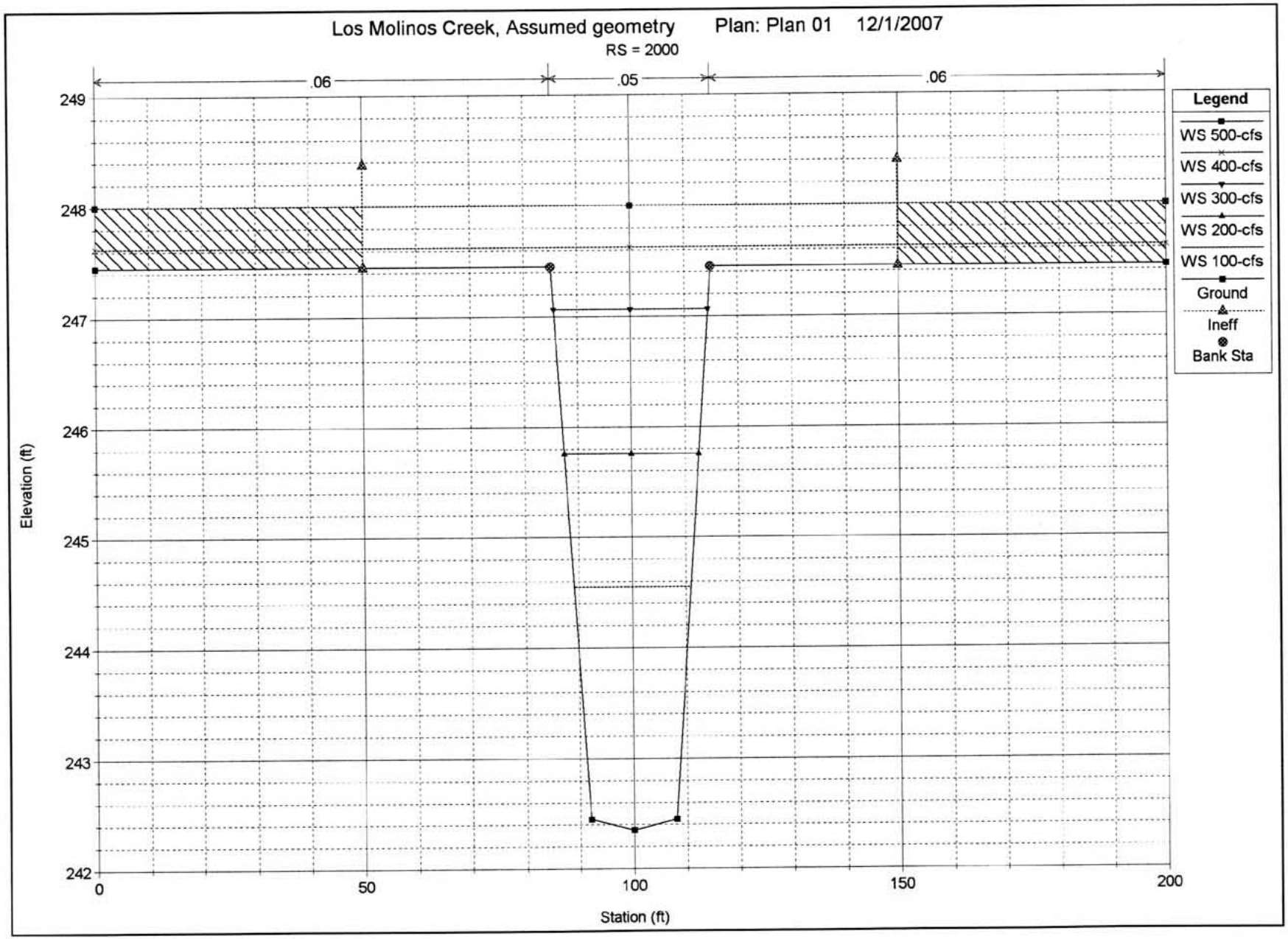
HEC-RAS Plan: Plan 01 River: Champlin Slough Reach: 1 (Continued)

| 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) | |
| 1 | 6330 | 200-cfs | 200.00 | 208.00 | 212.76 | 210.47 | 212.84 | 0.001047 | 2.37 | 84.24 | 28.18 | 0.24 |
| 1 | 6330 | 300-cfs | 300.00 | 208.00 | 213.77 | 210.96 | 213.88 | 0.000997 | 2.61 | 114.83 | 163.25 | 0.24 |
| 1 | 6330 | 400-cfs | 400.00 | 208.00 | 214.54 | 211.37 | 214.66 | 0.000975 | 2.86 | 140.81 | 187.63 | 0.25 |
| 1 | 6330 | 500-cfs | 500.00 | 208.00 | 215.03 | 211.74 | 215.18 | 0.001084 | 3.19 | 159.20 | 195.08 | 0.26 |
| 1 | 6330 | 750-cfs | 750.00 | 208.00 | 215.57 | 212.54 | 215.72 | 0.001081 | 3.38 | 306.44 | 199.70 | 0.27 |
| | | | | | | | | | | | | |
| 1 | 6030.* | 200-cfs | 200.00 | 207.74 | 212.39 | 210.08 | 212.50 | 0.001256 | 2.61 | 76.51 | 24.91 | 0.26 |
| 1 | 6030.* | 300-cfs | 300.00 | 207.74 | 213.42 | 210.63 | 213.55 | 0.001242 | 2.89 | 103.75 | 162.53 | 0.27 |
| 1 | 6030.* | 400-cfs | 400.00 | 207.74 | 214.17 | 211.08 | 214.33 | 0.001282 | 3.14 | 127.72 | 180.96 | 0.28 |
| 1 | 6030.* | 500-cfs | 500.00 | 207.74 | 214.61 | 211.50 | 214.81 | 0.001452 | 3.53 | 142.67 | 186.27 | 0.30 |
| 1 | 6030.* | 750-cfs | 750.00 | 207.74 | 215.40 | 212.36 | 215.46 | 0.000578 | 2.49 | 514.35 | 196.07 | 0.19 |
| | | | | | | | | | | | | |
| 1 | 5730 | 200-cfs | 200.00 | 207.49 | 211.92 | 209.72 | 212.06 | 0.001713 | 3.01 | 66.52 | 21.25 | 0.30 |
| 1 | 5730 | 300-cfs | 300.00 | 207.49 | 212.93 | 210.30 | 213.11 | 0.001715 | 3.35 | 89.57 | 158.24 | 0.31 |
| 1 | 5730 | 400-cfs | 400.00 | 207.49 | 213.63 | 210.81 | 213.84 | 0.002045 | 3.67 | 109.13 | 173.54 | 0.34 |
| 1 | 5730 | 500-cfs | 500.00 | 207.49 | 213.98 | 211.26 | 214.25 | 0.002362 | 4.19 | 120.25 | 178.34 | 0.37 |
| 1 | 5730 | 750-cfs | 750.00 | 207.49 | 215.17 | 212.21 | 215.26 | 0.000801 | 2.90 | 407.41 | 189.94 | 0.22 |
| | | | | | | | | | | | | |
| 1 | 5363.33* | 200-cfs | 200.00 | 207.02 | 211.53 | 209.01 | 211.60 | 0.000857 | 2.15 | 93.17 | 31.45 | 0.22 |
| 1 | 5363.33* | 300-cfs | 300.00 | 207.02 | 212.58 | 209.50 | 212.66 | 0.000807 | 2.33 | 128.69 | 167.34 | 0.22 |
| 1 | 5363.33* | 400-cfs | 400.00 | 207.02 | 213.25 | 209.92 | 213.36 | 0.000828 | 2.59 | 154.74 | 245.18 | 0.23 |
