

# National Flood Hazard Layer FIRMette



## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

|                             |  |                                                                                                                                                                   |
|-----------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SPECIAL FLOOD HAZARD AREAS  |  | Without Base Flood Elevation (BFE)<br>Zone A, V, A99                                                                                                              |
|                             |  | With BFE or Depth Zone AE, AO, AH, VE, AR                                                                                                                         |
|                             |  | Regulatory Floodway                                                                                                                                               |
| OTHER AREAS OF FLOOD HAZARD |  | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X |
|                             |  | Future Conditions 1% Annual Chance Flood Hazard Zone X                                                                                                            |
|                             |  | Area with Reduced Flood Risk due to Levee. See Notes. Zone X                                                                                                      |
|                             |  | Area with Flood Risk due to Levee Zone D                                                                                                                          |
| OTHER AREAS                 |  | NO SCREEN Area of Minimal Flood Hazard Zone X                                                                                                                     |
|                             |  | Effective LOMRs                                                                                                                                                   |
|                             |  | Area of Undetermined Flood Hazard Zone D                                                                                                                          |
| GENERAL STRUCTURES          |  | Channel, Culvert, or Storm Sewer                                                                                                                                  |
|                             |  | Levee, Dike, or Floodwall                                                                                                                                         |
| OTHER FEATURES              |  | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation                                                                                                 |
|                             |  | 17.5                                                                                                                                                              |
|                             |  | Coastal Transect                                                                                                                                                  |
|                             |  | Base Flood Elevation Line (BFE)                                                                                                                                   |
|                             |  | Limit of Study                                                                                                                                                    |
|                             |  | Jurisdiction Boundary                                                                                                                                             |
|                             |  | Coastal Transect Baseline                                                                                                                                         |
| MAP PANELS                  |  | Digital Data Available                                                                                                                                            |
|                             |  | No Digital Data Available                                                                                                                                         |
|                             |  | Unmapped                                                                                                                                                          |



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/13/2018 at 8:42:58 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



34°1'34.78"N

117°52'19.36"W

0 250 500 1,000 1,500 2,000 Feet

1:6,000

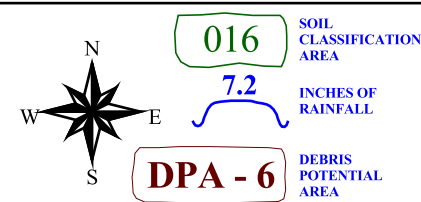
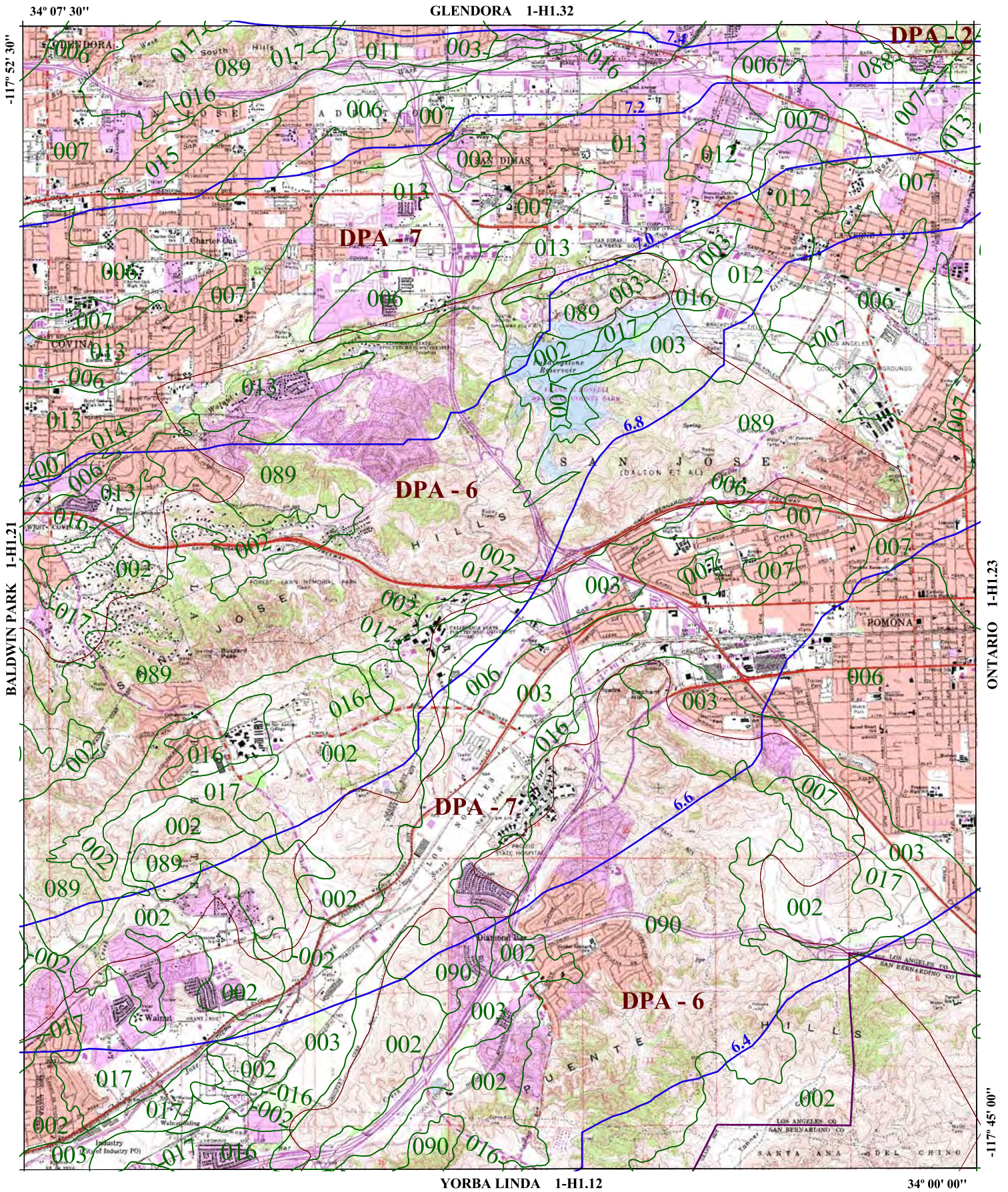
34°1'4.96"N

117°51'4.90"W

USGS The National Map: Orthoimagery. Data refreshed October 2017.

## **Appendix A: Project Information**

- **San Dimas 50-Year 24-Hour Isohyet and Soil Classification**



1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878  
 10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

# **SAN DIMAS** **50-YEAR 24-HOUR ISOHYET**

**1-H1.22**



## **Appendix B: HydroCalc Hydrology**

### **Pre-Development**

- 25-YR
- 50-YR

### **Post-Development**

- 25-YR
- 50-YR

## **Pre-Development HydroCalc**

## Peak Flow Hydrologic Analysis

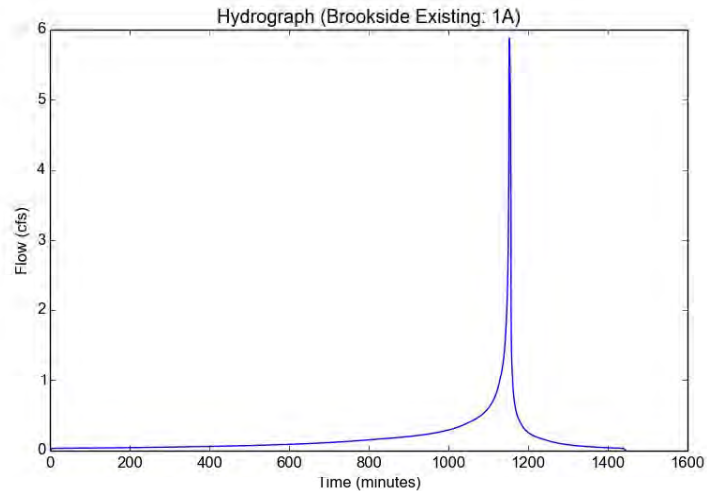
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 1A                 |
| Area (ac)                 | 1.87               |
| Flow Path Length (ft)     | 623.8              |
| Flow Path Slope (vft/hft) | 0.128246233        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 3.5097     |
| Undeveloped Runoff Coefficient (Cu) | 0.896      |
| Developed Runoff Coefficient (Cd)   | 0.896      |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 5.8807     |
| Burned Peak Flow Rate (cfs)         | 5.8807     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.3705     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 16137.0701 |



## Peak Flow Hydrologic Analysis

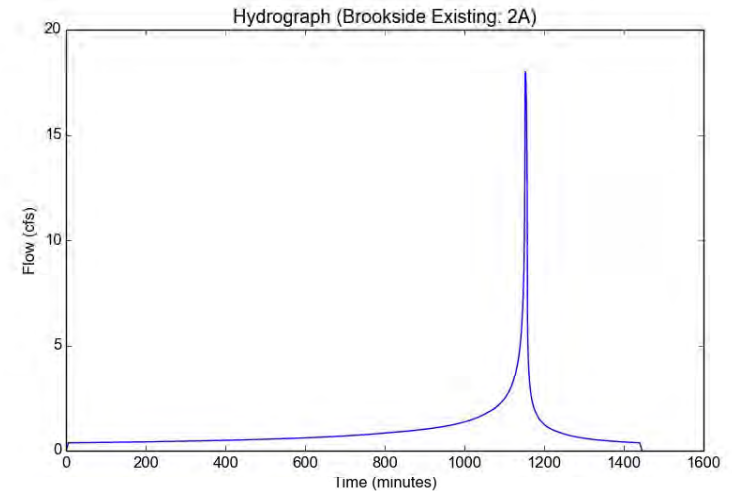
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Existing Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 2A                 |
| Area (ac)                 | 6.26               |
| Flow Path Length (ft)     | 739.9              |
| Flow Path Slope (vft/hft) | 0.075685904        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 3.2215     |
| Undeveloped Runoff Coefficient (Cu) | 0.889      |
| Developed Runoff Coefficient (Cd)   | 0.8936     |
| Time of Concentration (min)         | 6.0        |
| Clear Peak Flow Rate (cfs)          | 18.0214    |
| Burned Peak Flow Rate (cfs)         | 18.0214    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.8608     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 81056.8005 |



## Peak Flow Hydrologic Analysis

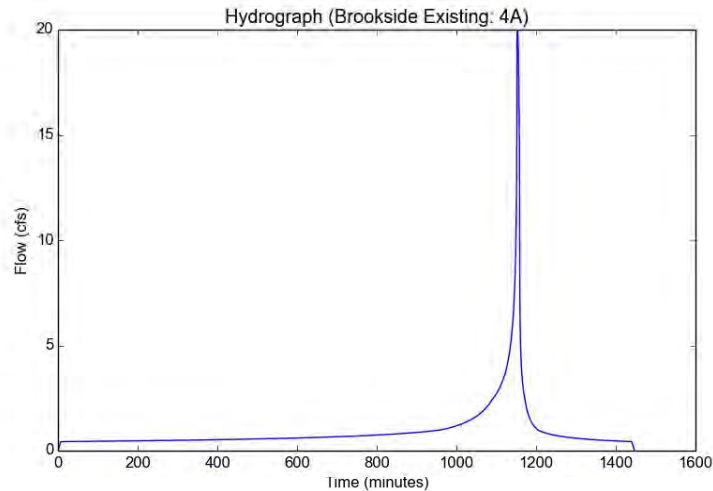
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 4A                 |
| Area (ac)                 | 7.45               |
| Flow Path Length (ft)     | 949.3              |
| Flow Path Slope (vft/hft) | 0.067418098        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.9963     |
| Undeveloped Runoff Coefficient (Cu) | 0.8924     |
| Developed Runoff Coefficient (Cd)   | 0.8956     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 19.9921    |
| Burned Peak Flow Rate (cfs)         | 19.9921    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.9036     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 82919.2725 |



## Peak Flow Hydrologic Analysis

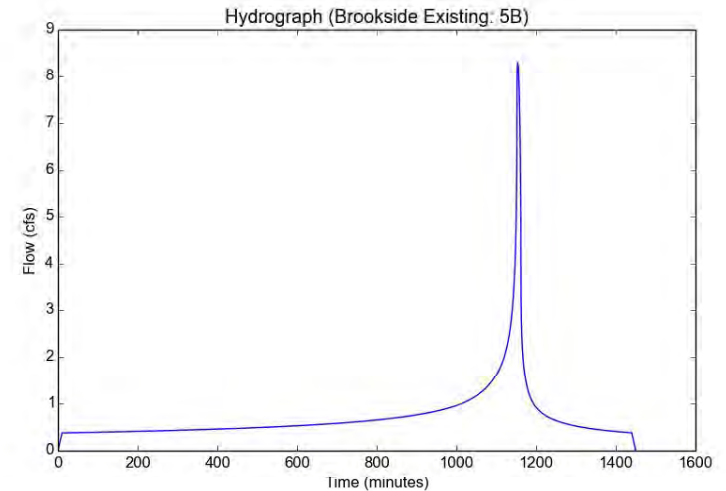
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 5B                 |
| Area (ac)                 | 3.81               |
| Flow Path Length (ft)     | 1009.4             |
| Flow Path Slope (vft/hft) | 0.023776501        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.82               |
| Soil Type                 | 89                 |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |           |
|-------------------------------------|-----------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826    |
| Peak Intensity (in/hr)              | 2.5339    |
| Undeveloped Runoff Coefficient (Cu) | 0.6807    |
| Developed Runoff Coefficient (Cd)   | 0.8605    |
| Time of Concentration (min)         | 10.0      |
| Clear Peak Flow Rate (cfs)          | 8.3077    |
| Burned Peak Flow Rate (cfs)         | 8.3077    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.4321    |
| 24-Hr Clear Runoff Volume (cu-ft)   | 62382.423 |



## Peak Flow Hydrologic Analysis

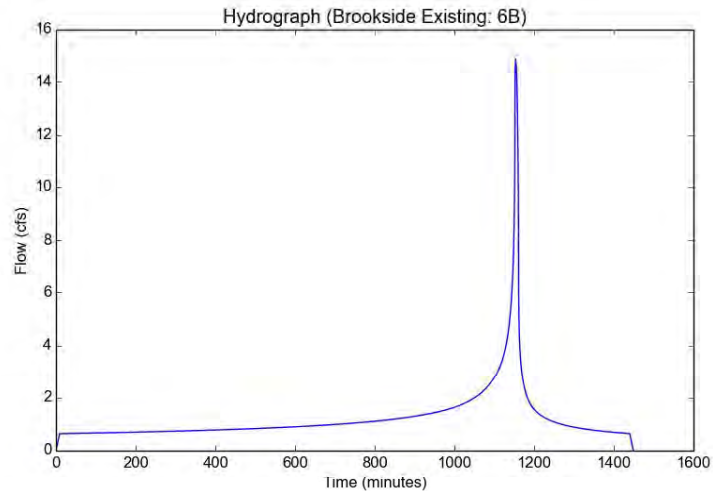
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 6B                 |
| Area (ac)                 | 6.49               |
| Flow Path Length (ft)     | 1255.8             |
| Flow Path Slope (vft/hft) | 0.070871158        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.82               |
| Soil Type                 | 89                 |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.6625     |
| Undeveloped Runoff Coefficient (Cu) | 0.6879     |
| Developed Runoff Coefficient (Cd)   | 0.8618     |
| Time of Concentration (min)         | 9.0        |
| Clear Peak Flow Rate (cfs)          | 14.8921    |
| Burned Peak Flow Rate (cfs)         | 14.8921    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 2.4395     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 106265.745 |



## Peak Flow Hydrologic Analysis

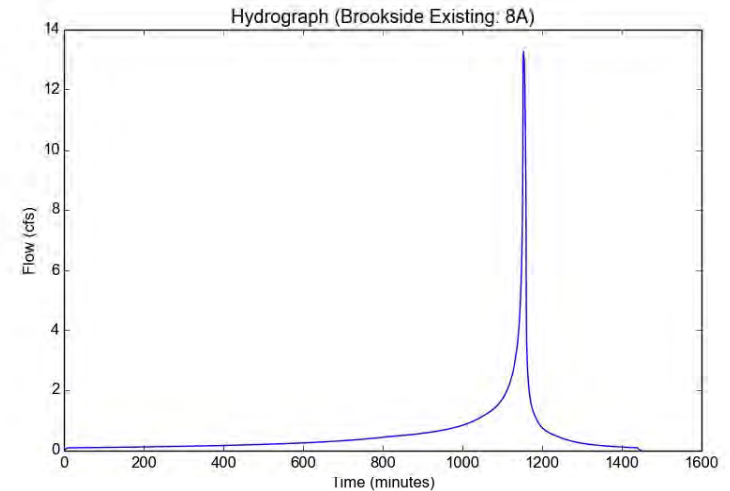
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 8A                 |
| Area (ac)                 | 5.39               |
| Flow Path Length (ft)     | 1116.4             |
| Flow Path Slope (vft/hft) | 0.083751344        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.8141     |
| Undeveloped Runoff Coefficient (Cu) | 0.8754     |
| Developed Runoff Coefficient (Cd)   | 0.8757     |
| Time of Concentration (min)         | 8.0        |
| Clear Peak Flow Rate (cfs)          | 13.2824    |
| Burned Peak Flow Rate (cfs)         | 13.2824    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.0671     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 46483.9761 |



## Peak Flow Hydrologic Analysis

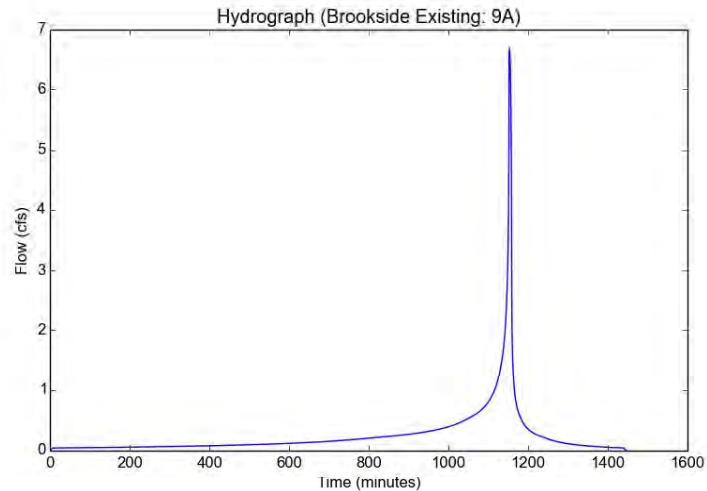
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Existing Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 9A                 |
| Area (ac)                 | 2.53               |
| Flow Path Length (ft)     | 912.2              |
| Flow Path Slope (vft/hft) | 0.060293795        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.9963     |
| Undeveloped Runoff Coefficient (Cu) | 0.8835     |
| Developed Runoff Coefficient (Cd)   | 0.8837     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 6.6989     |
| Burned Peak Flow Rate (cfs)         | 6.6989     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.501      |
| 24-Hr Clear Runoff Volume (cu-ft)   | 21825.6526 |



## Peak Flow Hydrologic Analysis

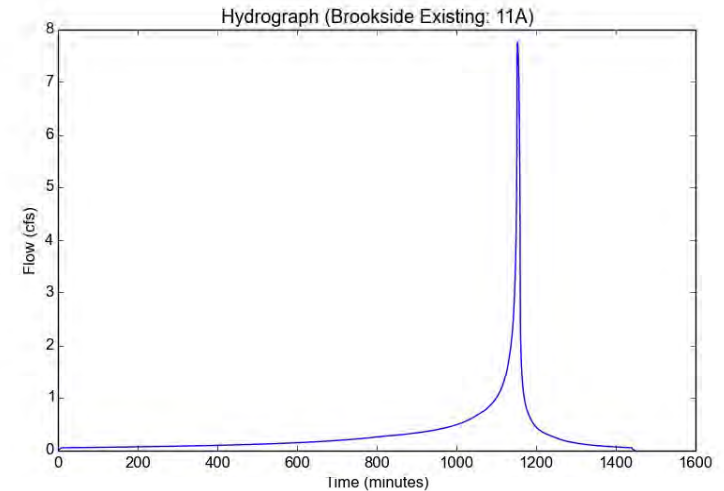
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 11A                |
| Area (ac)                 | 3.15               |
| Flow Path Length (ft)     | 890.9              |
| Flow Path Slope (vft/hft) | 0.040408576        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.8141     |
| Undeveloped Runoff Coefficient (Cu) | 0.8754     |
| Developed Runoff Coefficient (Cd)   | 0.8757     |
| Time of Concentration (min)         | 8.0        |
| Clear Peak Flow Rate (cfs)          | 7.7625     |
| Burned Peak Flow Rate (cfs)         | 7.7625     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.6236     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 27165.9601 |