| 1 | 5363.33* | 500-cfs | 500.00 | 207.02 | 213.79 | 210.30 | 213.85 | 0.000483 | 2.15 | 363.54 | 273.80 | 0.18 |
| 1 | 5363.33* | 750-cfs | 750.00 | 207.02 | 215.07 | 211.08 | 215.10 | 0.000217 | 1.70 | 793.47 | 276.02 | 0.12 |
| | | | | | | | | | | | | |
| 1 | 4996.66* | 200-cfs | 200.00 | 206.55 | 211.37 | 208.39 | 211.40 | 0.000343 | 1.46 | 137.22 | 42.56 | 0.14 |
| 1 | 4996.66* | 300-cfs | 300.00 | 206.55 | 212.43 | 208.82 | 212.47 | 0.000324 | 1.63 | 184.55 | 215.04 | 0.14 |
| 1 | 4996.66* | 400-cfs | 400.00 | 206.55 | 213.17 | 209.18 | 213.20 | 0.000210 | 1.47 | 447.25 | 305.13 | 0.12 |
| 1 | 4996.66* | 500-cfs | 500.00 | 206.55 | 213.72 | 209.49 | 213.74 | 0.000171 | 1.42 | 620.73 | 330.61 | 0.11 |
| 1 | 4996.66* | 750-cfs | 750.00 | 206.55 | 215.03 | 210.12 | 215.04 | 0.000102 | 1.27 | 1086.77 | 361.54 | 0.09 |
| | | | | | | | | | | | | |
| 1 | 4630 | 200-cfs | 200.00 | 206.08 | 211.31 | 207.87 | 211.32 | 0.000137 | 1.02 | 197.03 | 52.97 | 0.09 |
| 1 | 4630 | 300-cfs | 300.00 | 206.08 | 212.37 | 208.17 | 212.39 | 0.000136 | 1.18 | 256.71 | 273.19 | 0.10 |
| 1 | 4630 | 400-cfs | 400.00 | 206.08 | 213.11 | 208.42 | 213.13 | 0.000147 | 1.35 | 302.29 | 360.66 | 0.10 |
| 1 | 4630 | 500-cfs | 500.00 | 206.08 | 213.69 | 208.65 | 213.70 | 0.000078 | 1.05 | 841.95 | 383.93 | 0.08 |
| 1 | 4630 | 750-cfs | 750.00 | 206.08 | 215.01 | 209.17 | 215.02 | 0.000055 | 1.00 | 1391.65 | 447.06 | 0.07 |
| | | | | | | | | | | | | |
| 1 | 4595 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 4530 | 200-cfs | 200.00 | 206.08 | 211.27 | 208.15 | 211.29 | 0.000163 | 0.98 | 203.49 | 66.75 | 0.10 |
| 1 | 4530 | 300-cfs | 300.00 | 206.08 | 212.33 | 208.45 | 212.35 | 0.000143 | 1.08 | 277.80 | 199.06 | 0.10 |
| 1 | 4530 | 400-cfs | 400.00 | 206.08 | 213.02 | 208.72 | 213.05 | 0.000148 | 1.22 | 328.71 | 283.06 | 0.10 |
| 1 | 4530 | 500-cfs | 500.00 | 206.08 | 213.65 | 208.96 | 213.66 | 0.000097 | 1.08 | 681.20 | 283.06 | 0.08 |
| 1 | 4530 | 750-cfs | 750.00 | 206.08 | 214.97 | 209.46 | 214.98 | 0.000073 | 1.09 | 1054.37 | 283.06 | 0.08 |
| | | | | | | | | | | | | |
| 1 | 4103.33* | 200-cfs | 200.00 | 205.73 | 211.20 | 207.93 | 211.22 | 0.000176 | 1.03 | 194.14 | 62.97 | 0.10 |
| 1 | 4103.33* | 300-cfs | 300.00 | 205.73 | 212.27 | 208.32 | 212.29 | 0.000142 | 1.09 | 337.96 | 246.63 | 0.10 |