## Peak Flow Hydrologic Analysis

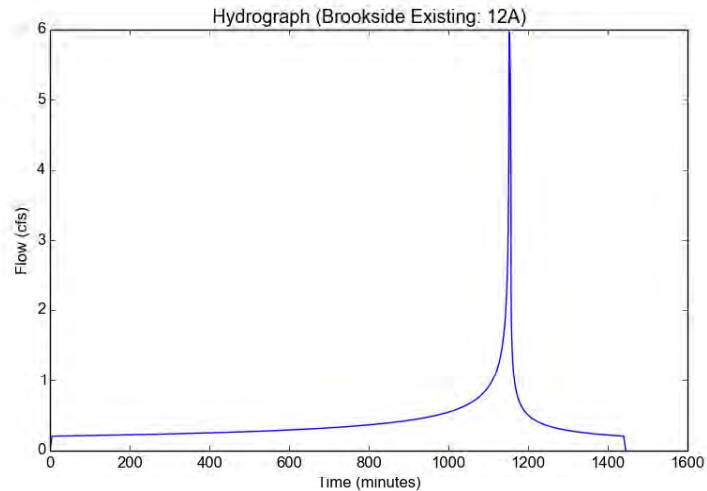
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 12A                |
| Area (ac)                 | 1.89               |
| Flow Path Length (ft)     | 508.8              |
| Flow Path Slope (vft/hft) | 0.074685535        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.91               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |           |
|-------------------------------------|-----------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826    |
| Peak Intensity (in/hr)              | 3.5097    |
| Undeveloped Runoff Coefficient (Cu) | 0.896     |
| Developed Runoff Coefficient (Cd)   | 0.8996    |
| Time of Concentration (min)         | 5.0       |
| Clear Peak Flow Rate (cfs)          | 5.9676    |
| Burned Peak Flow Rate (cfs)         | 5.9676    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.7858    |
| 24-Hr Clear Runoff Volume (cu-ft)   | 34230.606 |



## Peak Flow Hydrologic Analysis

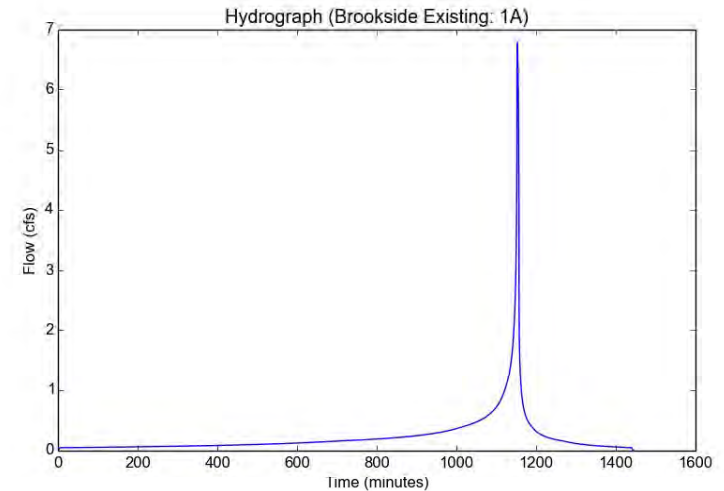
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 1A                 |
| Area (ac)                 | 1.87               |
| Flow Path Length (ft)     | 623.8              |
| Flow Path Slope (vft/hft) | 0.128246233        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.9974     |
| Undeveloped Runoff Coefficient (Cu) | 0.9078     |
| Developed Runoff Coefficient (Cd)   | 0.9077     |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 6.785      |
| Burned Peak Flow Rate (cfs)         | 6.785      |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.4638     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 20201.5437 |



## Peak Flow Hydrologic Analysis

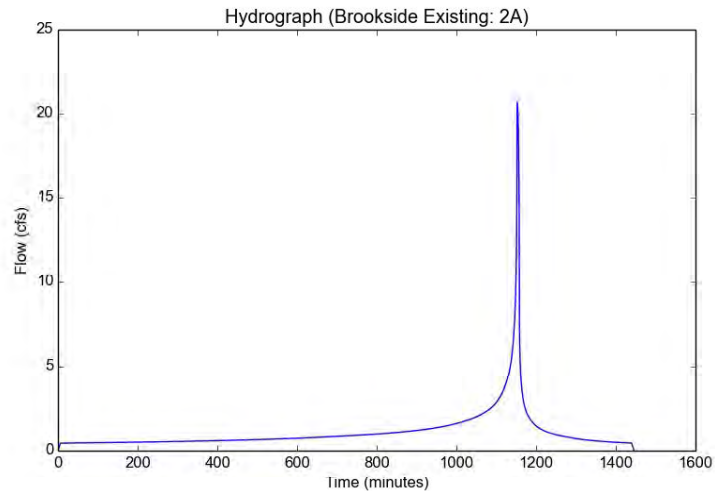
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 2A                 |
| Area (ac)                 | 6.26               |
| Flow Path Length (ft)     | 739.9              |
| Flow Path Slope (vft/hft) | 0.075685904        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.6691     |
| Undeveloped Runoff Coefficient (Cu) | 0.8998     |
| Developed Runoff Coefficient (Cd)   | 0.8999     |
| Time of Concentration (min)         | 6.0        |
| Clear Peak Flow Rate (cfs)          | 20.6696    |
| Burned Peak Flow Rate (cfs)         | 20.6696    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 2.2013     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 95890.2902 |



## Peak Flow Hydrologic Analysis

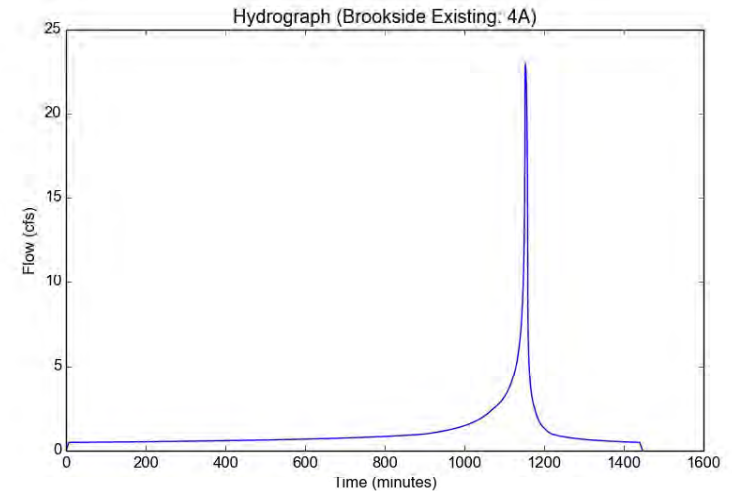
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 4A                 |
| Area (ac)                 | 7.45               |
| Flow Path Length (ft)     | 949.3              |
| Flow Path Slope (vft/hft) | 0.067418098        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |          |
|-------------------------------------|----------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7      |
| Peak Intensity (in/hr)              | 3.4127   |
| Undeveloped Runoff Coefficient (Cu) | 0.9084   |
| Developed Runoff Coefficient (Cd)   | 0.9048   |
| Time of Concentration (min)         | 7.0      |
| Clear Peak Flow Rate (cfs)          | 23.0054  |
| Burned Peak Flow Rate (cfs)         | 23.0054  |
| 24-Hr Clear Runoff Volume (ac-ft)   | 2.2268   |
| 24-Hr Clear Runoff Volume (cu-ft)   | 96998.32 |



## Peak Flow Hydrologic Analysis

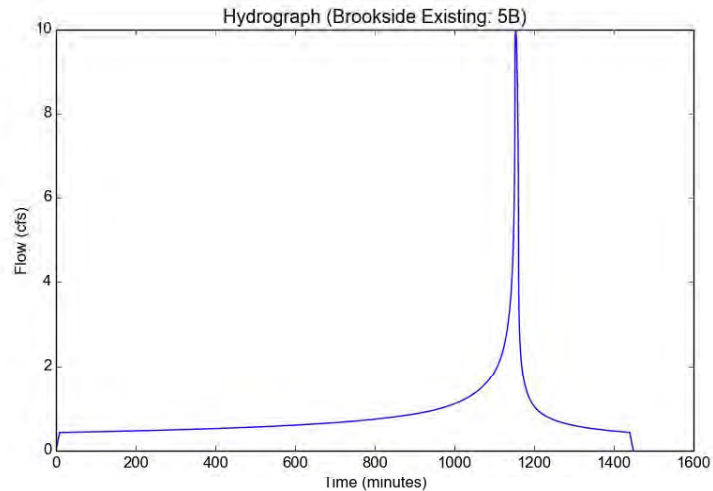
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 5B                 |
| Area (ac)                 | 3.81               |
| Flow Path Length (ft)     | 1009.4             |
| Flow Path Slope (vft/hft) | 0.023776501        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.82               |
| Soil Type                 | 89                 |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.0325     |
| Undeveloped Runoff Coefficient (Cu) | 0.7081     |
| Developed Runoff Coefficient (Cd)   | 0.8655     |
| Time of Concentration (min)         | 9.0        |
| Clear Peak Flow Rate (cfs)          | 9.9994     |
| Burned Peak Flow Rate (cfs)         | 9.9994     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.637      |
| 24-Hr Clear Runoff Volume (cu-ft)   | 71307.1908 |



## Peak Flow Hydrologic Analysis

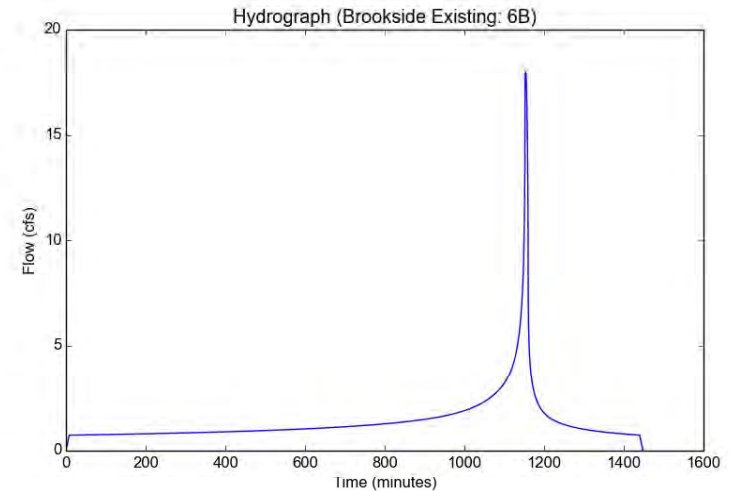
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Existing Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 6B                 |
| Area (ac)                 | 6.49               |
| Flow Path Length (ft)     | 1255.8             |
| Flow Path Slope (vft/hft) | 0.070871158        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.82               |
| Soil Type                 | 89                 |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |             |
|-------------------------------------|-------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7         |
| Peak Intensity (in/hr)              | 3.2051      |
| Undeveloped Runoff Coefficient (Cu) | 0.7155      |
| Developed Runoff Coefficient (Cd)   | 0.8668      |
| Time of Concentration (min)         | 8.0         |
| Clear Peak Flow Rate (cfs)          | 18.03       |
| Burned Peak Flow Rate (cfs)         | 18.03       |
| 24-Hr Clear Runoff Volume (ac-ft)   | 2.7885      |
| 24-Hr Clear Runoff Volume (cu-ft)   | 121468.4812 |



## Peak Flow Hydrologic Analysis

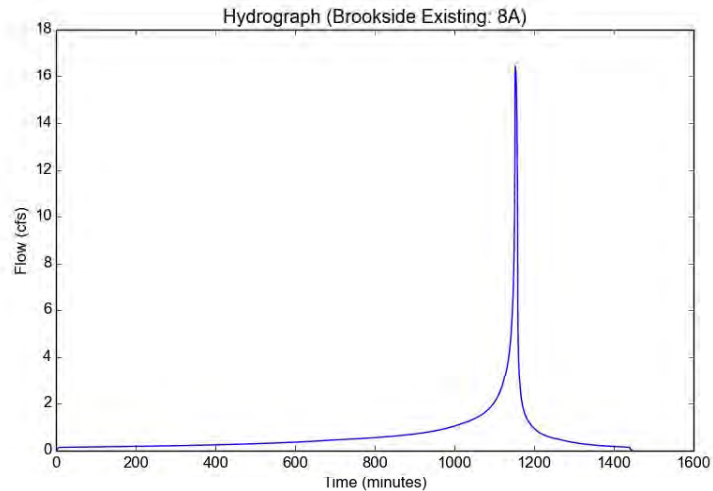
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Existing Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 8A                 |
| Area (ac)                 | 5.39               |
| Flow Path Length (ft)     | 1116.4             |
| Flow Path Slope (vft/hft) | 0.083751344        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.4127     |
| Undeveloped Runoff Coefficient (Cu) | 0.8936     |
| Developed Runoff Coefficient (Cd)   | 0.8937     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 16.4391    |
| Burned Peak Flow Rate (cfs)         | 16.4391    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.3363     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 58208.6293 |



## Peak Flow Hydrologic Analysis

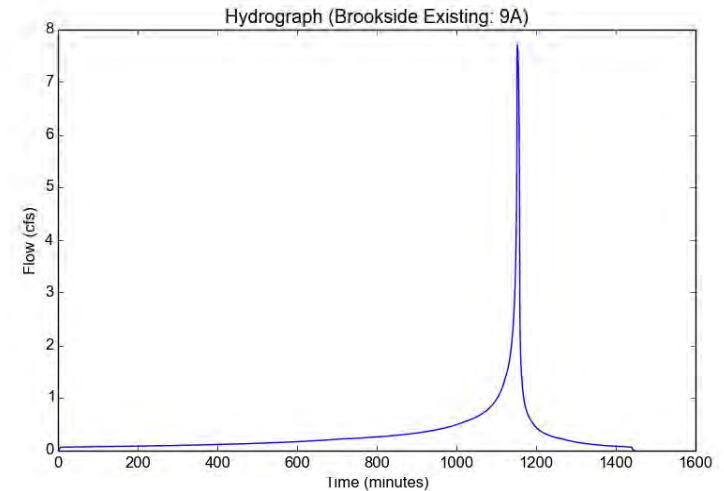
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Existing Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 9A                 |
| Area (ac)                 | 2.53               |
| Flow Path Length (ft)     | 912.2              |
| Flow Path Slope (vft/hft) | 0.060293795        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.4127     |
| Undeveloped Runoff Coefficient (Cu) | 0.8936     |
| Developed Runoff Coefficient (Cd)   | 0.8937     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 7.7163     |
| Burned Peak Flow Rate (cfs)         | 7.7163     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.6272     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 27322.4178 |



## Peak Flow Hydrologic Analysis

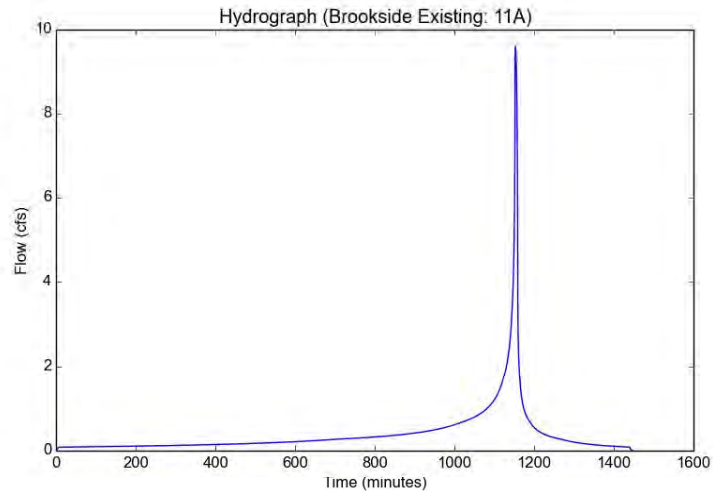
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Existing Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 11A                |
| Area (ac)                 | 3.15               |
| Flow Path Length (ft)     | 890.9              |
| Flow Path Slope (vft/hft) | 0.040408576        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.4127     |
| Undeveloped Runoff Coefficient (Cu) | 0.8936     |
| Developed Runoff Coefficient (Cd)   | 0.8937     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 9.6073     |
| Burned Peak Flow Rate (cfs)         | 9.6073     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.7809     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 34018.0301 |



## Peak Flow Hydrologic Analysis

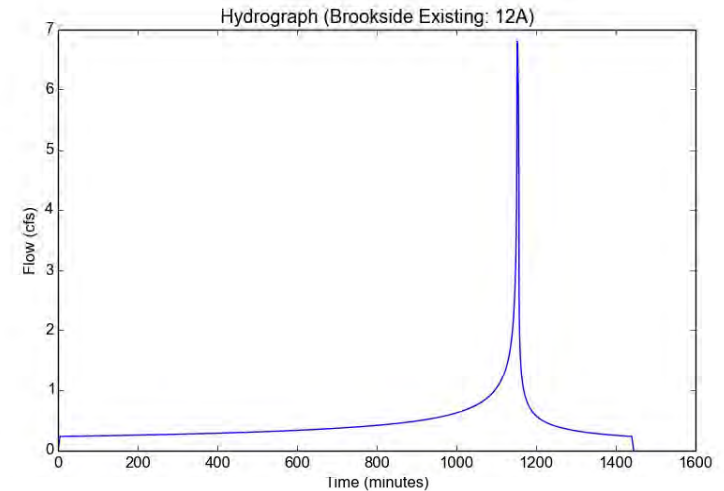
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Existing Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Existing |
| Subarea ID                | 12A                |
| Area (ac)                 | 1.89               |
| Flow Path Length (ft)     | 508.8              |
| Flow Path Slope (vft/hft) | 0.074685535        |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.91               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.9974     |
| Undeveloped Runoff Coefficient (Cu) | 0.9078     |
| Developed Runoff Coefficient (Cd)   | 0.9007     |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 6.8049     |
| Burned Peak Flow Rate (cfs)         | 6.8049     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.8989     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 39154.4483 |



## **Post-Development HydroCalc**

## Peak Flow Hydrologic Analysis

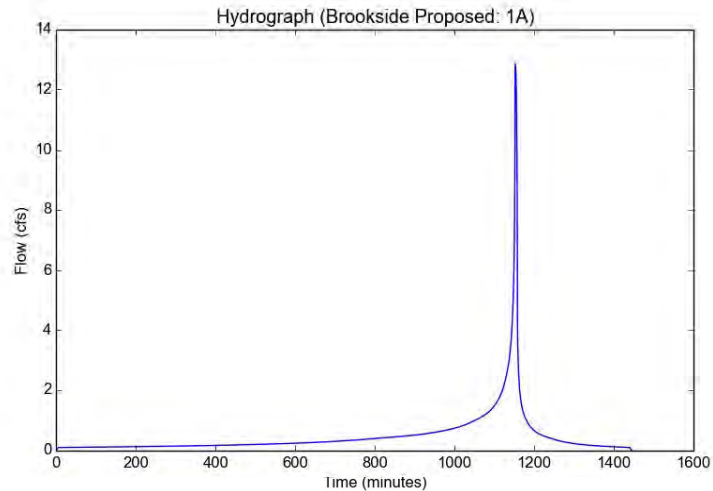
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 1A                 |
| Area (ac)                 | 4.49               |
| Flow Path Length (ft)     | 727.0              |
| Flow Path Slope (vft/hft) | 0.11               |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.07               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 3.2215     |
| Undeveloped Runoff Coefficient (Cu) | 0.889      |
| Developed Runoff Coefficient (Cd)   | 0.8898     |
| Time of Concentration (min)         | 6.0        |
| Clear Peak Flow Rate (cfs)          | 12.8703    |
| Burned Peak Flow Rate (cfs)         | 12.8703    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.9545     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 41579.8256 |