| 1 | 4103.33* | 400-cfs | 400.00 | 205.73 | 212.97 | 208.60 | 212.99 | 0.000116 | 1.10 | 511.32 | 246.63 | 0.09 |
| 1 | 4103.33* | 500-cfs | 500.00 | 205.73 | 213.61 | 208.85 | 213.62 | 0.000098 | 1.10 | 667.83 | 246.63 | 0.08 |
| 1 | 4103.33* | 750-cfs | 750.00 | 205.73 | 214.93 | 209.40 | 214.95 | 0.000077 | 1.13 | 995.09 | 246.63 | 0.08 |
| | | | | | | | | | | | | |
| 1 | 3676.66* | 200-cfs | 200.00 | 205.37 | 211.12 | 207.81 | 211.14 | 0.000205 | 1.10 | 182.26 | 59.83 | 0.11 |
| 1 | 3676.66* | 300-cfs | 300.00 | 205.37 | 212.21 | 208.27 | 212.22 | 0.000146 | 1.11 | 348.52 | 210.20 | 0.10 |
| 1 | 3676.66* | 400-cfs | 400.00 | 205.37 | 212.92 | 208.59 | 212.94 | 0.000121 | 1.13 | 498.49 | 210.20 | 0.09 |
| 1 | 3676.66* | 500-cfs | 500.00 | 205.37 | 213.56 | 208.85 | 213.58 | 0.000104 | 1.14 | 633.35 | 210.20 | 0.09 |
| 1 | 3676.66* | 750-cfs | 750.00 | 205.37 | 214.90 | 209.42 | 214.91 | 0.000086 | 1.20 | 913.80 | 210.20 | 0.08 |
| | | | | | | | | | | | | |
| 1 | 3250 | 200-cfs | 200.00 | 205.02 | 211.01 | 207.73 | 211.04 | 0.000261 | 1.19 | 168.30 | 57.81 | 0.12 |
| 1 | 3250 | 300-cfs | 300.00 | 205.02 | 212.14 | 208.29 | 212.16 | 0.000160 | 1.15 | 338.63 | 173.77 | 0.10 |
| 1 | 3250 | 400-cfs | 400.00 | 205.02 | 212.86 | 208.69 | 212.88 | 0.000135 | 1.18 | 464.36 | 173.77 | 0.10 |
| 1 | 3250 | 500-cfs | 500.00 | 205.02 | 213.51 | 209.00 | 213.53 | 0.000119 | 1.21 | 576.93 | 173.77 | 0.09 |
| 1 | 3250 | 750-cfs | 750.00 | 205.02 | 214.85 | 209.55 | 214.87 | 0.000103 | 1.30 | 809.81 | 173.77 | 0.09 |
| | | | | | | | | | | | | |
| 1 | 2950 | 200-cfs | 200.00 | 204.96 | 210.89 | 207.09 | 210.94 | 0.000419 | 1.73 | 119.87 | 50.59 | 0.16 |
| 1 | 2950 | 300-cfs | 300.00 | 204.96 | 212.05 | 207.64 | 212.09 | 0.000317 | 1.80 | 216.97 | 94.64 | 0.14 |
| 1 | 2950 | 400-cfs | 400.00 | 204.96 | 212.77 | 208.10 | 212.82 | 0.000301 | 1.92 | 285.79 | 94.64 | 0.14 |
| 1 | 2950 | 500-cfs | 500.00 | 204.96 | 213.42 | 208.52 | 213.47 | 0.000288 | 2.02 | 347.32 | 94.64 | 0.14 |
| 1 | 2950 | 750-cfs | 750.00 | 204.96 | 214.76 | 209.47 | 214.82 | 0.000279 | 2.26 | 473.91 | 94.64 | 0.14 |
| | | | | | | | | | | | | |
| 1 | 2450.* | 200-cfs | 200.00 | 204.98 | 210.81 | 206.49 | 210.82 | 0.000121 | 1.00 | 199.57 | 59.01 | 0.09 |
| 1 | 2450.* | 300-cfs | 300.00 | 204.98 | 211.98 | 206.85 | 212.00 | 0.000108 | 1.13 | 300.83 | 93.60 | 0.09 |
| 1 | 2450.* | 400-cfs | 400.00 | 204.98 | 212.70 | 207.17 | 212.73 | 0.000116 | 1.27 | 368.57 | 93.60 | 0.09 |
| 1 | 2450.* | 500-cfs | 500.00 | 204.98 | 213.35 | 207.46 | 213.38 | 0.000122 | 1.40 | 429.24 | 93.60 | 0.10 |
| 1 | 2450.* | 750-cfs | 750.00 | 204.98 | 214.68 | 208.09 | 214.72 | 0.000135 | 1.66 | 553.91 | 93.60 | 0.10 |
| | | | | | | | | | | | | |
| 1 | 1950 | 200-cfs | 200.00 | 205.00 | 210.78 | 206.22 | 210.79 | 0.000048 | 0.76 | 262.53 | 74.62 | 0.06 |
| 1 | 1950 | 300-cfs | 300.00 | 205.00 | 211.94 | 206.50 | 211.96 | 0.000055 | 0.93 | 321.29 | 92.56 | 0.07 |

HEC-RAS Plan: Plan 01 River: Champlin Slough Reach: 1 (Continued)

| 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) | |
| 1 | 1950 | 400-cfs | 400.00 | 205.00 | 212.66 | 206.73 | 212.68 | 0.000069 | 1.12 | 357.38 | 92.56 | 0.07 |
| 1 | 1950 | 500-cfs | 500.00 | 205.00 | 213.31 | 206.96 | 213.33 | 0.000066 | 1.05 | 516.11 | 92.56 | 0.07 |
| 1 | 1950 | 750-cfs | 750.00 | 205.00 | 214.64 | 207.45 | 214.67 | 0.000078 | 1.29 | 638.90 | 92.56 | 0.08 |
| | | | | | | | | | | | | |
| 1 | 1895 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 1800 | 200-cfs | 200.00 | 204.61 | 210.74 | 206.95 | 210.76 | 0.000141 | 1.05 | 190.69 | 53.29 | 0.09 |
| 1 | 1800 | 300-cfs | 300.00 | 204.61 | 211.90 | 207.33 | 211.92 | 0.000131 | 1.21 | 248.36 | 105.96 | 0.10 |
| 1 | 1800 | 400-cfs | 400.00 | 204.61 | 212.60 | 207.63 | 212.63 | 0.000150 | 1.41 | 283.26 | 121.13 | 0.10 |
| 1 | 1800 | 500-cfs | 500.00 | 204.61 | 213.22 | 207.91 | 213.25 | 0.000140 | 1.36 | 451.55 | 158.06 | 0.10 |
| 1 | 1800 | 750-cfs | 750.00 | 204.61 | 214.54 | 208.50 | 214.57 | 0.000130 | 1.51 | 659.46 | 158.06 | 0.10 |
| | | | | | | | | | | | | |
| 1 | 1340.* | 200-cfs | 200.00 | 203.96 | 210.66 | 206.40 | 210.68 | 0.000186 | 1.15 | 174.11 | 48.39 | 0.11 |
| 1 | 1340.* | 300-cfs | 300.00 | 203.96 | 211.83 | 206.92 | 211.85 | 0.000173 | 1.28 | 240.56 | 82.91 | 0.11 |
| 1 | 1340.* | 400-cfs | 400.00 | 203.96 | 212.52 | 207.37 | 212.55 | 0.000182 | 1.45 | 299.39 | 103.92 | 0.11 |
| 1 | 1340.* | 500-cfs | 500.00 | 203.96 | 213.14 | 207.84 | 213.17 | 0.000183 | 1.57 | 377.83 | 120.40 | 0.11 |
| 1 | 1340.* | 750-cfs | 750.00 | 203.96 | 214.45 | 208.56 | 214.50 | 0.000178 | 1.77 | 536.07 | 120.40 | 0.12 |