## Peak Flow Hydrologic Analysis

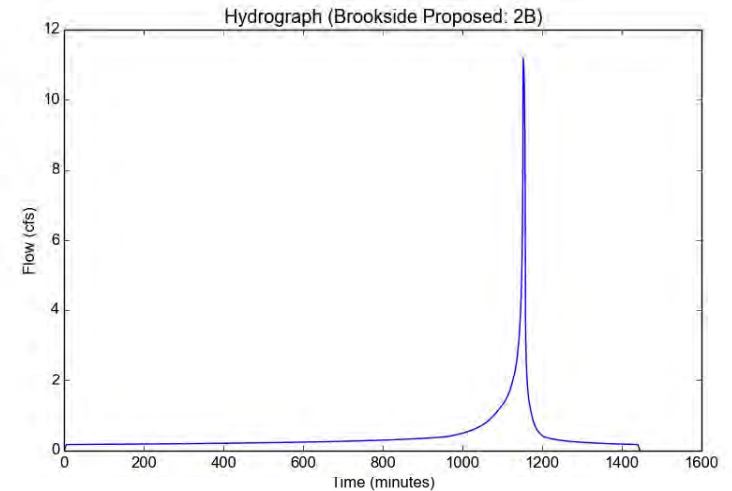
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 2B                 |
| Area (ac)                 | 3.85               |
| Flow Path Length (ft)     | 578.0              |
| Flow Path Slope (vft/hft) | 0.045              |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.301              |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 3.2215     |
| Undeveloped Runoff Coefficient (Cu) | 0.901      |
| Developed Runoff Coefficient (Cd)   | 0.9007     |
| Time of Concentration (min)         | 6.0        |
| Clear Peak Flow Rate (cfs)          | 11.1714    |
| Burned Peak Flow Rate (cfs)         | 11.1714    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.84       |
| 24-Hr Clear Runoff Volume (cu-ft)   | 36590.4413 |



## Peak Flow Hydrologic Analysis

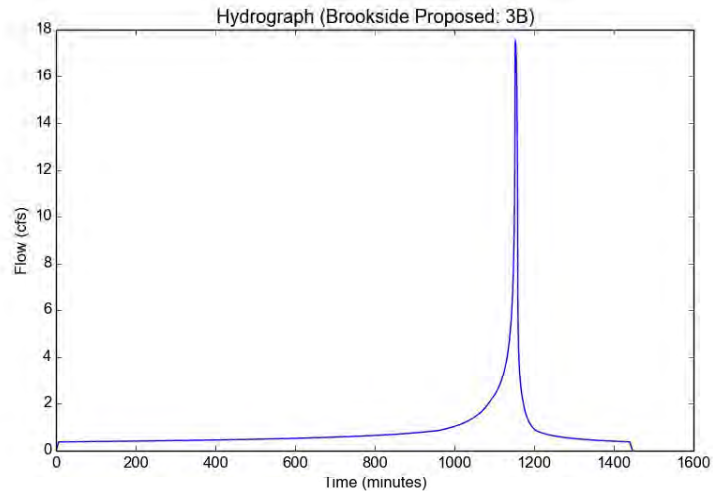
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 3B                 |
| Area (ac)                 | 6.54               |
| Flow Path Length (ft)     | 820.0              |
| Flow Path Slope (vft/hft) | 0.0433             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.9963     |
| Undeveloped Runoff Coefficient (Cu) | 0.8924     |
| Developed Runoff Coefficient (Cd)   | 0.8956     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 17.5501    |
| Burned Peak Flow Rate (cfs)         | 17.5501    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.671      |
| 24-Hr Clear Runoff Volume (cu-ft)   | 72790.8781 |



## Peak Flow Hydrologic Analysis

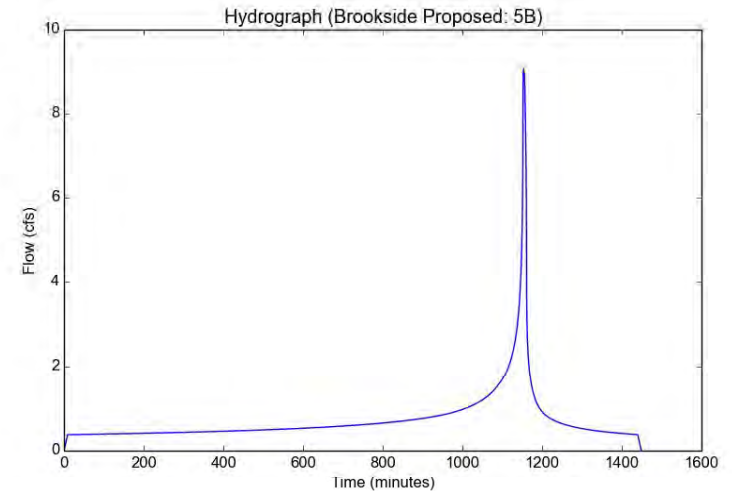
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 5B                 |
| Area (ac)                 | 3.81               |
| Flow Path Length (ft)     | 1009.0             |
| Flow Path Slope (vft/hft) | 0.0238             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.82               |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.6625     |
| Undeveloped Runoff Coefficient (Cu) | 0.8796     |
| Developed Runoff Coefficient (Cd)   | 0.8963     |
| Time of Concentration (min)         | 9.0        |
| Clear Peak Flow Rate (cfs)          | 9.0926     |
| Burned Peak Flow Rate (cfs)         | 9.0926     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.4518     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 63240.6667 |



## Peak Flow Hydrologic Analysis

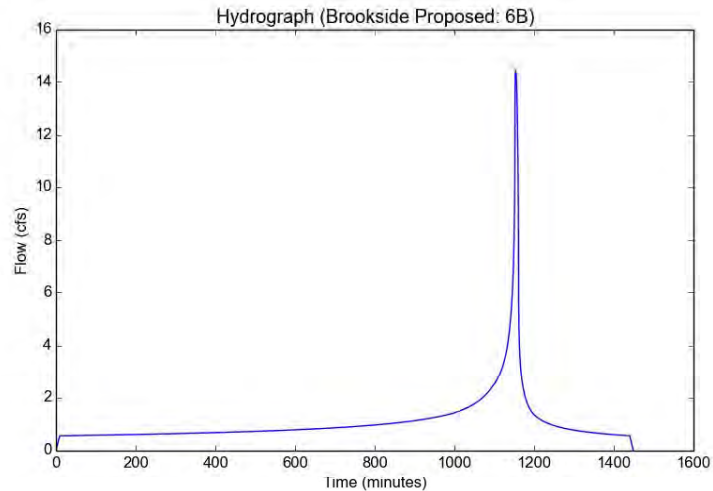
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 6B                 |
| Area (ac)                 | 6.49               |
| Flow Path Length (ft)     | 1256.0             |
| Flow Path Slope (vft/hft) | 0.0693             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.7                |
| Soil Type                 | 89                 |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.6625     |
| Undeveloped Runoff Coefficient (Cu) | 0.6879     |
| Developed Runoff Coefficient (Cd)   | 0.8364     |
| Time of Concentration (min)         | 9.0        |
| Clear Peak Flow Rate (cfs)          | 14.4523    |
| Burned Peak Flow Rate (cfs)         | 14.4523    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 2.1727     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 94644.8512 |



## Peak Flow Hydrologic Analysis

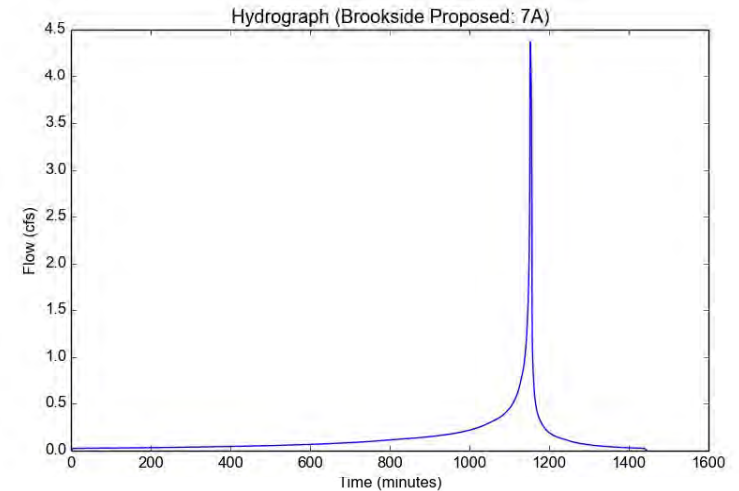
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 7A                 |
| Area (ac)                 | 1.39               |
| Flow Path Length (ft)     | 400.0              |
| Flow Path Slope (vft/hft) | 0.1                |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 3.5097     |
| Undeveloped Runoff Coefficient (Cu) | 0.896      |
| Developed Runoff Coefficient (Cd)   | 0.896      |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 4.3712     |
| Burned Peak Flow Rate (cfs)         | 4.3712     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.2754     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 11994.9345 |



## Peak Flow Hydrologic Analysis

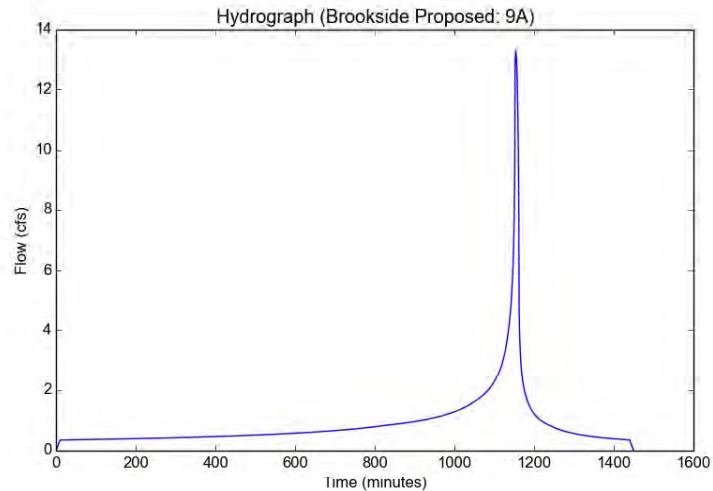
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 9A                 |
| Area (ac)                 | 5.98               |
| Flow Path Length (ft)     | 1310.0             |
| Flow Path Slope (vft/hft) | 0.046              |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.5339     |
| Undeveloped Runoff Coefficient (Cu) | 0.8631     |
| Developed Runoff Coefficient (Cd)   | 0.8786     |
| Time of Concentration (min)         | 10.0       |
| Clear Peak Flow Rate (cfs)          | 13.3128    |
| Burned Peak Flow Rate (cfs)         | 13.3128    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.7769     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 77403.4785 |



## Peak Flow Hydrologic Analysis

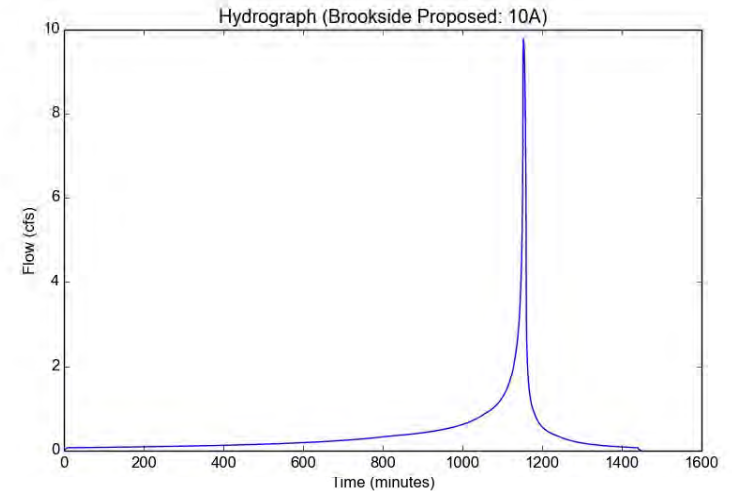
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 10A                |
| Area (ac)                 | 3.97               |
| Flow Path Length (ft)     | 920.0              |
| Flow Path Slope (vft/hft) | 0.06               |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 2.8141     |
| Undeveloped Runoff Coefficient (Cu) | 0.8754     |
| Developed Runoff Coefficient (Cd)   | 0.8757     |
| Time of Concentration (min)         | 8.0        |
| Clear Peak Flow Rate (cfs)          | 9.7832     |
| Burned Peak Flow Rate (cfs)         | 9.7832     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.786      |
| 24-Hr Clear Runoff Volume (cu-ft)   | 34237.7338 |



## Peak Flow Hydrologic Analysis

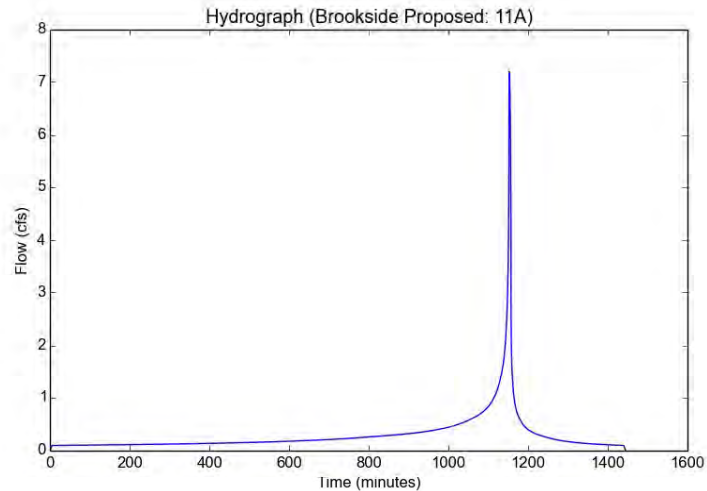
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 11A                |
| Area (ac)                 | 2.29               |
| Flow Path Length (ft)     | 533.0              |
| Flow Path Slope (vft/hft) | 0.0713             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.26               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 25-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (25-yr) Rainfall Depth (in) | 5.8826     |
| Peak Intensity (in/hr)              | 3.5097     |
| Undeveloped Runoff Coefficient (Cu) | 0.896      |
| Developed Runoff Coefficient (Cd)   | 0.897      |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 7.2096     |
| Burned Peak Flow Rate (cfs)         | 7.2096     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.5921     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 25793.0332 |



## Peak Flow Hydrologic Analysis

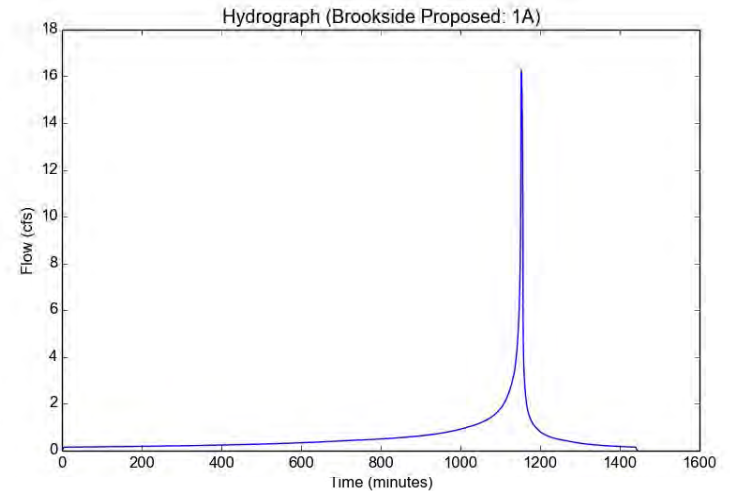
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 1A                 |
| Area (ac)                 | 4.49               |
| Flow Path Length (ft)     | 727.0              |
| Flow Path Slope (vft/hft) | 0.11               |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.07               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.9974     |
| Undeveloped Runoff Coefficient (Cu) | 0.9078     |
| Developed Runoff Coefficient (Cd)   | 0.9072     |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 16.283     |
| Burned Peak Flow Rate (cfs)         | 16.283     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.1817     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 51472.8041 |



## Peak Flow Hydrologic Analysis

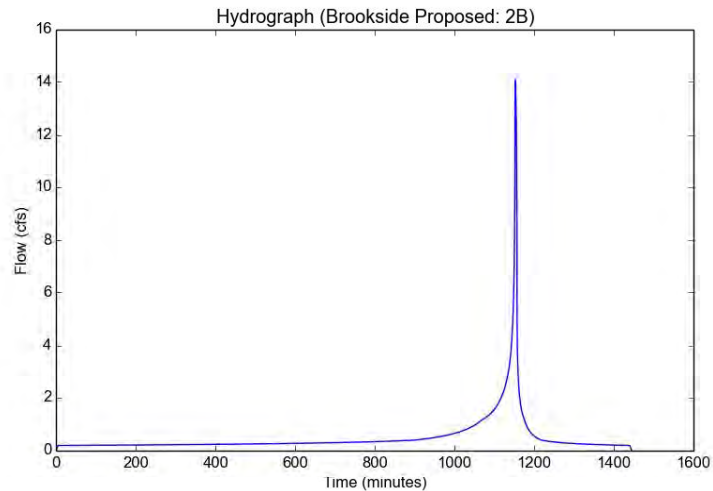
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Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 2B                 |
| Area (ac)                 | 3.85               |
| Flow Path Length (ft)     | 578.0              |
| Flow Path Slope (vft/hft) | 0.045              |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.301              |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.9974     |
| Undeveloped Runoff Coefficient (Cu) | 0.9217     |
| Developed Runoff Coefficient (Cd)   | 0.9152     |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 14.0847    |
| Burned Peak Flow Rate (cfs)         | 14.0847    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.9933     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 43268.7323 |



## Peak Flow Hydrologic Analysis

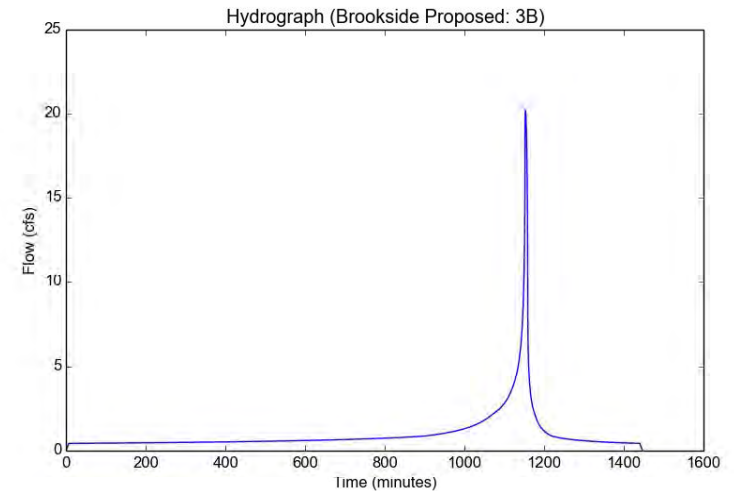
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 3B                 |
| Area (ac)                 | 6.54               |
| Flow Path Length (ft)     | 820.0              |
| Flow Path Slope (vft/hft) | 0.0433             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.4127     |
| Undeveloped Runoff Coefficient (Cu) | 0.9084     |
| Developed Runoff Coefficient (Cd)   | 0.9048     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 20.1953    |
| Burned Peak Flow Rate (cfs)         | 20.1953    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.9548     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 85150.2031 |



## Peak Flow Hydrologic Analysis

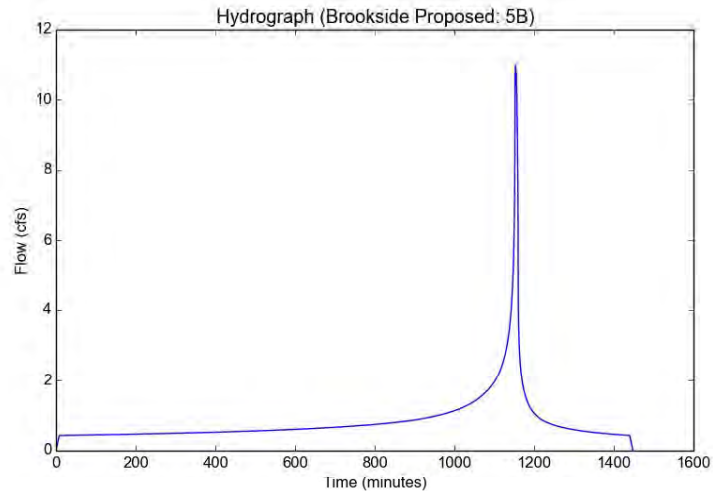
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 5B                 |
| Area (ac)                 | 3.81               |
| Flow Path Length (ft)     | 1009.0             |
| Flow Path Slope (vft/hft) | 0.0238             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.82               |
| Soil Type                 | 17                 |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.2051     |
| Undeveloped Runoff Coefficient (Cu) | 0.9004     |
| Developed Runoff Coefficient (Cd)   | 0.9001     |
| Time of Concentration (min)         | 8.0        |
| Clear Peak Flow Rate (cfs)          | 10.9912    |
| Burned Peak Flow Rate (cfs)         | 10.9912    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 1.6628     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 72433.3835 |