| | | | | | | | | | | | | |
| 1 | 880 | 200-cfs | 200.00 | 203.32 | 210.56 | 205.92 | 210.58 | 0.000247 | 1.30 | 153.77 | 42.50 | 0.12 |
| 1 | 880 | 300-cfs | 300.00 | 203.32 | 211.73 | 206.48 | 211.76 | 0.000227 | 1.46 | 206.99 | 55.51 | 0.12 |
| 1 | 880 | 400-cfs | 400.00 | 203.32 | 212.41 | 206.98 | 212.45 | 0.000250 | 1.68 | 247.32 | 79.64 | 0.13 |
| 1 | 880 | 500-cfs | 500.00 | 203.32 | 213.02 | 207.41 | 213.07 | 0.000259 | 1.84 | 303.67 | 82.73 | 0.13 |
| 1 | 880 | 750-cfs | 750.00 | 203.32 | 214.33 | 208.32 | 214.39 | 0.000271 | 2.15 | 411.56 | 82.73 | 0.14 |
| | | | | | | | | | | | | |
| 1 | 440.* | 200-cfs | 200.00 | 203.14 | 210.46 | 205.84 | 210.49 | 0.000200 | 1.24 | 161.03 | 40.87 | 0.11 |
| 1 | 440.* | 300-cfs | 300.00 | 203.14 | 211.63 | 206.52 | 211.67 | 0.000199 | 1.42 | 217.13 | 79.37 | 0.11 |
| 1 | 440.* | 400-cfs | 400.00 | 203.14 | 212.31 | 206.96 | 212.35 | 0.000215 | 1.61 | 280.02 | 89.17 | 0.12 |
| 1 | 440.* | 500-cfs | 500.00 | 203.14 | 212.92 | 207.37 | 212.97 | 0.000223 | 1.75 | 334.32 | 89.17 | 0.13 |
| 1 | 440.* | 750-cfs | 750.00 | 203.14 | 214.22 | 208.19 | 214.28 | 0.000234 | 2.04 | 450.32 | 89.17 | 0.13 |
| | | | | | | | | | | | | |
| 1 | 0 | 200-cfs | 200.00 | 202.95 | 210.36 | 205.39 | 210.39 | 0.000250 | 1.34 | 149.61 | 39.85 | 0.12 |
| 1 | 0 | 300-cfs | 300.00 | 202.95 | 211.53 | 205.91 | 211.57 | 0.000250 | 1.49 | 213.79 | 92.49 | 0.12 |
| 1 | 0 | 400-cfs | 400.00 | 202.95 | 212.21 | 206.38 | 212.25 | 0.000250 | 1.64 | 291.28 | 95.61 | 0.13 |
| 1 | 0 | 500-cfs | 500.00 | 202.95 | 212.82 | 206.80 | 212.86 | 0.000250 | 1.76 | 349.44 | 95.61 | 0.13 |
| 1 | 0 | 750-cfs | 750.00 | 202.95 | 214.12 | 207.78 | 214.17 | 0.000250 | 2.01 | 473.75 | 95.61 | 0.13 |


Los Molinos Creek, Assumed geometry
Plan: Plan 01
12/1/2007
Los Molinos Cree 1
STATE ROUTE 99E
SHERWOOD BLVD
BUENA VISTA AVENUE
Legend
WS 500-cfs
WS 400-cfs
WS 300-cfs
WS 200-cfs
WS 100-cfs
Ground
Elevation (ft)
Main Channel Distance (ft)
250
245
240
235
230
225
0
500
1000
1500
2000
2500
75
290.*
480.*
670.*
860.*
1050
1115
1337.5*
1525.*
1712.5*
1900
1985
2100


Los Molinos Creek, Assumed geometry
Plan: Plan 01
12/1/2007
RS = 2000
.06
.05
.06
Legend
WS 500-cfs
WS 400-cfs
WS 300-cfs
WS 200-cfs
WS 100-cfs
Ground
Ineff
Bank Sta
Elevation (ft)