## Peak Flow Hydrologic Analysis

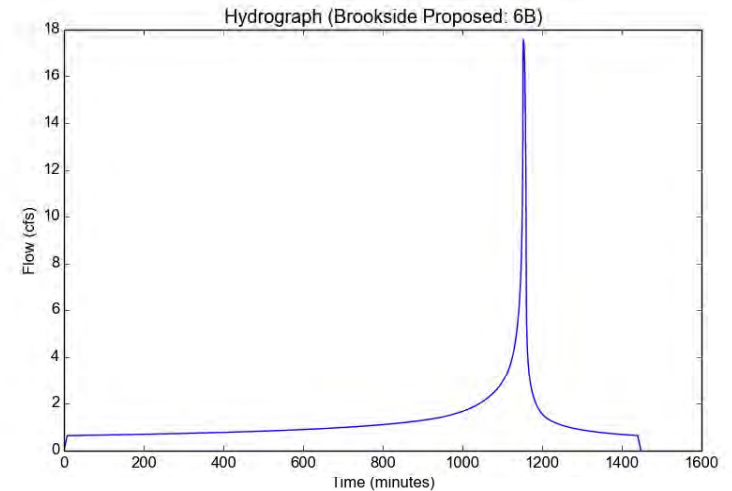
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 6B                 |
| Area (ac)                 | 6.49               |
| Flow Path Length (ft)     | 1256.0             |
| Flow Path Slope (vft/hft) | 0.0693             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.7                |
| Soil Type                 | 89                 |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |             |
|-------------------------------------|-------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7         |
| Peak Intensity (in/hr)              | 3.2051      |
| Undeveloped Runoff Coefficient (Cu) | 0.7155      |
| Developed Runoff Coefficient (Cd)   | 0.8446      |
| Time of Concentration (min)         | 8.0         |
| Clear Peak Flow Rate (cfs)          | 17.5694     |
| Burned Peak Flow Rate (cfs)         | 17.5694     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 2.4914      |
| 24-Hr Clear Runoff Volume (cu-ft)   | 108524.1132 |



## Peak Flow Hydrologic Analysis

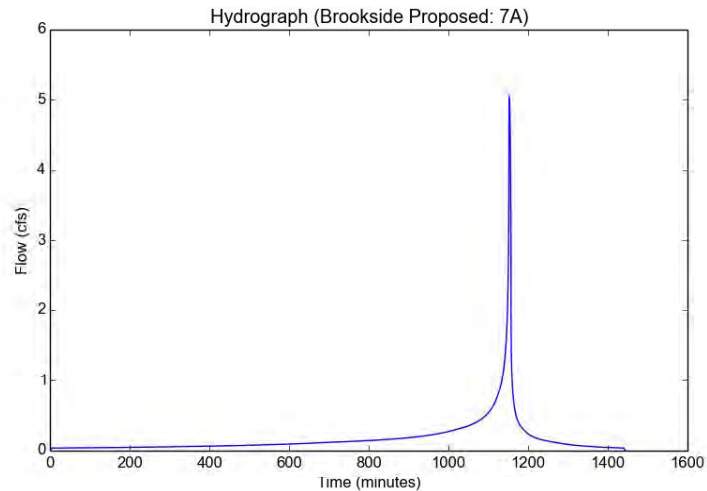
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 7A                 |
| Area (ac)                 | 1.39               |
| Flow Path Length (ft)     | 400.0              |
| Flow Path Slope (vft/hft) | 0.1                |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.9974     |
| Undeveloped Runoff Coefficient (Cu) | 0.9078     |
| Developed Runoff Coefficient (Cd)   | 0.9077     |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 5.0434     |
| Burned Peak Flow Rate (cfs)         | 5.0434     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.3447     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 15016.1207 |



## Peak Flow Hydrologic Analysis

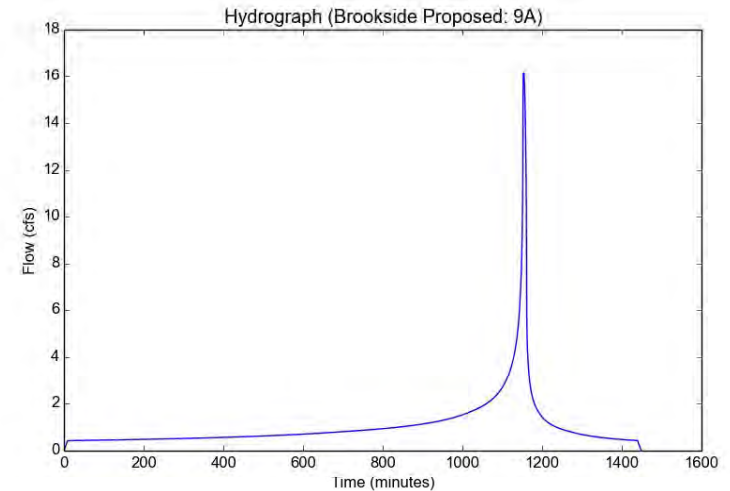
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 9A                 |
| Area (ac)                 | 5.98               |
| Flow Path Length (ft)     | 1310.0             |
| Flow Path Slope (vft/hft) | 0.046              |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.42               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.0325     |
| Undeveloped Runoff Coefficient (Cu) | 0.8845     |
| Developed Runoff Coefficient (Cd)   | 0.891      |
| Time of Concentration (min)         | 9.0        |
| Clear Peak Flow Rate (cfs)          | 16.1574    |
| Burned Peak Flow Rate (cfs)         | 16.1574    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 2.1025     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 91586.0885 |



## Peak Flow Hydrologic Analysis

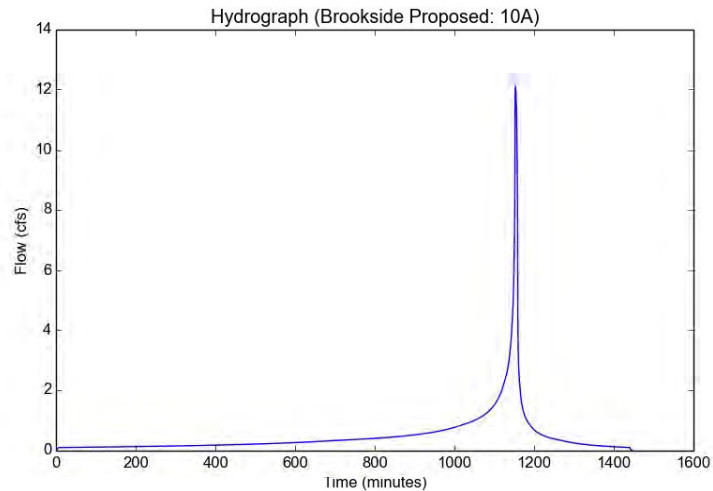
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 10A                |
| Area (ac)                 | 3.97               |
| Flow Path Length (ft)     | 920.0              |
| Flow Path Slope (vft/hft) | 0.06               |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.01               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.4127     |
| Undeveloped Runoff Coefficient (Cu) | 0.8936     |
| Developed Runoff Coefficient (Cd)   | 0.8937     |
| Time of Concentration (min)         | 7.0        |
| Clear Peak Flow Rate (cfs)          | 12.1082    |
| Burned Peak Flow Rate (cfs)         | 12.1082    |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.9842     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 42873.5173 |



## Peak Flow Hydrologic Analysis

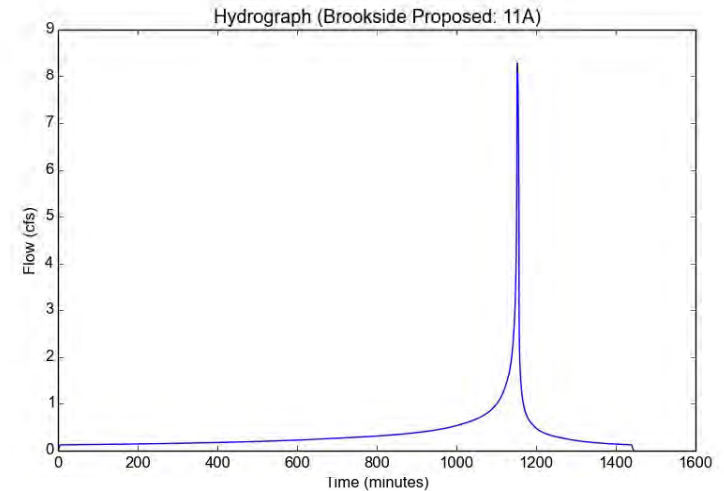
File location: H:/pdata/137644/Calcs/Strmwater/Hydrology/HydroCalc Results/Brookside Proposed Report.pdf  
Version: HydroCalc 0.2.0-beta

### Input Parameters

|                           |                    |
|---------------------------|--------------------|
| Project Name              | Brookside Proposed |
| Subarea ID                | 11A                |
| Area (ac)                 | 2.29               |
| Flow Path Length (ft)     | 533.0              |
| Flow Path Slope (vft/hft) | 0.0713             |
| 50-yr Rainfall Depth (in) | 6.7                |
| Percent Impervious        | 0.26               |
| Soil Type                 | 2                  |
| Design Storm Frequency    | 50-yr              |
| Fire Factor               | 0                  |
| LID                       | False              |

### Output Results

|                                     |            |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.7        |
| Peak Intensity (in/hr)              | 3.9974     |
| Undeveloped Runoff Coefficient (Cu) | 0.9078     |
| Developed Runoff Coefficient (Cd)   | 0.9057     |
| Time of Concentration (min)         | 5.0        |
| Clear Peak Flow Rate (cfs)          | 8.2912     |
| Burned Peak Flow Rate (cfs)         | 8.2912     |
| 24-Hr Clear Runoff Volume (ac-ft)   | 0.7127     |
| 24-Hr Clear Runoff Volume (cu-ft)   | 31044.9875 |



## **Appendix C: HEC-RAS Input and Output Data**

- **WSPGW Input and Output**
- **Existing HEC-RAS Output**
- **Proposed HEC-RAS Output**
- **FlowMaster Worksheets**

LC-EX.EDT  
 FILE: LC-EX.WSW W S P G W - EDIT LISTING - Version  
 14.06 Date: 5- 6-2014 Time: 2:50:53  
 WATER SURFACE PROFILE - CHANNEL DEFINITION  
 LISTING PAGE 1  

| CARD | SECT | CHN  | NO OF    | AVE PIER | HEIGHT 1 | BASE   | ZL    | ZR   | INV  | Y(1) | Y(2) |
|------|------|------|----------|----------|----------|--------|-------|------|------|------|------|
| Y(3) | Y(4) | Y(5) | Y(6)     | Y(7)     | Y(8)     | Y(9)   | Y(10) |      |      |      |      |
| CODE | NO   | TYPE | PIER/PIP | WIDTH    | DIAMETER | WIDTH  |       |      | DROP |      |      |
| CD   | 1    | 3    | 0        | .000     | 7.000    | 16.000 | .000  | .000 | .00  |      |      |
| CD   | 2    | 3    | 0        | .000     | 5.000    | 20.000 | .000  | .000 | .00  |      |      |
| CD   | 3    | 5    | 0        | .000     |          |        |       |      |      |      |      |
| CD   | 4    | 5    | 0        | .000     |          |        |       |      |      |      |      |
| CD   | 5    | 5    | 0        | .000     |          |        |       |      |      |      |      |

W S P G W - EDIT LISTING - Version  
 14.06 Date: 5- 6-2014 Time: 2:50:53  
 WATER SURFACE PROFILE - CROSS SECTION POINT  
 LISTING PAGE 2  

| CARD        | SECT        | NO OF       | X(1) , Y(1)     | X(2) , Y(2)     | X(3) , Y(3)     | X(4) , Y(4)   |
|-------------|-------------|-------------|-----------------|-----------------|-----------------|---------------|
| X(5) , Y(5) | X(6) , Y(6) | X(7) , Y(7) | X(8) , Y(8)     | X(9) , Y(9)     | X(10) , Y(10)   | X(11) , Y(11) |
| CODE        | NO          | POINTS      | X(N) , Y(N)     | X(N+1) , Y(N+1) | X(35) , Y(35)   |               |
| PTS         | 3           | 12          | .000 573.000    | 21.410 572.970  | 38.300 572.000  | 61.790        |
| 567.000     | 70.790      | 559.810     | 80.790 559.810  | 89.790 567.000  |                 |               |
| PTS         |             |             | 150.500 570.570 | 164.070 571.050 | 171.810 570.680 | 237.200       |
| 571.500     | 310.090     | 573.050     |                 |                 |                 |               |
| PTS         | 4           | 7           | .000 573.000    | 32.290 567.300  | 49.210 560.010  | 60.480        |
| 560.010     | 66.720      | 568.160     | 120.630 571.330 | 292.890 574.010 |                 |               |
| PTS         | 5           | 7           | .000 573.000    | 31.530 567.980  | 47.890 560.630  | 54.900        |
| 560.630     | 57.860      | 566.090     | 124.150 571.590 | 284.020 574.020 |                 |               |

W S P G W  
 PAGE NO 1  
 WATER SURFACE PROFILE - TITLE CARD LISTING  
 HEADING LINE NO 1 IS -  
 Lemon Creek  
 HEADING LINE NO 2 IS -  
 HEADING LINE NO 3 IS -

W S P G W  
 PAGE NO 2  
 WATER SURFACE PROFILE - ELEMENT CARD LISTING  

| ELEMENT NO | 1 IS A | SYSTEM OUTLET | U/S DATA | STATION  | INVERT  | SECT |
|------------|--------|---------------|----------|----------|---------|------|
| W S ELEV   |        |               |          | 1110.100 | 551.410 | 1    |
| 551.410    |        |               |          |          |         |      |
| ELEMENT NO | 2 IS A | WALL EXIT     | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          | 1110.100 | 551.410 | 1    |
| ELEMENT NO | 3 IS A | REACH         | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          | 1356.890 | 553.380 | 1    |
|            |        | RADIUS        | ANGLE    | ANG PT   | MAN H   |      |
|            |        | .000          | .000     | .000     | 0       | .013 |
| ELEMENT NO | 4 IS A | REACH         | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          | 1698.130 | 556.100 | 1    |
|            |        | RADIUS        | ANGLE    | ANG PT   | MAN H   |      |
|            |        | 999.980       | 19.552   | .000     | 1       | .013 |
| ELEMENT NO | 5 IS A | REACH         | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          |          |         |      |
|            |        | RADIUS        | ANGLE    | ANG PT   | MAN H   |      |
|            |        |               |          |          |         | N    |

|            |          |                  |      | LC-EX.EDT |         |      |      |
|------------|----------|------------------|------|-----------|---------|------|------|
|            |          | .000             | .000 | 1881.590  | 557.560 | 1    | .013 |
| ELEMENT NO | 6 IS A   | TRANSITION       |      | *         | *       | *    |      |
|            |          | U/S DATA         |      | STATION   | INVERT  | SECT | N    |
|            | RADIUS   | ANGLE            |      | 1902.640  | 557.730 | 2    | .013 |
| ELEMENT NO | 7 IS A   | REACH            |      | *         | *       | *    |      |
|            |          | U/S DATA         |      | STATION   | INVERT  | SECT | N    |
|            | RADIUS   | ANGLE            |      | ANG PT    | MAN H   |      |      |
|            |          |                  |      | 1988.640  | 558.600 | 2    | .013 |
| ELEMENT NO | 8 IS A   | WALL ENTRANCE    |      | .000      | 0       | *    |      |
|            |          | U/S DATA         |      | STATION   | INVERT  | SECT | FP   |
|            |          |                  |      | 1988.640  | 558.600 | 2    | .500 |
| ELEMENT NO | 9 IS A   | TRANSITION       |      | *         | *       | *    |      |
|            |          | U/S DATA         |      | STATION   | INVERT  | SECT | N    |
|            | RADIUS   | ANGLE            |      | 2008.640  | 559.810 | 3    | .014 |
| ELEMENT NO | 10 IS A  | TRANSITION       |      | *         | *       | *    |      |
|            |          | U/S DATA         |      | STATION   | INVERT  | SECT | N    |
|            | RADIUS   | ANGLE            |      | 2070.170  | 560.010 | 4    | .040 |
| ELEMENT NO | 11 IS A  | TRANSITION       |      | *         | *       | *    |      |
|            |          | U/S DATA         |      | STATION   | INVERT  | SECT | N    |
|            | RADIUS   | ANGLE            |      | 2090.360  | 560.630 | 5    | .040 |
| ELEMENT NO | 12 IS A  | SYSTEM HEADWORKS |      |           |         | *    | *    |
|            |          | U/S DATA         |      | STATION   | INVERT  | SECT |      |
|            | W S ELEV |                  |      | 2090.360  | 560.630 | 5    |      |
|            | .000     |                  |      |           |         |      |      |