249
248
247
246
245
244
243
242
0
50
100
150
200
Station (ft)

HEC-RAS Plan: Plan 01 River: Los Molinos Cree Reach: 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) | |
| 1 | 2100 | 200-cfs | 200.00 | 242.95 | 246.06 | 244.62 | 246.22 | 0.003847 | 3.25 | 61.60 | 24.42 | 0.36 |
| 1 | 2100 | 300-cfs | 300.00 | 242.95 | 247.27 | 245.09 | 247.43 | 0.002653 | 3.22 | 93.13 | 27.80 | 0.31 |
| 1 | 2100 | 400-cfs | 400.00 | 242.95 | 247.85 | 245.50 | 248.05 | 0.002969 | 3.64 | 109.75 | 29.43 | 0.33 |
| 1 | 2100 | 500-cfs | 500.00 | 242.95 | 248.22 | 245.87 | 248.48 | 0.003376 | 4.09 | 133.07 | 200.00 | 0.36 |
| | | | | | | | | | | | | |
| 1 | 2000 | 200-cfs | 200.00 | 242.35 | 245.76 | 244.03 | 245.89 | 0.002770 | 2.90 | 69.03 | 25.26 | 0.31 |
| 1 | 2000 | 300-cfs | 300.00 | 242.35 | 247.06 | 244.49 | 247.19 | 0.001920 | 2.87 | 104.44 | 28.92 | 0.27 |
| 1 | 2000 | 400-cfs | 400.00 | 242.35 | 247.62 | 244.90 | 247.79 | 0.002157 | 3.27 | 133.22 | 200.00 | 0.29 |
| 1 | 2000 | 500-cfs | 500.00 | 242.35 | 248.00 | 245.27 | 248.18 | 0.002259 | 3.55 | 170.71 | 200.00 | 0.30 |
| | | | | | | | | | | | | |
| 1 | 1985 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 1900 | 200-cfs | 200.00 | 241.75 | 244.34 | 243.42 | 244.60 | 0.007314 | 4.05 | 49.41 | 22.98 | 0.49 |
| 1 | 1900 | 300-cfs | 300.00 | 241.75 | 244.97 | 243.89 | 245.31 | 0.007642 | 4.66 | 64.32 | 24.73 | 0.51 |
| 1 | 1900 | 400-cfs | 400.00 | 241.75 | 245.49 | 244.30 | 245.91 | 0.007894 | 5.15 | 77.70 | 26.20 | 0.53 |
| 1 | 1900 | 500-cfs | 500.00 | 241.75 | 245.95 | 244.66 | 246.43 | 0.008128 | 5.56 | 89.96 | 27.48 | 0.54 |
| | | | | | | | | | | | | |
| 1 | 1712.5* | 200-cfs | 200.00 | 240.62 | 243.00 | 242.20 | 243.25 | 0.007043 | 4.03 | 49.69 | 25.37 | 0.51 |
| 1 | 1712.5* | 300-cfs | 300.00 | 240.62 | 243.57 | 242.64 | 243.91 | 0.007323 | 4.63 | 64.74 | 27.35 | 0.53 |
| 1 | 1712.5* | 400-cfs | 400.00 | 240.62 | 244.05 | 243.02 | 244.46 | 0.007553 | 5.12 | 78.20 | 29.01 | 0.55 |
| 1 | 1712.5* | 500-cfs | 500.00 | 240.62 | 244.47 | 243.36 | 244.94 | 0.007745 | 5.52 | 90.63 | 30.45 | 0.56 |
| | | | | | | | | | | | | |
| 1 | 1525.* | 200-cfs | 200.00 | 239.50 | 241.68 | 240.98 | 241.93 | 0.007187 | 4.02 | 49.78 | 28.05 | 0.53 |
| 1 | 1525.* | 300-cfs | 300.00 | 239.50 | 242.21 | 241.40 | 242.54 | 0.007263 | 4.58 | 65.49 | 30.39 | 0.55 |