Lemon Creek

Date: 5- 6-2014 Time: 2:50:57

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
      | Elev  | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
      | Ch Slope |      |      |      |      | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
1110.100 | 551.410 | 5.695 | 557.105 | 2000.00 | 21.95 | 7.48 | 564.59 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
WALL EXIT
1110.100 | 551.410 | 5.693 | 557.103 | 2000.00 | 21.96 | 7.49 | 564.59 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
246.790 | .0080 | | | | | | .0072 | 1.78 | 5.69 | 1.62 | 5.55 | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | |
1356.890 | 553.380 | 5.815 | 559.195 | 2000.00 | 21.50 | 7.17 | 566.37 | .23 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
154.556 | .0080 | | | | | | .0068 | 1.05 | 6.04 | 1.57 | 5.55 | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | |
1511.446 | 554.612 | 5.946 | 560.558 | 2000.00 | 21.02 | 6.86 | 567.42 | .22 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
186.684 | .0080 | | | | | | .0062 | 1.15 | 6.17 | 1.52 | 5.55 | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | |
1698.130 | 556.100 | 6.236 | 562.336 | 2000.00 | 20.05 | 6.24 | 568.58 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
51.416 | .0080 | | | | | | .0056 | .29 | 6.24 | 1.41 | 5.55 | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | |
1749.546 | 556.509 | 6.363 | 562.872 | 2000.00 | 19.65 | 5.99 | 568.86 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
82.908 | .0080 | | | | | | .0051 | .43 | 6.36 | 1.37 | 5.55 | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1832.454 | 557.169 | 6.673 | 563.842 | 2000.00 | 18.73 | 5.45 | 569.29 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
49.136 | .0080 | | | | | | .0045 | .22 | 6.67 | 1.28 | 5.55 | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----

```

## Lemon Creek

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
1881.590 | 557.560 | 7.000 | 564.560 | 2000.00 | 17.86 | 4.95 | 569.51 | 7.00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0081 | | | | | .0042 | .09 | 7.00 | 1.19 | | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1902.640 | 557.730 | 5.995 | 563.724 | 2000.00 | 20.00 | 6.21 | 569.94 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
86.000 | .0101 | | | | | .0121 | 1.04 | 5.99 | 1.58 | 4.21 | .013 | .00 | .00 | BOX
WALL ENTRANCE
1988.640 | 558.600 | 6.169 | 564.769 | 2000.00 | 20.00 | 6.21 | 570.98 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0605 | | | | | .0071 | .14 | 6.17 | 1.58 | | .014 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
2008.640 | 559.810 | 12.728 | 572.538 | 2000.00 | 2.67 | .11 | 572.65 | .40 | 8.48 | 257.09 | | | 3 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0033 | | | | | .0015 | .09 | 13.13 | .28 | | .040 | | | | IR-OPEN
| | | | | | | | | | | | | | | |
2070.170 | 560.010 | 12.581 | 572.591 | 2000.00 | 3.18 | .16 | 572.75 | 1.35 | 7.19 | 199.37 | | | 4 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0307 | | | | | .0017 | .03 | 13.93 | .31 | | .040 | | | | IR-OPEN
| | | | | | | | | | | | | | | |
2090.360 | 560.630 | 11.983 | 572.613 | 2000.00 | 3.34 | .17 | 572.79 | 1.41 | 8.31 | 189.03 | | | 5 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -

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Lemon Creek

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
1110.100 | 551.410 | 5.745 | 557.155 | 2025.00 | 22.03 | 7.54 | 564.69 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
WALL EXIT
1110.100 | 551.410 | 5.744 | 557.154 | 2025.00 | 22.04 | 7.54 | 564.69 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
246.790 | .0080 | | | | | .0072 | 1.78 | 5.74 | 1.62 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
1356.890 | 553.380 | 5.865 | 559.245 | 2025.00 | 21.58 | 7.23 | 566.48 | .23 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
147.348 | .0080 | | | | | .0068 | 1.01 | 6.10 | 1.57 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
1504.238 | 554.555 | 5.986 | 560.540 | 2025.00 | 21.14 | 6.94 | 567.48 | .22 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
193.892 | .0080 | | | | | .0062 | 1.21 | 6.21 | 1.52 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
1698.130 | 556.100 | 6.278 | 562.378 | 2025.00 | 20.16 | 6.31 | 568.69 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
36.962 | .0080 | | | | | .0057 | .21 | 6.28 | 1.42 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
1735.092 | 556.394 | 6.363 | 562.757 | 2025.00 | 19.89 | 6.14 | 568.90 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
91.961 | .0080 | | | | | .0053 | .48 | 6.36 | 1.39 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1827.052 | 557.126 | 6.673 | 563.799 | 2025.00 | 18.97 | 5.59 | 569.38 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
54.538 | .0080 | | | | | .0063 | .34 | 6.67 | 1.29 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----

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Lemon Creek

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1881.590 | 557.560 | 7.000 | 564.560 | 2025.00 | 18.08 | 5.08 | 569.64 | 7.00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
TRANS STR | .0081 | | | | | .0076 | .16 | 7.00 | 1.20 | .013 | .00 | .00 | BOX
1902.640 | 557.730 | 6.008 | 563.738 | 2025.00 | 20.25 | 6.37 | 570.11 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
86.000 | .0101 | | | | | .0125 | 1.07 | 6.01 | 1.60 | 4.25 | .013 | .00 | .00 | BOX
WALL ENTRANCE
1988.640 | 558.600 | 6.210 | 564.810 | 2025.00 | 20.25 | 6.37 | 571.18 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
TRANS STR | .0605 | | | | | .0073 | .15 | 6.21 | 1.60 | .014 | .00 | .00 | BOX
2008.640 | 559.810 | 12.986 | 572.796 | 2025.00 | 2.47 | .10 | 572.89 | .37 | 8.53 | 273.71 | | | 3 | 0 | .0
TRANS STR | .0033 | | | | | .0012 | .08 | 13.36 | .25 | .040 | | | | IR-OPEN
2070.170 | 560.010 | 12.830 | 572.840 | 2025.00 | 2.97 | .14 | 572.98 | 1.28 | 7.24 | 216.80 | | | 4 | 0 | .0
TRANS STR | .0307 | | | | | .0015 | .03 | 14.12 | .30 | .040 | | | | IR-OPEN
2090.360 | 560.630 | 12.230 | 572.860 | 2025.00 | 3.12 | .15 | 573.01 | 1.36 | 8.34 | 206.83 | | | 5 | 0 | .0

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Lemon Creek

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1110.100 | 551.410 | 5.795 | 557.205 | 2050.00 | 22.11 | 7.59 | 564.80 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
WALL EXIT
1110.100 | 551.410 | 5.793 | 557.203 | 2050.00 | 22.12 | 7.60 | 564.80 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
246.790 | .0080 | | | | | .0072 | 1.79 | 5.79 | 1.62 | 5.65 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
1356.890 | 553.380 | 5.913 | 559.293 | 2050.00 | 21.67 | 7.29 | 566.58 | .23 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
139.159 | .0080 | | | | | .0069 | .95 | 6.15 | 1.57 | 5.65 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
1496.049 | 554.489 | 6.024 | 560.513 | 2050.00 | 21.27 | 7.02 | 567.54 | .22 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
202.081 | .0080 | | | | | .0063 | 1.27 | 6.25 | 1.53 | 5.65 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
1698.130 | 556.100 | 6.318 | 562.418 | 2050.00 | 20.28 | 6.39 | 568.80 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
21.012 | .0080 | | | | | .0058 | .12 | 6.32 | 1.42 | 5.65 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1719.142 | 556.267 | 6.363 | 562.630 | 2050.00 | 20.14 | 6.30 | 568.93 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
102.054 | .0080 | | | | | .0054 | .55 | 6.36 | 1.41 | 5.65 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1821.196 | 557.079 | 6.673 | 563.753 | 2050.00 | 19.20 | 5.72 | 569.48 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
60.394 | .0080 | | | | | .0064 | .39 | 6.67 | 1.31 | 5.65 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----

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## Lemon Creek

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1881.590 | 557.560 | 7.000 | 564.560 | 2050.00 | 18.30 | 5.20 | 569.76 | 7.00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
TRANS STR | .0081 | | | | | .0078 | .16 | 7.00 | 1.22 | .013 | .00 | .00 | BOX
1902.640 | 557.730 | 5.988 | 563.718 | 2050.00 | 20.50 | 6.53 | 570.24 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
86.000 | .0101 | | | | | .0128 | 1.10 | 5.99 | 1.62 | 4.29 | .013 | .00 | .00 | BOX
WALL ENTRANCE
1988.640 | 558.600 | 6.216 | 564.816 | 2050.00 | 20.50 | 6.53 | 571.34 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
TRANS STR | .0605 | | | | | .0075 | .15 | 6.22 | 1.62 | .014 | .00 | .00 | BOX
2008.640 | 559.810 | 13.207 | 573.017 | 2050.00 | 2.33 | .08 | 573.10 | .37 | 8.58 | 307.74 | | | 3 | 0 | .0
TRANS STR | .0033 | | | | | .0011 | .07 | 13.57 | .24 | .040 | | | | IR-OPEN
2070.170 | 560.010 | 13.046 | 573.056 | 2050.00 | 2.81 | .12 | 573.18 | 1.21 | 7.28 | 227.97 | | | 4 | 0 | .0
TRANS STR | .0307 | | | | | .0013 | .03 | 14.25 | .28 | .040 | | | | IR-OPEN
2090.360 | 560.630 | 12.443 | 573.073 | 2050.00 | 2.96 | .14 | 573.21 | 1.27 | 8.38 | 216.91 | | | 5 | 0 | .0

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Lemon Creek

Date: 5- 6-2014 Time: 2:50:57

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| Ch Slope | | | | | | | | | | | | | |
L/Elem | | | | | | | | | | | | | |
*****
1110.100 | 551.410 | 5.843 | 557.253 | 2075.00 | 22.19 | 7.65 | 564.90 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | |
WALL EXIT
1110.100 | 551.410 | 5.842 | 557.252 | 2075.00 | 22.20 | 7.65 | 564.90 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | |
246.790 | .0080 | | | | | | | | | | | | | |
| | | | | | | | | | | | | |
1356.890 | 553.380 | 5.961 | 559.341 | 2075.00 | 21.76 | 7.35 | 566.69 | .24 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | |
129.563 | .0080 | | | | | | | | | | | | | |
| | | | | | | | | | | | | |
1486.453 | 554.413 | 6.060 | 560.473 | 2075.00 | 21.40 | 7.11 | 567.58 | .23 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | |
211.677 | .0080 | | | | | | | | | | | | | |
| | | | | | | | | | | | | |
1698.130 | 556.100 | 6.356 | 562.456 | 2075.00 | 20.40 | 6.46 | 568.92 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | |
3.321 | .0080 | | | | | | | | | | | | | |
| | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1701.451 | 556.126 | 6.363 | 562.489 | 2075.00 | 20.38 | 6.45 | 568.94 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | |
113.376 | .0080 | | | | | | | | | | | | | |
| | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1814.827 | 557.029 | 6.673 | 563.702 | 2075.00 | 19.43 | 5.86 | 569.57 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | |
66.763 | .0080 | | | | | | | | | | | | | |
| | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----

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## Lemon Creek

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1881.590 | 557.560 | 7.000 | 564.560 | 2075.00 | 18.53 | 5.33 | 569.89 | 7.00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
TRANS STR | .0081 | | | | | .0080 | .17 | 7.00 | 1.23 | .013 | .00 | .00 | BOX
1902.640 | 557.730 | 5.967 | 563.697 | 2075.00 | 20.75 | 6.69 | 570.38 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
86.000 | .0101 | | | | | .0131 | 1.12 | 5.97 | 1.64 | 4.32 | .013 | .00 | .00 | BOX
WALL ENTRANCE
1988.640 | 558.600 | 6.222 | 564.822 | 2075.00 | 20.75 | 6.69 | 571.51 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
TRANS STR | .0605 | | | | | .0076 | .15 | 6.22 | 1.64 | .014 | .00 | .00 | BOX
2008.640 | 559.810 | 13.430 | 573.240 | 2075.00 | 2.19 | .07 | 573.31 | .32 | 8.63 | 307.74 | | | 3 | 0 | .0
TRANS STR | .0033 | | | | | .0009 | .06 | 13.75 | .22 | .040 | | | | IR-OPEN
2070.170 | 560.010 | 13.257 | 573.267 | 2075.00 | 2.67 | .11 | 573.38 | 1.09 | 7.34 | 227.97 | | | 4 | 0 | .0
TRANS STR | .0307 | | | | | .0011 | .02 | 14.35 | .25 | .040 | | | | IR-OPEN
2090.360 | 560.630 | 12.650 | 573.280 | 2075.00 | 2.81 | .12 | 573.40 | 1.15 | 8.41 | 216.91 | | | 5 | 0 | .0

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LC.EDT  
 FILE: LC.WSW W S P G W - EDIT LISTING - Version  
 14.06 Date: 5- 6-2014 Time: 1:43:27  
 WATER SURFACE PROFILE - CHANNEL DEFINITION  
 LISTING PAGE 1  

| CARD | SECT | CHN  | NO OF    | AVE PIER | HEIGHT 1 | BASE   | ZL    | ZR   | INV  | Y(1) | Y(2) |
|------|------|------|----------|----------|----------|--------|-------|------|------|------|------|
| Y(3) | Y(4) | Y(5) | Y(6)     | Y(7)     | Y(8)     | Y(9)   | Y(10) |      |      |      |      |
| CODE | NO   | TYPE | PIER/PIP | WIDTH    | DIAMETER | WIDTH  |       |      | DROP |      |      |
| CD   | 1    | 3    | 0        | .000     | 7.000    | 16.000 | .000  | .000 | .00  |      |      |
| CD   | 2    | 3    | 0        | .000     | 5.000    | 20.000 | .000  | .000 | .00  |      |      |
| CD   | 3    | 5    | 0        | .000     |          |        |       |      |      |      |      |
| CD   | 4    | 5    | 0        | .000     |          |        |       |      |      |      |      |
| CD   | 5    | 5    | 0        | .000     |          |        |       |      |      |      |      |

W S P G W - EDIT LISTING - Version  
 14.06 Date: 5- 6-2014 Time: 1:43:27  
 WATER SURFACE PROFILE - CROSS SECTION POINT  
 LISTING PAGE 2  

| CARD        | SECT        | NO OF       | X(1) , Y(1)     | X(2) , Y(2)     | X(3) , Y(3)     | X(4) , Y(4)   |
|-------------|-------------|-------------|-----------------|-----------------|-----------------|---------------|
| X(5) , Y(5) | X(6) , Y(6) | X(7) , Y(7) | X(8) , Y(8)     | X(9) , Y(9)     | X(10) , Y(10)   | X(11) , Y(11) |
| CODE        | NO          | POINTS      | X(N) , Y(N)     | X(N+1) , Y(N+1) | X(35) , Y(35)   |               |
| PTS         | 3           | 12          | .000 573.000    | 21.410 572.970  | 38.300 572.000  | 61.790        |
| 567.000     | 70.790      | 559.810     | 80.790 559.810  | 89.790 567.000  |                 |               |
| PTS         |             |             | 189.930 571.060 | 192.420 574.000 | 295.020 574.000 | 298.000       |
| 575.000     | 310.090     | 575.000     |                 |                 |                 |               |
| PTS         | 4           | 6           | .000 573.000    | 32.290 567.300  | 49.210 560.010  | 60.480        |
| 560.010     | 66.720      | 568.160     | 84.440 572.000  |                 |                 |               |
| PTS         | 5           | 7           | .000 573.000    | 31.530 567.980  | 47.890 560.630  | 54.900        |
| 560.630     | 57.860      | 566.090     | 65.700 567.330  | 76.010 572.000  |                 |               |

W S P G W  
 PAGE NO 1  
 WATER SURFACE PROFILE - TITLE CARD LISTING  
 HEADING LINE NO 1 IS -  
 Lemon Creek  
 HEADING LINE NO 2 IS -  
 HEADING LINE NO 3 IS -

W S P G W  
 PAGE NO 2  
 WATER SURFACE PROFILE - ELEMENT CARD LISTING  

| ELEMENT NO | 1 IS A | SYSTEM OUTLET | U/S DATA | STATION  | INVERT  | SECT |
|------------|--------|---------------|----------|----------|---------|------|
| W S ELEV   |        |               |          | 1110.100 | 551.410 | 1    |
| 551.410    |        |               |          |          |         |      |
| ELEMENT NO | 2 IS A | WALL EXIT     | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          | 1110.100 | 551.410 | 1    |
| ELEMENT NO | 3 IS A | REACH         | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          | 1356.890 | 553.380 | 1    |
|            |        | RADIUS        | ANGLE    | ANG PT   | MAN H   |      |
|            |        | .000          | .000     | .000     | 0       | .013 |
| ELEMENT NO | 4 IS A | REACH         | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          | 1698.130 | 556.100 | 1    |
|            |        | RADIUS        | ANGLE    | ANG PT   | MAN H   |      |
|            |        | 999.980       | 19.552   | .000     | 1       | .013 |
| ELEMENT NO | 5 IS A | REACH         | U/S DATA | STATION  | INVERT  | SECT |
|            |        |               |          |          |         |      |
|            |        | RADIUS        | ANGLE    | ANG PT   | MAN H   |      |
|            |        |               |          |          |         | N    |

|            |          |                  |          | LC. EDT  |         |      |
|------------|----------|------------------|----------|----------|---------|------|
|            |          | .000             | .000     | 1881.590 | 557.560 | 1    |
| ELEMENT NO | 6 IS A   | TRANSITION       |          | *        | *       | *    |
|            |          | U/S DATA         | STATION  | INVERT   | SECT    | N    |
|            | RADIUS   | ANGLE            | 1902.640 | 557.730  | 2       | .013 |
|            | 40.000   | -30.152          |          |          |         |      |
| ELEMENT NO | 7 IS A   | REACH            | *        | *        | *       |      |
|            |          | U/S DATA         | STATION  | INVERT   | SECT    | N    |
|            | RADIUS   | ANGLE            | ANG PT   | MAN H    |         |      |
|            |          |                  | 1988.640 | 558.600  | 2       | .013 |
|            | .000     | .000             | .000     | 0        |         |      |
| ELEMENT NO | 8 IS A   | WALL ENTRANCE    |          |          | *       |      |
|            |          | U/S DATA         | STATION  | INVERT   | SECT    | FP   |
|            |          |                  | 1988.640 | 558.600  | 2       | .500 |
| ELEMENT NO | 9 IS A   | TRANSITION       | *        | *        | *       |      |
|            |          | U/S DATA         | STATION  | INVERT   | SECT    | N    |
|            | RADIUS   | ANGLE            | 2008.640 | 559.810  | 3       | .014 |
|            | .000     | .000             |          |          |         |      |
| ELEMENT NO | 10 IS A  | TRANSITION       | *        | *        | *       |      |
|            |          | U/S DATA         | STATION  | INVERT   | SECT    | N    |
|            | RADIUS   | ANGLE            | 2070.170 | 560.010  | 4       | .040 |
|            | 183.138  | 19.250           |          |          |         |      |
| ELEMENT NO | 11 IS A  | TRANSITION       | *        | *        | *       |      |
|            |          | U/S DATA         | STATION  | INVERT   | SECT    | N    |
|            | RADIUS   | ANGLE            | 2090.360 | 560.630  | 5       | .040 |
|            | 60.094   | 19.250           |          |          |         |      |
| ELEMENT NO | 12 IS A  | SYSTEM HEADWORKS |          |          | *       |      |
|            |          | U/S DATA         | STATION  | INVERT   | SECT    |      |
|            | W S ELEV |                  | 2090.360 | 560.630  | 5       |      |
|            | .000     |                  |          |          |         |      |

Lemon Creek

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1110.100 | 551.410 | 5.644 | 557.054 | 1975.00 | 21.87 | 7.43 | 564.48 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
WALL EXIT
1110.100 | 551.410 | 5.643 | 557.053 | 1975.00 | 21.88 | 7.43 | 564.48 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
246.790 | .0080 | | | | | .0072 | 1.78 | 5.64 | 1.62 | 5.50 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1356.890 | 553.380 | 5.765 | 559.145 | 1975.00 | 21.41 | 7.12 | 566.26 | .23 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
160.781 | .0080 | | | | | .0068 | 1.09 | 5.99 | 1.57 | 5.50 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1517.671 | 554.662 | 5.904 | 560.565 | 1975.00 | 20.91 | 6.79 | 567.35 | .22 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
180.459 | .0080 | | | | | .0061 | 1.11 | 6.12 | 1.52 | 5.50 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1698.130 | 556.100 | 6.192 | 562.292 | 1975.00 | 19.94 | 6.17 | 568.46 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
64.577 | .0080 | | | | | .0055 | .36 | 6.19 | 1.41 | 5.50 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1762.707 | 556.614 | 6.363 | 562.977 | 1975.00 | 19.40 | 5.84 | 568.82 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
74.745 | .0080 | | | | | .0050 | .37 | 6.36 | 1.36 | 5.50 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1837.452 | 557.209 | 6.673 | 563.882 | 1975.00 | 18.50 | 5.31 | 569.19 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
44.138 | .0080 | | | | | .0044 | .19 | 6.67 | 1.26 | 5.50 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----

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## Lemon Creek

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
1881.590 | 557.560 | 7.000 | 564.560 | 1975.00 | 17.63 | 4.83 | 569.39 | 7.00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0081 | | | | | .0041 | .09 | 7.00 | 1.17 | | .013 | .00 | .00 | BOX
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
----- WARNING - Flow depth near top of box conduit -----
1902.640 | 557.730 | 6.015 | 563.745 | 1975.00 | 19.75 | 6.06 | 569.80 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
86.000 | .0101 | | | | .0118 | 1.02 | 6.02 | 1.56 | 4.18 | .013 | .00 | .00 | BOX
WALL ENTRANCE
1988.640 | 558.600 | 6.164 | 564.764 | 1975.00 | 19.75 | 6.06 | 570.82 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0605 | | | | .0069 | .14 | 6.16 | 1.56 | | .014 | .00 | .00 | BOX
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
2008.640 | 559.810 | 12.502 | 572.312 | 1975.00 | 2.90 | .13 | 572.44 | .29 | 8.55 | 158.12 | | | 3 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0033 | | | | .0013 | .08 | 12.79 | .25 | | .040 | | | | IR-OPEN
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
2070.170 | 560.010 | 12.236 | 572.246 | 1975.00 | 4.47 | .31 | 572.56 | 1.06 | 7.14 | 78.78 | | | 4 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0307 | | | | .0022 | .04 | 13.29 | .33 | | .040 | | | | IR-OPEN
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
2090.360 | 560.630 | 11.533 | 572.163 | 1975.00 | 5.50 | .47 | 572.63 | 1.42 | 8.33 | 69.73 | | | 5 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -

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Lemon Creek

Date: 5- 6-2014 Time: 1:43:31

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1110.100 | 551.410 | 5.695 | 557.105 | 2000.00 | 21.95 | 7.48 | 564.59 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
WALL EXIT
1110.100 | 551.410 | 5.693 | 557.103 | 2000.00 | 21.96 | 7.49 | 564.59 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
246.790 | .0080 | | | | | .0072 | 1.78 | 5.69 | 1.62 | 5.55 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1356.890 | 553.380 | 5.815 | 559.195 | 2000.00 | 21.50 | 7.17 | 566.37 | .23 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
154.556 | .0080 | | | | | .0068 | 1.05 | 6.04 | 1.57 | 5.55 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1511.446 | 554.612 | 5.946 | 560.558 | 2000.00 | 21.02 | 6.86 | 567.42 | .22 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
186.684 | .0080 | | | | | .0062 | 1.15 | 6.17 | 1.52 | 5.55 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1698.130 | 556.100 | 6.236 | 562.336 | 2000.00 | 20.05 | 6.24 | 568.58 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
51.416 | .0080 | | | | | .0056 | .29 | 6.24 | 1.41 | 5.55 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1749.546 | 556.509 | 6.363 | 562.872 | 2000.00 | 19.65 | 5.99 | 568.86 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
82.908 | .0080 | | | | | .0051 | .43 | 6.36 | 1.37 | 5.55 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1832.454 | 557.169 | 6.673 | 563.842 | 2000.00 | 18.73 | 5.45 | 569.29 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
49.136 | .0080 | | | | | .0045 | .22 | 6.67 | 1.28 | 5.55 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----

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## Lemon Creek

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
1881.590 | 557.560 | 7.000 | 564.560 | 2000.00 | 17.86 | 4.95 | 569.51 | 7.00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0081 | | | | | .0042 | .09 | 7.00 | 1.19 | | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1902.640 | 557.730 | 5.995 | 563.724 | 2000.00 | 20.00 | 6.21 | 569.94 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
86.000 | .0101 | | | | | .0121 | 1.04 | 5.99 | 1.58 | 4.21 | .013 | .00 | .00 | BOX
WALL ENTRANCE
1988.640 | 558.600 | 6.169 | 564.769 | 2000.00 | 20.00 | 6.21 | 570.98 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0605 | | | | | .0071 | .14 | 6.17 | 1.58 | | .014 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
2008.640 | 559.810 | 12.714 | 572.524 | 2000.00 | 2.80 | .12 | 572.65 | .28 | 8.59 | 161.99 | | | 3 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0033 | | | | | .0012 | .07 | 12.99 | .23 | | .040 | | | | IR-OPEN
| | | | | | | | | | | | | | | | |
2070.170 | 560.010 | 12.446 | 572.456 | 2000.00 | 4.36 | .30 | 572.75 | 1.01 | 7.19 | 78.78 | | | 4 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0307 | | | | | .0020 | .04 | 13.45 | .32 | | .040 | | | | IR-OPEN
| | | | | | | | | | | | | | | | |
2090.360 | 560.630 | 11.748 | 572.378 | 2000.00 | 5.35 | .44 | 572.82 | 1.34 | 8.37 | 69.73 | | | 5 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -

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Lemon Creek

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
1110.100 | 551.410 | 5.745 | 557.155 | 2025.00 | 22.03 | 7.54 | 564.69 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
WALL EXIT
1110.100 | 551.410 | 5.744 | 557.154 | 2025.00 | 22.04 | 7.54 | 564.69 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
246.790 | .0080 | | | | | .0072 | 1.78 | 5.74 | 1.62 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1356.890 | 553.380 | 5.865 | 559.245 | 2025.00 | 21.58 | 7.23 | 566.48 | .23 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
147.348 | .0080 | | | | | .0068 | 1.01 | 6.10 | 1.57 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1504.238 | 554.555 | 5.986 | 560.540 | 2025.00 | 21.14 | 6.94 | 567.48 | .22 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
193.892 | .0080 | | | | | .0062 | 1.21 | 6.21 | 1.52 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1698.130 | 556.100 | 6.278 | 562.378 | 2025.00 | 20.16 | 6.31 | 568.69 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
36.962 | .0080 | | | | | .0057 | .21 | 6.28 | 1.42 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1735.092 | 556.394 | 6.363 | 562.757 | 2025.00 | 19.89 | 6.14 | 568.90 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
91.961 | .0080 | | | | | .0053 | .48 | 6.36 | 1.39 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
1827.052 | 557.126 | 6.673 | 563.799 | 2025.00 | 18.97 | 5.59 | 569.38 | .00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
54.538 | .0080 | | | | | .0063 | .34 | 6.67 | 1.29 | 5.60 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----

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## Lemon Creek

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
| Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1881.590 | 557.560 | 7.000 | 564.560 | 2025.00 | 18.08 | 5.08 | 569.64 | 7.00 | 7.00 | 16.00 | 7.000 | 16.000 | .00 | 0 | .0
| | | | | | | | | | | | | | | | |
TRANS STR | .0081 | | | | | | .0076 | .16 | 7.00 | 1.20 | .013 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
1902.640 | 557.730 | 6.008 | 563.738 | 2025.00 | 20.25 | 6.37 | 570.11 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| | | | | | | | | | | | | | | | |
86.000 | .0101 | | | | | | .0125 | 1.07 | 6.01 | 1.60 | 4.25 | .013 | .00 | .00 | BOX
WALL ENTRANCE
| | | | | | | | | | | | | | | | |
1988.640 | 558.600 | 6.210 | 564.810 | 2025.00 | 20.25 | 6.37 | 571.18 | .00 | 5.00 | 20.00 | 5.000 | 20.000 | .00 | 0 | .0
| | | | | | | | | | | | | | | | |
TRANS STR | .0605 | | | | | | .0073 | .15 | 6.21 | 1.60 | .014 | .00 | .00 | BOX
| | | | | | | | | | | | | | | | |
2008.640 | 559.810 | 12.966 | 572.776 | 2025.00 | 2.68 | .11 | 572.89 | .26 | 8.64 | 166.59 | | | 3 | 0 | .0
| | | | | | | | | | | | | | | | |
TRANS STR | .0033 | | | | | | .0010 | .06 | 13.23 | .22 | .040 | | | | IR-OPEN
| | | | | | | | | | | | | | | | |
2070.170 | 560.010 | 12.695 | 572.705 | 2025.00 | 4.24 | .28 | 572.98 | .95 | 7.24 | 78.78 | | | 4 | 0 | .0
| | | | | | | | | | | | | | | | |
TRANS STR | .0307 | | | | | | .0018 | .04 | 13.65 | .30 | .040 | | | | IR-OPEN
| | | | | | | | | | | | | | | | |
2090.360 | 560.630 | 12.002 | 572.632 | 2025.00 | 5.17 | .42 | 573.05 | 1.25 | 8.41 | 69.73 | | | 5 | 0 | .0
| | | | | | | | | | | | | | | | |