| 1 | 1525.* | 400-cfs | 400.00 | 239.50 | 242.64 | 241.76 | 243.04 | 0.007535 | 5.07 | 78.95 | 32.27 | 0.57 |
| 1 | 1525.* | 500-cfs | 500.00 | 239.50 | 242.97 | 242.08 | 243.45 | 0.008130 | 5.56 | 89.87 | 33.71 | 0.60 |
| | | | | | | | | | | | | |
| 1 | 1337.5* | 200-cfs | 200.00 | 238.38 | 240.59 | 239.79 | 240.78 | 0.005078 | 3.53 | 56.73 | 32.40 | 0.47 |
| 1 | 1337.5* | 300-cfs | 300.00 | 238.38 | 241.28 | 240.17 | 241.50 | 0.004136 | 3.72 | 80.70 | 36.33 | 0.44 |
| 1 | 1337.5* | 400-cfs | 400.00 | 238.38 | 241.71 | 240.51 | 241.97 | 0.004186 | 4.12 | 101.10 | 84.66 | 0.45 |
| 1 | 1337.5* | 500-cfs | 500.00 | 238.38 | 241.91 | 240.80 | 242.25 | 0.004909 | 4.70 | 115.33 | 128.87 | 0.50 |
| | | | | | | | | | | | | |
| 1 | 1150 | 200-cfs | 200.00 | 237.25 | 240.38 | 238.58 | 240.44 | 0.000775 | 1.90 | 113.50 | 149.24 | 0.21 |
| 1 | 1150 | 300-cfs | 300.00 | 237.25 | 241.27 | 238.93 | 241.29 | 0.000323 | 1.50 | 307.54 | 200.00 | 0.14 |
| 1 | 1150 | 400-cfs | 400.00 | 237.25 | 241.74 | 239.25 | 241.77 | 0.000281 | 1.53 | 402.16 | 200.00 | 0.14 |
| 1 | 1150 | 500-cfs | 500.00 | 237.25 | 241.97 | 239.52 | 242.00 | 0.000324 | 1.70 | 448.28 | 200.00 | 0.15 |
| | | | | | | | | | | | | |
| 1 | 1115 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 1050 | 200-cfs | 200.00 | 236.55 | 238.23 | 237.88 | 238.53 | 0.009796 | 4.41 | 45.33 | 34.08 | 0.67 |
| 1 | 1050 | 300-cfs | 300.00 | 236.55 | 238.64 | 238.24 | 239.03 | 0.009748 | 5.00 | 60.04 | 37.24 | 0.69 |
| 1 | 1050 | 400-cfs | 400.00 | 236.55 | 238.99 | 238.55 | 239.45 | 0.009662 | 5.43 | 73.60 | 39.93 | 0.71 |
| 1 | 1050 | 500-cfs | 500.00 | 236.55 | 239.24 | 238.83 | 239.79 | 0.009747 | 5.94 | 87.26 | 78.77 | 0.72 |
| | | | | | | | | | | | | |
| 1 | 860.* | 200-cfs | 200.00 | 234.90 | 236.54 | 236.13 | 236.79 | 0.008276 | 4.04 | 49.54 | 37.55 | 0.62 |
| 1 | 860.* | 300-cfs | 300.00 | 234.90 | 236.92 | 236.47 | 237.25 | 0.008700 | 4.67 | 64.19 | 40.51 | 0.65 |
| 1 | 860.* | 400-cfs | 400.00 | 234.90 | 237.23 | 236.76 | 237.65 | 0.009034 | 5.18 | 77.27 | 42.97 | 0.68 |
| 1 | 860.* | 500-cfs | 500.00 | 234.90 | 237.51 | 237.02 | 237.99 | 0.008864 | 5.57 | 91.71 | 73.29 | 0.69 |
| | | | | | | | | | | | | |
| 1 | 670.* | 200-cfs | 200.00 | 233.25 | 234.67 | 234.41 | 234.96 | 0.011388 | 4.36 | 45.89 | 39.50 | 0.71 |
| 1 | 670.* | 300-cfs | 300.00 | 233.25 | 235.04 | 234.72 | 235.41 | 0.010792 | 4.89 | 61.31 | 42.53 | 0.72 |
| 1 | 670.* | 400-cfs | 400.00 | 233.25 | 235.36 | 235.00 | 235.80 | 0.010425 | 5.30 | 75.42 | 45.13 | 0.72 |
| 1 | 670.* | 500-cfs | 500.00 | 233.25 | 235.61 | 235.24 | 236.12 | 0.010895 | 5.78 | 86.57 | 47.08 | 0.75 |
| | | | | | | | | | | | | |
| 1 | 480.* | 200-cfs | 200.00 | 231.60 | 233.19 | 232.70 | 233.37 | 0.006191 | 3.46 | 57.84 | 44.61 | 0.54 |
| 1 | 480.* | 300-cfs | 300.00 | 231.60 | 233.54 | 232.99 | 233.79 | 0.006639 | 4.05 | 74.14 | 47.53 | 0.57 |
| 1 | 480.* | 400-cfs | 400.00 | 231.60 | 233.83 | 233.25 | 234.15 | 0.007097 | 4.54 | 88.09 | 49.90 | 0.60 |
| 1 | 480.* | 500-cfs | 500.00 | 231.60 | 234.17 | 233.49 | 234.52 | 0.006389 | 4.73 | 107.11 | 85.03 | 0.58 |
| | | | | | | | | | | | | |
| 1 | 290.* | 200-cfs | 200.00 | 229.95 | 231.06 | 230.99 | 231.43 | 0.019515 | 4.90 | 40.83 | 44.30 | 0.90 |
| 1 | 290.* | 300-cfs | 300.00 | 229.95 | 231.37 | 231.27 | 231.83 | 0.017500 | 5.44 | 55.10 | 46.95 | 0.89 |
| 1 | 290.* | 400-cfs | 400.00 | 229.95 | 231.65 | 231.52 | 232.18 | 0.016039 | 5.83 | 68.58 | 49.33 | 0.87 |
| 1 | 290.* | 500-cfs | 500.00 | 229.95 | 231.74 | 231.74 | 232.47 | 0.020879 | 6.86 | 72.88 | 50.06 | 1.00 |
| | | | | | | | | | | | | |
| 1 | 100 | 200-cfs | 200.00 | 228.30 | 230.06 | 229.30 | 230.17 | 0.003018 | 2.59 | 77.19 | 53.60 | 0.38 |
| 1 | 100 | 300-cfs | 300.00 | 228.30 | 230.61 | 229.57 | 230.73 | 0.002512 | 2.79 | 107.68 | 58.34 | 0.36 |
| 1 | 100 | 400-cfs | 400.00 | 228.30 | 231.07 | 229.80 | 231.20 | 0.002106 | 2.91 | 145.98 | 200.00 | 0.34 |
| 1 | 100 | 500-cfs | 500.00 | 228.30 | 231.54 | 230.01 | 231.63 | 0.001222 | 2.52 | 267.53 | 200.00 | 0.27 |
| | | | | | | | | | | | | |
| 1 | 75 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 0 | 200-cfs | 200.00 | 227.50 | 230.02 | 228.51 | 230.06 | 0.000801 | 1.66 | 121.20 | 200.00 | 0.21 |
| 1 | 0 | 300-cfs | 300.00 | 227.50 | 230.52 | 228.76 | 230.57 | 0.000800 | 1.93 | 170.66 | 200.00 | 0.21 |
| 1 | 0 | 400-cfs | 400.00 | 227.50 | 230.92 | 229.00 | 230.99 | 0.000801 | 2.13 | 210.94 | 200.00 | 0.22 |
| 1 | 0 | 500-cfs | 500.00 | 227.50 | 231.28 | 229.21 | 231.35 | 0.000801 | 2.30 | 246.55 | 200.00 | 0.22 |