```

HEC-RAS Version 4.1.0 Jan 2010  
U.S. Army Corps 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
XXXXXXX XXXX      XXX XXXX      XXXXXX      XXXX
X      X X          X      X      X      X      X
X      X X          X      X      X      X      X
X      X XXXXXX      XXXX      X      X      XXXXX

```

### PLAN DATA

Plan Title: Lemon Creek Exist 13.5' BR  
Plan File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.p01

Geometry Title: Lemon Creek\_Existing\_2014-04-17  
Geometry File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.g09

```
Flow Title      : Flow 01
Flow File       :
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.f01
```

|                           |                    |   |    |
|---------------------------|--------------------|---|----|
| Plan Summary Information: |                    |   |    |
| Number of:                | Cross Sections     | = | 28 |
|                           | Culverts           | = | 4  |
|                           | Bridges            | = | 0  |
|                           | Multiple Openings  | = | 0  |
|                           | Inline Structures  | = | 0  |
|                           | 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: Flow 01

Flow File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.f01

| River      | Reach  | RS      | 50-YR |
|------------|--------|---------|-------|
| LemonCreek | Reach1 | 3105.06 | 2021  |
| LemonCreek | Reach1 | 2271.00 | 3182  |
| LemonCreek | Reach1 | 1000.00 | 3255  |

### Boundary Conditions

| River<br>Downstream | Reach | Profile | Upstream |
|---------------------|-------|---------|----------|
|---------------------|-------|---------|----------|

LemonCreek Reach1 50-YR  
Known WS = 572.5

## GEOMETRY DATA

Geometry Title: Lemon Creek\_Existing\_2014-04-17  
Geometry File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.g09

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 3105.06

[illegible]

LemonCreekEX.rep

|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 168.94 | 606.24 | 171.11 | 608    | 172.29 | 609    | 172.63 | 609.28 | 173.45 | 610    |
| 173.85 | 610.33 | 175    | 611.33 | 175.74 | 612    | 176.29 | 612.45 | 177.63 | 613.63 |
| 178.1  | 614    | 179.26 | 614    | 179.8  | 613.99 | 189.57 | 613.87 | 191.68 | 613.87 |
| 199.95 | 613.97 | 201.97 | 613.98 | 204.41 | 614    | 206.55 | 614    | 216.51 | 614.19 |
| 225.73 | 614.36 | 235.23 | 614.48 | 235.51 | 614.49 | 242.83 | 614.6  | 250    | 614.71 |

Manning's n Values

| Sta   | n Val | Sta   | n Val | Sta   | n Val | Sta    | n Val | Sta    | n Val |
|-------|-------|-------|-------|-------|-------|--------|-------|--------|-------|
| 0     | .035  | 86.36 | .024  | 99.63 | .07   | 135.52 | .04   | 150.53 | .07   |
| 178.1 | .035  |       |       |       |       |        |       |        |       |

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

|       |       |  |       |       |       |  |    |  |    |
|-------|-------|--|-------|-------|-------|--|----|--|----|
| 99.63 | 178.1 |  | 73.02 | 70.23 | 61.56 |  | .1 |  | .3 |
|-------|-------|--|-------|-------|-------|--|----|--|----|

# CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 599.43   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 2.39     | Wt. n-Val.             |         | 0.058   |
| W.S. Elev (ft)     | 597.04   | Reach Len. (ft)        | 73.02   | 70.23   |
| 61.56              |          |                        |         |         |
| Crit W.S. (ft)     | 597.04   | Flow Area (sq ft)      |         | 162.91  |
| E.G. Slope (ft/ft) | 0.036860 | Area (sq ft)           |         | 162.91  |
| Q Total (cfs)      | 2021.00  | Flow (cfs)             |         | 2021.00 |
| Top width (ft)     | 34.21    | Top width (ft)         |         | 34.21   |
| Vel Total (ft/s)   | 12.41    | Avg. Vel. (ft/s)       |         | 12.41   |
| Max Chl Dpth (ft)  | 9.07     | Hydr. Depth (ft)       |         | 4.76    |
| Conv. Total (cfs)  | 10526.7  | Conv. (cfs)            |         | 10526.7 |
| Length wtd. (ft)   | 70.23    | Wetted Per. (ft)       |         | 40.99   |
| Min Ch El (ft)     | 587.97   | Shear (lb/sq ft)       |         | 9.15    |
| Alpha              | 1.00     | Stream Power (lb/ft s) | 250.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.92     | Cum Volume (acre-ft)   | 1.70    | 15.65   |
| 2.94               |          |                        |         |         |
| C & E Loss (ft)    | 0.55     | Cum SA (acres)         | 1.27    | 1.79    |
| 1.04               |          |                        |         |         |

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.

LemonCreekEX.rep

Note: Manning's n values were composited to a single value in the main channel.

# CROSS SECTION

RIVER: LemonCreek

REACH: Reach1 RS: 3034.83

# INPUT

Description:

| Station | Elevation | Data   | num=   | 150    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| Sta     | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 0       | 654.51    | .65    | 654.16 | .98    | 654    | 1.43   | 653.75 | 2.95   | 653    |     |      |
| 6.41    | 651.18    | 8.8    | 649.9  | 12.58  | 648    | 14.58  | 647    | 15.17  | 646.71 |     |      |
| 16.58   | 646       | 17.43  | 645.59 | 18.6   | 645    | 19.64  | 644.49 | 20.61  | 644    |     |      |
| 22.63   | 643       | 24.26  | 642.22 | 26.52  | 641.11 | 28.7   | 640    | 30.07  | 639.35 |     |      |
| 34.7    | 637       | 37.9   | 635.38 | 38.66  | 635    | 44.26  | 632.16 | 46.49  | 631.04 |     |      |
| 47.13   | 630.71    | 48.54  | 630    | 50.32  | 629    | 50.49  | 628.89 | 56.79  | 625    |     |      |
| 59.22   | 623.51    | 60.78  | 622.54 | 61.68  | 622    | 62.54  | 621.47 | 63.32  | 621    |     |      |
| 64.91   | 620       | 66.59  | 619    | 69.89  | 617    | 70.63  | 616.54 | 75.9   | 613.36 |     |      |
| 76.51   | 613       | 79.06  | 611.46 | 81.49  | 610    | 81.97  | 609.89 | 82.18  | 609.88 |     |      |
| 88.33   | 609       | 89.03  | 608.91 | 93.18  | 608.15 | 94.03  | 608    | 95.87  | 607    |     |      |
| 97.73   | 606       | 99.58  | 605    | 102.99 | 603.17 | 104.72 | 602.23 | 105.26 | 601.95 |     |      |
| 107.03  | 601       | 107.32 | 600.85 | 109.2  | 599.84 | 110.81 | 599    | 113.57 | 597.54 |     |      |
| 115.6   | 596.47    | 116.52 | 596    | 117.37 | 595.55 | 122.16 | 593    | 124.59 | 591.72 |     |      |
| 124.8   | 591.69    | 126.64 | 591.12 | 126.98 | 591    | 129.43 | 590.19 | 130.03 | 590    |     |      |
| 133.63  | 588.8     | 137.13 | 587.76 | 139.71 | 587    | 140.99 | 586.63 | 143.1  | 586    |     |      |
| 146.49  | 585       | 148.73 | 584.39 | 149.3  | 584.32 | 149.9  | 584.27 | 150.2  | 584.27 |     |      |
| 150.36  | 584.32    | 151    | 585    | 152.49 | 586.5  | 153.97 | 588    | 154.59 | 588.62 |     |      |
| 155.37  | 589.42    | 155.95 | 590    | 156.63 | 590.7  | 157.3  | 591.37 | 158.71 | 592.82 |     |      |
| 159.83  | 593.95    | 159.97 | 594.1  | 160.98 | 595    | 161.97 | 596    | 163.03 | 597    |     |      |
| 165.13  | 599       | 166.19 | 600    | 167.23 | 601    | 167.94 | 601.67 | 169.32 | 603    |     |      |
| 169.72  | 603.37    | 171.89 | 605.44 | 173.96 | 607.43 | 175.19 | 608.63 | 176.61 | 610    |     |      |
| 177.54  | 611       | 177.65 | 611.16 | 177.74 | 611.19 | 178.31 | 611.24 | 179.59 | 611.38 |     |      |
| 182.29  | 611.53    | 184.92 | 611.67 | 186.19 | 611.72 | 186.99 | 611.79 | 187.99 | 611.9  |     |      |
| 188.21  | 611.9     | 188.65 | 612    | 190.22 | 612.41 | 192.45 | 613    | 193.25 | 613    |     |      |
| 195.98  | 613.14    | 205.84 | 613.47 | 207.42 | 613.5  | 207.81 | 613.52 | 209.4  | 613.53 |     |      |
| 211.48  | 613.59    | 213.11 | 613.63 | 217.97 | 613.71 | 224.33 | 613.82 | 227.26 | 613.82 |     |      |
| 228.78  | 613.94    | 229.65 | 614    | 230.15 | 614    | 233.33 | 614.03 | 233.5  | 614.04 |     |      |
| 250.15  | 614.34    | 250.84 | 614.37 | 254.01 | 614.41 | 254.32 | 614.42 | 263.46 | 614.53 |     |      |
| 263.62  | 614.54    | 270.28 | 614.54 | 271.05 | 614.55 | 277.22 | 614.79 | 277.56 | 614.81 |     |      |
| 281.89  | 614.85    | 286.2  | 614.92 | 291.64 | 615    | 291.91 | 615    | 300    | 615.1  |     |      |

Manning's n Values

| Sta    | n Val | Sta    | n Val | Sta   | n Val | Sta    | n Val | Sta | n Val |
|--------|-------|--------|-------|-------|-------|--------|-------|-----|-------|
| 0      | .035  | 81.49  | .024  | 93.18 | .07   | 146.49 | .04   | 151 | .07   |
| 177.65 | .024  | 188.21 | .035  |       |       |        |       |     |       |

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

|       |        |  |        |        |        |  |    |  |    |
|-------|--------|--|--------|--------|--------|--|----|--|----|
| 93.18 | 177.65 |  | 141.38 | 132.96 | 132.46 |  | .1 |  | .3 |
|-------|--------|--|--------|--------|--------|--|----|--|----|

# CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                   |         |         |
|--------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)     | 597.44   | Element           | Left OB | Channel |
| Right OB           |          |                   |         |         |
| Vel Head (ft)      | 0.55     | Wt. n-Val.        |         | 0.068   |
| W.S. Elev (ft)     | 596.88   | Reach Len. (ft)   | 141.38  | 132.96  |
| 132.46             |          |                   |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft) |         | 338.80  |
| E.G. Slope (ft/ft) | 0.006641 | Area (sq ft)      |         | 338.80  |
| Q Total (cfs)      | 2021.00  | Flow (cfs)        |         | 2021.00 |

|                   |         |                        |        |         |
|-------------------|---------|------------------------|--------|---------|
| LemonCreekEX.rep  |         |                        |        |         |
| Top width (ft)    | 48.09   | Top width (ft)         |        | 48.09   |
| Vel Total (ft/s)  | 5.97    | Avg. Vel. (ft/s)       |        | 5.97    |
| Max Chl Dpth (ft) | 12.61   | Hydr. Depth (ft)       |        | 7.05    |
| Conv. Total (cfs) | 24799.5 | Conv. (cfs)            |        | 24799.5 |
| Length wtd. (ft)  | 132.96  | Wetted Per. (ft)       |        | 55.69   |
| Min Ch El (ft)    | 584.27  | Shear (lb/sq ft)       |        | 2.52    |
| Alpha             | 1.00    | Stream Power (lb/ft s) | 300.00 | 0.00    |
| Frctn Loss (ft)   | 0.61    | Cum Volume (acre-ft)   | 1.70   | 15.25   |
| C & E Loss (ft)   | 0.06    | Cum SA (acres)         | 1.27   | 1.72    |
| 0.00              |         |                        |        |         |
| 2.94              |         |                        |        |         |
| 1.04              |         |                        |        |         |

Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1

RS: 2901.87

INPUT  
Description:

| Station Elevation Data |        | num=   | 142     |        |         |        |        |        |        |     |      |
|------------------------|--------|--------|---------|--------|---------|--------|--------|--------|--------|-----|------|
| Sta                    | Elev   | Sta    | Elev    | Sta    | Elev    | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 0                      | 655.86 | 17     | 655.77  | 3.23   | 654.22  | 3.91   | 653.86 | 5.6    | 653    |     |      |
| 7.92                   | 651.81 | 9.49   | 651     | 13.39  | 649     | 13.82  | 648.77 | 15.34  | 648    |     |      |
| 15.84                  | 647.73 | 17.28  | 647     | 19.22  | 646     | 20.57  | 645.31 | 21.8   | 644.67 |     |      |
| 23.1                   | 644    | 23.77  | 643.66  | 25.05  | 643     | 26.28  | 642.37 | 26.99  | 642    |     |      |
| 28.94                  | 641    | 30.87  | 640     | 32.82  | 639     | 33.63  | 638.58 | 35.63  | 637.55 |     |      |
| 38.65                  | 636    | 40.59  | 635     | 41.54  | 634.52  | 42.54  | 634    | 43.54  | 633.49 |     |      |
| 44.49                  | 633    | 45.57  | 632.45  | 47.5   | 631.45  | 48.38  | 631    | 49.94  | 630.14 |     |      |
| 51.81                  | 629    | 53.31  | 628     | 55.18  | 626.88  | 56.61  | 626    | 58.17  | 625    |     |      |
| 59.62                  | 624.09 | 61.31  | 623     | 61.53  | 622.87  | 62.87  | 622    | 64.37  | 621.12 |     |      |
| 66.24                  | 620    | 66.47  | 619.87  | 67.92  | 619     | 68.64  | 618.59 | 70.46  | 617.51 |     |      |
| 72.31                  | 616.4  | 72.97  | 616     | 74.54  | 615     | 76.01  | 614.06 | 76.46  | 613.78 |     |      |
| 78.09                  | 612.75 | 80.84  | 611     | 88.66  | 610.32  | 92.2   | 610    | 94.42  | 608.96 |     |      |
| 96.44                  | 608    | 98.66  | 606.95  | 99.4   | 606.61  | 99.88  | 606.37 | 101.19 | 605.65 |     |      |
| 102.28                 | 605    | 103.93 | 604     | 104.4  | 603.71  | 105.63 | 603    | 106.12 | 602.69 |     |      |
| 107.1                  | 602    | 108.82 | 601     | 109.63 | 600.52  | 110.53 | 600    | 111.26 | 599.57 |     |      |
| 112.24                 | 599    | 113.95 | 598     | 114.53 | 597.67  | 117.37 | 596    | 117.84 | 595.72 |     |      |
| 119.08                 | 595    | 120.78 | 594     | 121.18 | 593.74  | 121.9  | 593.38 | 122.56 | 593    |     |      |
| 123.46                 | 592.47 | 124.24 | 592     | 124.82 | 591.68  | 127.69 | 590    | 127.92 | 589.87 |     |      |
| 129.38                 | 589    | 130.1  | 588.59  | 131.08 | 588     | 133.92 | 586.3  | 134.55 | 585.91 |     |      |
| 136.17                 | 584.96 | 137.82 | 583.97  | 138.03 | 583.85  | 139.81 | 582.78 | 140.9  | 582.11 |     |      |
| 141.09                 | 582    | 149.24 | 581.685 | 150.82 | 581.685 | 153.89 | 581.71 | 154.89 | 583.24 |     |      |
| 155.36                 | 584    | 156.01 | 585     | 156.4  | 585.64  | 156.64 | 586    | 157.28 | 587    |     |      |
| 157.66                 | 587.62 | 158.54 | 589     | 159.02 | 589.68  | 159.23 | 590    | 159.79 | 590.79 |     |      |
| 160.39                 | 591.79 | 161.13 | 593     | 161.63 | 593.87  | 162.29 | 594.96 | 162.87 | 595.96 |     |      |
| 163.46                 | 597    | 164.62 | 599     | 170.43 | 599.97  | 170.49 | 600    | 175.15 | 600.33 |     |      |
| 184.09                 | 601    | 187.25 | 601.01  | 188.18 | 601.01  | 188.7  | 601.02 | 191.36 | 601.02 |     |      |
| 221.77                 | 601.46 | 245.88 | 601.79  | 246.37 | 601.79  | 258.43 | 602    | 263.3  | 602.15 |     |      |
| 263.6                  | 602.15 | 266.1  | 602.18  | 269.94 | 602.23  | 279.75 | 602.41 | 293.61 | 602.64 |     |      |
| 294.59                 | 602.65 | 300    | 602.74  |        |         |        |        |        |        |     |      |

|                    |       |       |       |      |       |        |       |
|--------------------|-------|-------|-------|------|-------|--------|-------|
| Manning's n Values |       | num=  | 4     |      |       |        |       |
| Sta                | n val | Sta   | n val | Sta  | n val | Sta    | n val |
| 0                  | .035  | 80.84 | .024  | 92.2 | .07   | 164.62 | .035  |

|                                     |          |                        |               |                     |
|-------------------------------------|----------|------------------------|---------------|---------------------|
| LemonCreekEX.rep                    |          |                        |               |                     |
| Bank Sta: Left                      | Right    | Lengths: Left Channel  | Right         | Coeff Contr. Expan. |
| 92.2                                | 164.62   | 123.39                 | 123.28 123.54 | .1 .3               |
| CROSS SECTION OUTPUT Profile #50-YR |          |                        |               |                     |
| E.G. Elev (ft)                      | 596.76   | Element                | Left OB       | Channel             |
| Right OB                            |          |                        |               |                     |
| Vel Head (ft)                       | 0.34     | Wt. n-Val.             |               | 0.070               |
| W.S. Elev (ft)                      | 596.42   | Reach Len. (ft)        | 123.39        | 123.28              |
| 123.54                              |          |                        |               |                     |
| Crit W.S. (ft)                      |          | Flow Area (sq ft)      |               | 431.14              |
| E.G. Slope (ft/ft)                  | 0.003404 | Area (sq ft)           |               | 431.14              |
| Q Total (cfs)                       | 2021.00  | Flow (cfs)             |               | 2021.00             |
| Top Width (ft)                      | 46.47    | Top Width (ft)         |               | 46.47               |
| Vel Total (ft/s)                    | 4.69     | Avg. Vel. (ft/s)       |               | 4.69                |
| Max Chl Dpth (ft)                   | 14.73    | Hydr. Depth (ft)       |               | 9.28                |
| Conv. Total (cfs)                   | 34641.2  | Conv. (cfs)            |               | 34641.2             |
| Length wtd. (ft)                    | 123.28   | Wetted Per. (ft)       |               | 58.55               |
| Min Ch El (ft)                      | 581.69   | Shear (lb/sq ft)       |               | 1.56                |
| Alpha                               | 1.00     | Stream Power (lb/ft s) | 300.00        | 0.00                |
| 0.00                                |          |                        |               |                     |
| Frctn Loss (ft)                     | 0.55     | Cum Volume (acre-ft)   | 1.70          | 14.07               |
| 2.94                                |          |                        |               |                     |
| C & E Loss (ft)                     | 0.02     | Cum SA (acres)         | 1.27          | 1.57                |
| 1.04                                |          |                        |               |                     |

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1

RS: 2778.59

INPUT  
Description:

| Station Elevation Data |        | num=   | 145    |        |        |        |        |        |        |     |      |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| Sta                    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 0                      | 651.29 | .66    | 650.97 | 2.74   | 649.95 | 4.83   | 648.94 | 6.76   | 648    |     |      |
| 9.01                   | 646.91 | 12.92  | 645    | 17.02  | 643    | 19.08  | 642    | 19.62  | 641.72 |     |      |
| 21.09                  | 641    | 22.06  | 640.51 | 25.69  | 638.76 | 26.38  | 638.51 | 28.3   | 638    |     |      |
| 30.82                  | 637.56 | 33.89  | 637    | 34.36  | 636.71 | 35.44  | 636    | 36.11  | 635.62 |     |      |
| 37.07                  | 635    | 38.45  | 634.16 | 39.32  | 633.64 | 40.71  | 633    | 42.94  | 632    |     |      |
| 44.69                  | 631.2  | 45.14  | 631    | 45.38  | 630.87 | 47.09  | 630    | 48.69  | 629.07 |     |      |
| 49.35                  | 628.7  | 52.31  | 627.22 | 52.74  | 627    | 53.08  | 626.8  | 53.95  | 626.24 |     |      |
| 54.59                  | 625.91 | 56.2   | 625    | 56.8   | 624.73 | 57.19  | 624.54 | 58.23  | 624    |     |      |
| 59.63                  | 623.15 | 59.83  | 623    | 60.54  | 622.63 | 61.7   | 622    | 63.22  | 621.15 |     |      |
| 65.22                  | 620    | 66.95  | 619    | 68.39  | 618.2  | 68.73  | 618    | 69.28  | 617.71 |     |      |
| 74.24                  | 615    | 75.15  | 614.46 | 75.91  | 614    | 77.27  | 613    | 77.91  | 612.54 |     |      |
| 78.64                  | 612    | 79.07  | 611.7  | 79.58  | 611.29 | 80.98  | 610.26 | 81.3   | 610    |     |      |
| 83.73                  | 608.2  | 83.99  | 608    | 85.34  | 607    | 86.85  | 606.83 | 96.07  | 606    |     |      |
| 99.83                  | 605.48 | 100.28 | 605.42 | 101.19 | 605    | 102.57 | 604.31 | 103.17 | 604    |     |      |
| 103.74                 | 603.73 | 103.87 | 603.7  | 106.43 | 603    | 109.67 | 602.11 | 110.17 | 601.87 |     |      |
| 111.91                 | 601    | 112.94 | 600.48 | 113.87 | 600    | 114.83 | 599.52 | 115.85 | 599    |     |      |

INPUT

Description:

|         |           |        |         |        |        |        |        |        |        |     |
|---------|-----------|--------|---------|--------|--------|--------|--------|--------|--------|-----|
| Station | Elevation | Data   | num=    | 143    |        |        |        |        |        |     |
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta |
| 0       | 629.11    | 17     | 629     | 1.44   | 628.22 | 1.78   | 628    | 3.08   | 627.2  |     |
| 3.77    | 626.77    | 5.09   | 626     | 6.74   | 625    | 8.95   | 623.67 | 10.97  | 622.82 |     |
| 12.89   | 622       | 13.82  | 621.61  | 15.25  | 621    | 20.03  | 619    | 21.64  | 618.33 |     |
| 22.39   | 618       | 23.05  | 617.72  | 24.71  | 617    | 26.38  | 616.28 | 29.34  | 615    |     |
| 29.7    | 614.85    | 31.6   | 614     | 32.13  | 613.78 | 32.58  | 613.57 | 33.89  | 612.93 |     |
| 37.85   | 611       | 39.87  | 610     | 39.88  | 610    | 42.26  | 609    | 48.69  | 608.22 |     |
| 50.03   | 608       | 59.51  | 607.21  | 64.04  | 607    | 70.15  | 606.65 | 77.81  | 606    |     |
| 78.1    | 605.97    | 78.63  | 605.89  | 79.03  | 605.81 | 84.21  | 604.19 | 84.86  | 604    |     |
| 85.81   | 603.7     | 88.08  | 603     | 89.38  | 602.57 | 91.27  | 602    | 94.06  | 601.06 |     |
| 94.26   | 601       | 97.7   | 600.07  | 98.02  | 600    | 98.25  | 599.99 | 98.43  | 599.95 |     |
| 99.38   | 599.81    | 99.47  | 599.79  | 100.51 | 599.69 | 101.2  | 599.63 | 104.95 | 599.36 |     |
| 109.43  | 599       | 111.88 | 598.81  | 114.05 | 598.62 | 114.57 | 598.56 | 115.49 | 598.42 |     |
| 116.63  | 598.23    | 116.72 | 598.21  | 117.6  | 598.01 | 117.74 | 598    | 118.37 | 597.8  |     |
| 118.86  | 597.6     | 119.25 | 597.43  | 121.96 | 596    | 122.61 | 595.66 | 123.92 | 595    |     |
| 124.72  | 594.58    | 125.91 | 594     | 126.63 | 593.62 | 128.61 | 592.59 | 129.71 | 592    |     |
| 130.55  | 591.56    | 131.53 | 591     | 132.65 | 590.37 | 134.09 | 589.62 | 135.24 | 589    |     |
| 136.12  | 588.55    | 137.18 | 588     | 138.21 | 587.48 | 139.12 | 587    | 141.03 | 586    |     |
| 142.95  | 585.05    | 143.16 | 584.94  | 144.77 | 584    | 146.54 | 583.05 | 146.81 | 582.91 |     |
| 147.84  | 582       | 149.84 | 577.486 | 152.21 | 581.79 | 152.42 | 582    | 152.78 | 582.28 |     |
| 154.85  | 583.85    | 155.91 | 584.66  | 156.53 | 585.01 | 158.48 | 586    | 159.13 | 586.34 |     |
| 161.31  | 587.46    | 162.42 | 588     | 163.79 | 588.7  | 166.31 | 590    | 167.93 | 590.84 |     |
| 170.22  | 591.98    | 172.09 | 593     | 173.04 | 593.49 | 173.15 | 593.58 | 173.46 | 593.77 |     |
| 173.76  | 593.93    | 173.9  | 594     | 174.11 | 594.01 | 174.6  | 594.06 | 177.6  | 594.35 |     |
| 180.9   | 594.58    | 184.82 | 594.84  | 186.41 | 594.94 | 187.2  | 595    | 202.01 | 595.9  |     |
| 202.79  | 595.99    | 203.44 | 596     | 204.82 | 596.15 | 206.5  | 596.37 | 207.15 | 596.46 |     |
| 207.98  | 596.61    | 210.7  | 597     | 233.38 | 597.87 | 236.43 | 598    | 237.82 | 598.22 |     |
| 238.32  | 598.29    | 238.63 | 598.35  | 243.95 | 599    | 247.06 | 599.39 | 251.97 | 600    |     |
| 255.36  | 600.3     | 262.22 | 601     | 263.23 | 601.09 | 267.66 | 601.46 | 273.98 | 602    |     |
| 281.73  | 602.72    | 285.05 | 603     | 300    | 603.47 |        |        |        |        |     |

Manning's n Values

|        |       |        |      |        |      |       |      |        |     |       |
|--------|-------|--------|------|--------|------|-------|------|--------|-----|-------|
| Sta    | n val | Sta    | num= | 8      | Sta  | n val | Sta  | n val  | Sta | n val |
| 0      | .07   | 42.26  | .024 | 77.81  | .07  | 99.38 | .024 | 116.72 | .07 |       |
| 146.81 | .04   | 152.78 | .07  | 173.76 | .035 |       |      |        |     |       |

Bank Sta: Left

Right

Lengths: Left

Channel

Right

Coeff

Contr.

Expan.

CROSS SECTION OUTPUT

Profile #50-YR

|                    |          |                   |         |         |
|--------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)     | 595.66   | Element           | Left OB | Channel |
| Right OB           |          |                   |         |         |
| Vel Head (ft)      | 0.44     | wt. n-Val.        |         | 0.065   |
| 0.035              |          |                   |         |         |
| W.S. Elev (ft)     | 595.22   | Reach Len. (ft)   | 32.36   | 25.00   |
| 27.91              |          |                   |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft) |         | 374.81  |
| 9.74               |          |                   |         |         |
| E.G. Slope (ft/ft) | 0.004969 | Area (sq ft)      |         | 374.81  |
| 9.74               |          |                   |         |         |
| Q Total (cfs)      | 2021.00  | Flow (cfs)        |         | 2001.05 |
| 19.96              |          |                   |         |         |
| Top width (ft)     | 67.41    | Top width (ft)    |         | 50.28   |
| 17.13              |          |                   |         |         |
| Vel Total (ft/s)   | 5.26     | Avg. Vel. (ft/s)  |         | 5.34    |
| 2.05               |          |                   |         |         |
| Max Chl Dpth (ft)  | 17.74    | Hydr. Depth (ft)  |         | 7.45    |
| 0.57               |          |                   |         |         |
| Conv. Total (cfs)  | 28670.1  | Conv. (cfs)       |         | 28387.0 |
| 283.1              |          |                   |         |         |
| Length wtd. (ft)   | 25.69    | Wetted Per. (ft)  |         | 62.42   |

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|                 |        |                        |        |       |
|-----------------|--------|------------------------|--------|-------|
| 17.19           |        |                        |        |       |
| Min Ch El (ft)  | 577.49 | Shear (lb/sq ft)       |        | 1.86  |
| 0.18            |        |                        |        |       |
| Alpha           | 1.02   | Stream Power (lb/ft s) | 300.00 | 0.00  |
| 0.00            |        |                        |        |       |
| Frctn Loss (ft) | 0.07   | Cum Volume (acre-ft)   | 1.70   | 12.20 |
| 2.92            |        |                        |        |       |
| C & E Loss (ft) | 0.06   | Cum SA (acres)         | 1.27   | 1.34  |
| 1.01            |        |                        |        |       |

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.

Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2660.90

INPUT  
Description:

| Station | Elevation | Data   | num=   | 146    | Sta    | Elev   | Sta    | Elev   | Sta    | Elev | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|------|-----|------|
| 0       | 630.28    | 1.17   | 629.59 | 2.14   | 629    | 3.81   | 628    | 4.86   | 627.38 |      |     |      |
| 5.46    | 627       | 6.7    | 626.27 | 7.14   | 626    | 8.5    | 625.19 | 10.35  | 624.1  |      |     |      |
| 11.79   | 623.24    | 15.08  | 621.62 | 17.19  | 620.62 | 18.46  | 620    | 19.26  | 619.62 |      |     |      |
| 20.53   | 619       | 22.56  | 618    | 24.49  | 617.02 | 24.64  | 616.95 | 26.86  | 616    |      |     |      |
| 27.34   | 615.81    | 28.98  | 615    | 31.14  | 614.15 | 31.66  | 613.92 | 34.15  | 612.8  |      |     |      |
| 35.91   | 612       | 39.45  | 610.4  | 40.29  | 610    | 42.06  | 609.23 | 42.92  | 608.85 |      |     |      |
| 43.61   | 608.64    | 46.2   | 608    | 46.84  | 608    | 50.12  | 607.83 | 51.12  | 607.8  |      |     |      |
| 52.48   | 607.77    | 74.51  | 607    | 76.9   | 606    | 76.91  | 606    | 79.93  | 604.76 |      |     |      |
| 81.79   | 604       | 86.1   | 602.23 | 88.79  | 601.12 | 89.33  | 600.96 | 93.76  | 599.62 |      |     |      |
| 95.38   | 599       | 97.43  | 598.18 | 98.13  | 597.91 | 100.41 | 597    | 103.17 | 596    |      |     |      |
| 106.2   | 594.89    | 107.78 | 594.57 | 109.73 | 594.24 | 111.07 | 594    | 115.97 | 593.09 |      |     |      |
| 116.48  | 593.01    | 117.12 | 592.98 | 118.35 | 592.81 | 119.98 | 592.55 | 123.04 | 592    |      |     |      |
| 126.66  | 591.33    | 130.37 | 590.67 | 131.01 | 590.56 | 132.1  | 590.28 | 132.33 | 590.23 |      |     |      |
| 132.68  | 590.14    | 133.1  | 589.91 | 134.94 | 588.93 | 136.02 | 588    | 138.38 | 586    |      |     |      |
| 139.56  | 584.95    | 140.73 | 584    | 141.89 | 582.96 | 143.04 | 582    | 144.21 | 581    |      |     |      |
| 144.77  | 580.54    | 145.45 | 580    | 146.08 | 579.46 | 146.65 | 579    | 147.46 | 577    |      |     |      |
| 152.58  | 577       | 153.57 | 580    | 153.93 | 580.37 | 154.45 | 581    | 155.17 | 581.75 |      |     |      |
| 155.42  | 582.09    | 156.17 | 583    | 156.41 | 583.34 | 156.92 | 584    | 157.42 | 584.73 |      |     |      |
| 158.1   | 585.6     | 158.51 | 586    | 159.05 | 586.35 | 159.67 | 586.73 | 159.86 | 586.82 |      |     |      |
| 162.48  | 587.74    | 163.19 | 588    | 164.84 | 588.59 | 165.94 | 589    | 167.28 | 589.48 |      |     |      |
| 168.68  | 590       | 169.74 | 590.38 | 171.35 | 591    | 172.42 | 591.39 | 173.8  | 592    |      |     |      |
| 175.38  | 592.61    | 175.85 | 592.79 | 177.47 | 593    | 179.3  | 593.18 | 186.06 | 593.72 |      |     |      |
| 187.67  | 593.83    | 189.39 | 594    | 190.8  | 594.32 | 193.73 | 595    | 194.83 | 595.26 |      |     |      |
| 197.32  | 595.81    | 198.08 | 596    | 199.1  | 596.27 | 201.53 | 597    | 202.88 | 597.41 |      |     |      |
| 203.25  | 597.47    | 204.58 | 597.55 | 204.77 | 597.59 | 211.02 | 598.01 | 215.93 | 598.18 |      |     |      |
| 225.26  | 599       | 225.68 | 599.04 | 228.09 | 599.36 | 228.29 | 599.4  | 230.99 | 600    |      |     |      |
| 236.59  | 601       | 238.82 | 601.41 | 239.61 | 601.48 | 240.01 | 601.53 | 241.04 | 601.63 |      |     |      |
| 242.17  | 601.71    | 246.98 | 602    | 251.64 | 602.25 | 256.1  | 602.6  | 262.19 | 603    |      |     |      |
| 274.12  | 603.23    | 275.35 | 603.26 | 282.76 | 603.55 | 283.51 | 603.57 | 294.77 | 604    |      |     |      |
| 300     | 604.03    |        |        |        |        |        |        |        |        |      |     |      |

| Manning's n | Values | num= | 8      | Sta  | n Val  | Sta  | n Val  | Sta | n Val | Sta | n Val |
|-------------|--------|------|--------|------|--------|------|--------|-----|-------|-----|-------|
| 0           | .07    | .024 | 74.51  | .07  | 116.48 | .024 | 132.33 | .07 |       |     |       |
| 146.65      | .04    | .07  | 175.38 | .035 |        |      |        |     |       |     |       |

Bank Sta: Left 132.33 Right 175.38 Lengths: Left Channel 70 Right 72.44 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 2

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| Sta L  | Sta R  | Elev | Permanent |
|--------|--------|------|-----------|
| 0      | 146.63 | 590  | F         |
| 153.38 | 300    | 590  | F         |

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 595.53   | Element                | Left OB | Channel |
|--------------------|----------|------------------------|---------|---------|
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.24     | Wt. n-Val.             | 0.026   | 0.065   |
| 0.035              |          |                        |         |         |
| W.S. Elev (ft)     | 595.30   | Reach Len. (ft)        | 72.46   | 70.00   |
| 72.44              |          |                        |         |         |
| Crit W.S. (ft)     | 590.01   | Flow Area (sq ft)      | 70.69   | 433.13  |
| 30.14              |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.001662 | Area (sq ft)           | 70.69   | 433.13  |
| 30.14              |          |                        |         |         |
| Q Total (cfs)      | 2021.00  | Flow (cfs)             | 343.49  | 1608.62 |
| 68.89              |          |                        |         |         |
| Top Width (ft)     | 89.91    | Top Width (ft)         | 27.24   | 43.05   |
| 19.62              |          |                        |         |         |
| Vel Total (ft/s)   | 3.78     | Avg. Vel. (ft/s)       | 4.86    | 3.71    |
| 2.29               |          |                        |         |         |
| Max Chl Dpth (ft)  | 18.30    | Hydr. Depth (ft)       | 2.59    | 10.06   |
| 1.54               |          |                        |         |         |
| Conv. Total (cfs)  | 49568.1  | Conv. (cfs)            | 8424.7  | 39453.8 |
| 1689.6             |          |                        |         |         |
| Length Wtd. (ft)   | 70.00    | wetted Per. (ft)       | 27.74   | 54.65   |
| 19.86              |          |                        |         |         |
| Min Ch El (ft)     | 577.00   | Shear (lb/sq ft)       | 0.26    | 0.82    |
| 0.16               |          |                        |         |         |
| Alpha              | 1.06     | Stream Power (lb/ft s) | 300.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    |          | Cum Volume (acre-ft)   | 1.67    | 11.97   |
| 2.91               |          |                        |         |         |
| C & E Loss (ft)    |          | Cum SA (acres)         | 1.26    | 1.31    |
| 0.99               |          |                        |         |         |

#### CULVERT

RIVER: LemonCreek  
REACH: Reach1 RS: 2625.92

INPUT

Description: Culvert #4

Distance from Upstream XS = 5

Deck/Roadway Width = 60

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

| num=   | 2      | Sta Hi Cord Lo Cord | Sta Hi Cord Lo Cord |
|--------|--------|---------------------|---------------------|
| 132.33 | 590.23 | 175.38              | 592.38              |

Upstream Bridge Cross Section Data

| Station | Elevation | Data  | num=   | 146   | Sta    | Elev  | Sta    | Elev  | Sta    | Elev | Sta | Elev |
|---------|-----------|-------|--------|-------|--------|-------|--------|-------|--------|------|-----|------|
| 0       | 630.28    | 1.17  | 629.59 | 2.14  | 629    | 3.81  | 628    | 4.86  | 627.38 |      |     |      |
| 5.46    | 627       | 6.7   | 626.27 | 7.14  | 626    | 8.5   | 625.19 | 10.35 | 624.1  |      |     |      |
| 11.79   | 623.24    | 15.08 | 621.62 | 17.19 | 620.62 | 18.46 | 620    | 19.26 | 619.62 |      |     |      |
| 20.53   | 619       | 22.56 | 618    | 24.49 | 617.02 | 24.64 | 616.95 | 26.86 | 616    |      |     |      |
| 27.34   | 615.81    | 28.98 | 615    | 31.14 | 614.15 | 31.66 | 613.92 | 34.15 | 612.8  |      |     |      |
| 35.91   | 612       | 39.45 | 610.4  | 40.29 | 610    | 42.06 | 609.23 | 42.92 | 608.85 |      |     |      |
| 43.61   | 608.64    | 46.2  | 608    | 46.84 | 608    | 50.12 | 607.83 | 51.12 | 607.8  |      |     |      |

|                                          |          |             |           |        |        |        |        |        |        |     |       |
|------------------------------------------|----------|-------------|-----------|--------|--------|--------|--------|--------|--------|-----|-------|
| LemonCreekEX.rep                         |          |             |           |        |        |        |        |        |        |     |       |
| 52.48                                    | 607.77   | 74.51       | 607       | 76.9   | 606    | 76.91  | 606    | 79.93  | 604.76 |     |       |
| 81.79                                    | 604      | 86.1        | 602.23    | 88.79  | 601.12 | 89.33  | 600.96 | 93.76  | 599.62 |     |       |
| 95.38                                    | 599      | 97.43       | 598.18    | 98.13  | 597.91 | 100.41 | 597    | 103.17 | 596    |     |       |
| 106.2                                    | 594.89   | 107.78      | 594.57    | 109.73 | 594.24 | 111.07 | 594    | 115.97 | 593.09 |     |       |
| 116.48                                   | 593.01   | 117.12      | 592.98    | 118.35 | 592.81 | 119.98 | 592.55 | 123.04 | 592    |     |       |
| 126.66                                   | 591.33   | 130.37      | 590.67    | 131.01 | 590.56 | 132.1  | 590.28 | 132.33 | 590.23 |     |       |
| 132.68                                   | 590.14   | 133.1       | 589.91    | 134.94 | 588.93 | 136.02 | 588    | 138.38 | 586    |     |       |
| 139.56                                   | 584.95   | 140.73      | 584       | 141.89 | 582.96 | 143.04 | 582    | 144.21 | 581    |     |       |
| 144.77                                   | 580.54   | 145.45      | 580       | 146.08 | 579.46 | 146.65 | 579    | 147.46 | 577    |     |       |
| 152.58                                   | 577      | 153.57      | 580       | 153.93 | 580.37 | 154.45 | 581    | 155.17 | 581.75 |     |       |
| 155.42                                   | 582.09   | 156.17      | 583       | 156.41 | 583.34 | 156.92 | 584    | 157.42 | 584.73 |     |       |
| 158.1                                    | 585.6    | 158.51      | 586       | 159.05 | 586.35 | 159.67 | 586.73 | 159.86 | 586.82 |     |       |
| 162.48                                   | 587.74   | 163.19      | 588       | 164.84 | 588.59 | 165.94 | 589    | 167.28 | 589.48 |     |       |
| 168.68                                   | 590      | 169.74      | 590.38    | 171.35 | 591    | 172.42 | 591.39 | 173.8  | 592    |     |       |
| 175.38                                   | 592.61   | 175.85      | 592.79    | 177.47 | 593    | 179.3  | 593.18 | 186.06 | 593.72 |     |       |
| 187.67                                   | 593.83   | 189.39      | 594       | 190.8  | 594.32 | 193.73 | 595    | 194.83 | 595.26 |     |       |
| 197.32                                   | 595.81   | 198.08      | 596       | 199.1  | 596.27 | 201.53 | 597    | 202.88 | 597.41 |     |       |
| 203.25                                   | 597.47   | 204.58      | 597.55    | 204.77 | 597.59 | 211.02 | 598.01 | 215.93 | 598.18 |     |       |
| 225.26                                   | 599      | 225.68      | 599.04    | 228.09 | 599.36 | 228.29 | 599.4  | 230.99 | 600    |     |       |
| 236.59                                   | 601      | 238.82      | 601.41    | 239.61 | 601.48 | 240.01 | 601.53 | 241.04 | 601.63 |     |       |
| 242.17                                   | 601.71   | 246.98      | 602       | 251.64 | 602.25 | 256.1  | 602.6  | 262.19 | 603    |     |       |
| 274.12                                   | 603.23   | 275.35      | 603.26    | 282.76 | 603.55 | 283.51 | 603.57 | 294.77 | 604    |     |       |
| 300                                      | 604.03   |             |           |        |        |        |        |        |        |     |       |
| Manning's n Values                       |          |             |           |        |        |        |        |        |        |     |       |
| Sta                                      | n Val    | Sta         | n Val     | Sta    | n Val  | Sta    | n Val  | Sta    | n Val  | Sta | n Val |
| 0                                        | .07      | 46.2        | .024      | 74.51  | .07    | 116.48 | .024   | 132.33 | .07    |     |       |
| 146.65                                   | .04      | 153.57      | .07       | 175.38 | .035   |        |        |        |        |     |       |
| Bank Sta: Left Right Coeff Contr. Expan. |          |             |           |        |        |        |        |        |        |     |       |
| 132.33                                   | 175.38   |             | .1        | .3     |        |        |        |        |        |     |       |
| Ineffective Flow num= 2                  |          |             |           |        |        |        |        |        |        |     |       |
| Sta L                                    | Sta R    | Elev        | Permanent |        |        |        |        |        |        |     |       |
| 0                                        | 146.63   | 590         | F         |        |        |        |        |        |        |     |       |
| 153.38                                   | 300      | 590         | F         |        |        |        |        |        |        |     |       |
| Downstream Deck/Roadway Coordinates      |          |             |           |        |        |        |        |        |        |     |       |
| num= 2                                   |          |             |           |        |        |        |        |        |        |     |       |
| Sta Hi Cord                              | Lo Cord  | Sta Hi Cord | Lo Cord   |        |        |        |        |        |        |     |       |
| 135.61                                   | 585      | 177.28      | 592.01    |        |        |        |        |        |        |     |       |
| Downstream Bridge Cross Section Data     |          |             |           |        |        |        |        |        |        |     |       |
| Station Elevation Data                   | num= 143 |             |           |        |        |        |        |        |        |     |       |
| Sta                                      | Elev     | Sta         | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev  |
| 0                                        | 637.8    | 1.54        | 637       | 4.49   | 635.48 | 5.4    | 635    | 7.33   | 634    |     |       |
| 9.27                                     | 633      | 9.96        | 632.65    | 11.18  | 632    | 13.62  | 630.74 | 15.02  | 630    |     |       |
| 18.45                                    | 628.21   | 18.86       | 628       | 20.77  | 627    | 22.44  | 626.13 | 22.9   | 625.88 |     |       |
| 24.59                                    | 625      | 28.39       | 623.01    | 32.33  | 620.94 | 35.21  | 619.42 | 35.62  | 619.26 |     |       |
| 36.14                                    | 619      | 36.3        | 618.9     | 38.51  | 617.86 | 40.74  | 616.82 | 42.47  | 616    |     |       |
| 42.99                                    | 615.76   | 44.6        | 615       | 45.29  | 614.68 | 47.65  | 613.57 | 48.85  | 613    |     |       |
| 52.83                                    | 611.13   | 53.82       | 610.67    | 55.53  | 609.93 | 57.7   | 609    | 58.06  | 608.84 |     |       |
| 60.03                                    | 608      | 83.31       | 607.1     | 85.87  | 607    | 87.33  | 605.88 | 89.11  | 604.67 |     |       |
| 90.08                                    | 604      | 90.82       | 603.5     | 92.41  | 602.41 | 93.96  | 601.36 | 94.48  | 601    |     |       |
| 96.99                                    | 599.29   | 98.48       | 598.27    | 99.97  | 597.26 | 101.81 | 596    | 103.28 | 595    |     |       |
| 106.55                                   | 592.76   | 109.49      | 590.76    | 110.6  | 590    | 112.5  | 588.71 | 116.47 | 586    |     |       |
| 118.71                                   | 585.71   | 118.94      | 585.71    | 124.08 | 585.63 | 128.92 | 585.67 | 130.47 | 585.69 |     |       |
| 131.82                                   | 585.51   | 134.87      | 585.02    | 135.61 | 585    | 135.78 | 585    | 137.07 | 584.15 |     |       |
| 137.27                                   | 584      | 138.98      | 582.85    | 141.7  | 581    | 143.44 | 579.84 | 144.68 | 579    |     |       |
| 144.98                                   | 578.81   | 146.17      | 578       | 147.32 | 575    | 152.4  | 575    | 153.05 | 576    |     |       |
| 155.09                                   | 577      | 156.7       | 577.8     | 157.12 | 578    | 158.39 | 578.74 | 159.11 | 579    |     |       |
| 159.52                                   | 579.31   | 160.24      | 579.65    | 160.76 | 579.96 | 160.9  | 580    | 161.1  | 580.31 |     |       |
| 162.13                                   | 581      | 162.99      | 581.87    | 164.83 | 583.08 | 166.24 | 584    | 166.48 | 584.15 |     |       |
| 167.78                                   | 585      | 169.3       | 586       | 169.66 | 586.29 | 170.73 | 587    | 171.16 | 587.41 |     |       |
| 172.03                                   | 588      | 172.53      | 588.52    | 173.21 | 589    | 173.69 | 589.63 | 174.21 | 590    |     |       |
| 175.04                                   | 590.71   | 175.43      | 591       | 176.12 | 591.59 | 176.61 | 591.82 | 177.07 | 592    |     |       |
| 177.28                                   | 592.01   | 179.08      | 592.1     | 183.4  | 593    | 184.92 | 593.22 | 186.1  | 593.29 |     |       |

|                                                |        |                          |           |        |          |               |                          |        |        |
|------------------------------------------------|--------|--------------------------|-----------|--------|----------|---------------|--------------------------|--------|--------|
| 187.1                                          | 593.34 | 190.35                   | 594       | 194.08 | 594.92   | 195.19        | 595.19                   | 195.55 | 595.27 |
| 197.76                                         | 595.72 | 199.11                   | 596       | 203.25 | 596.88   | 203.86        | 597                      | 207.88 | 597.85 |
| 208.73                                         | 598.02 | 213.41                   | 599       | 218.2  | 600      | 220.42        | 600.46                   | 223    | 601    |
| 226.11                                         | 601.56 | 228.87                   | 602       | 234.57 | 602.84   | 235.69        | 603                      | 236.19 | 603.01 |
| 237.5                                          | 603.01 | 238.75                   | 603       | 241.23 | 603      | 245.38        | 603.06                   | 246.61 | 603.07 |
| 249.9                                          | 603.12 | 258.33                   | 603.26    | 262.38 | 603.31   | 268.64        | 603.4                    | 281.77 | 603.6  |
| 282.27                                         | 603.6  | 283.22                   | 603.62    | 300    | 603.89   |               |                          |        |        |
| Manning's n values num= 8                      |        |                          |           |        |          |               |                          |        |        |
| Sta                                            | n Val  | Sta                      | n Val     | Sta    | n Val    | Sta           | n Val                    | Sta    | n Val  |
| 0                                              | .07    | 60.03                    | .024      | 85.87  | .07      | 116.47        | .024                     | 135.61 | .07    |
| 146.17                                         | .04    | 153.05                   | .07       | 177.28 | .035     |               |                          |        |        |
| Bank Sta: Left Right Coeff Contr. Expan.       |        |                          |           |        |          |               |                          |        |        |
| 135.61                                         |        | 177.28                   |           |        |          | .1            |                          | .3     |        |
| Ineffective Flow num= 2                        |        |                          |           |        |          |               |                          |        |        |
| Sta L                                          | Sta R  | Elev                     | Permanent |        |          |               |                          |        |        |
| 0                                              | 146.63 | 585                      | F         |        |          |               |                          |        |        |
| 153.38                                         | 300    | 585                      | F         |        |          |               |                          |        |        |
| Upstream Embankment side slope                 |        |                          |           |        |          | =             | 0 horiz. to 1.0 vertical |        |        |
| Downstream Embankment side slope               |        |                          |           |        |          | =             | 0 horiz. to 1.0 vertical |        |        |
| Maximum allowable submergence for weir flow    |        |                          |           |        |          | =             | .98                      |        |        |
| Elevation at which weir flow begins            |        |                          |           |        |          | =             |                          |        |        |
| Energy head used in spillway design            |        |                          |           |        |          | =             |                          |        |        |
| Spillway height used in design                 |        |                          |           |        |          | =             |                          |        |        |
| weir crest shape                               |        |                          |           |        |          | =             | Broad Crested            |        |        |
| Number of Culverts = 1                         |        |                          |           |        |          |               |                          |        |        |
| Culvert Name Shape Rise Span                   |        |                          |           |        |          |               |                          |        |        |
| Culvert #1                                     |        | Circular                 |           | 6.75   |          |               |                          |        |        |
| FHWA Chart # 2 - Corrugated Metal Pipe Culvert |        |                          |           |        |          |               |                          |        |        |
| FHWA Scale # 1 - Headwall                      |        |                          |           |        |          |               |                          |        |        |
| Solution Criteria = Highest U.S. EG            |        |                          |           |        |          |               |                          |        |        |
| Culvert Upstrm Dist                            |        | Length                   |           | Top n  | Bottom n | Depth Blocked | Entrance Loss Coef       |        |        |
| Exit Loss Coef                                 |        |                          |           |        |          |               |                          |        |        |
| 5                                              |        | 60                       |           | .024   | .024     | 0             | .5                       |        |        |
| 1                                              |        |                          |           |        |          |               |                          |        |        |
| Upstream                                       |        | Elevation = 577          |           |        |          |               |                          |        |        |
|                                                |        | Centerline Station = 150 |           |        |          |               |                          |        |        |
| Downstream                                     |        | Elevation = 575          |           |        |          |               |                          |        |        |
|                                                |        | Centerline Station = 150 |           |        |          |               |                          |        |        |
| CROSS SECTION                                  |        |                          |           |        |          |               |                          |        |        |
| RIVER: LemonCreek                              |        |                          |           |        |          |               |                          |        |        |
| REACH: Reach1                                  |        | RS: 2590.90              |           |        |          |               |                          |        |        |
| INPUT                                          |        |                          |           |        |          |               |                          |        |        |
| Description:                                   |        |                          |           |        |          |               |                          |        |        |
| Station Elevation Data                         |        | num= 143                 |           |        |          |               |                          |        |        |
| Sta                                            | Elev   | Sta                      | Elev      | Sta    | Elev     | Sta           | Elev                     | Sta    | Elev   |
| 0                                              | 637.8  | 1.54                     | 637       | 4.49   | 635.48   | 5.4           | 635                      | 7.33   | 634    |
| 9.27                                           | 633    | 9.96                     | 632.65    | 11.18  | 632      | 13.62         | 630.74                   | 15.02  | 630    |
| 18.45                                          | 628.21 | 18.86                    | 628       | 20.77  | 627      | 22.44         | 626.13                   | 22.9   | 625.88 |
| 24.59                                          | 625    | 28.39                    | 623.01    | 32.33  | 620.94   | 35.21         | 619.42                   | 35.62  | 619.26 |
| 36.14                                          | 619    | 36.3                     | 618.9     | 38.51  | 617.86   | 40.74         | 616.82                   | 42.47  | 616    |
| 42.99                                          | 615.76 | 44.6                     | 615       | 45.29  | 614.68   | 47.65         | 613.57                   | 48.85  | 613    |
| 52.83                                          | 611.13 | 53.82                    | 610.67    | 55.53  | 609.93   | 57.7          | 609                      | 58.06  | 608.84 |
| 60.03                                          | 608    | 83.31                    | 607.1     | 85.87  | 607      | 87.33         | 605.88                   | 89.11  | 604.67 |
| 90.08                                          | 604    | 90.82                    | 603.5     | 92.41  | 602.41   | 93.96         | 601.36                   | 94.48  | 601    |
| 96.99                                          | 599.29 | 98.48                    | 598.27    | 99.97  | 597.26   | 101.81        | 596                      | 103.28 | 595    |
| 106.55                                         | 592.76 | 109.49                   | 590.76    | 110.6  | 590      | 112.5         | 588.71                   | 116.47 | 586    |
| 118.71                                         | 585.71 | 118.94                   | 585.71    | 124.08 | 585.63   | 128.92        | 585.67                   | 130.47 | 585.69 |

|                           |          |                        |         |         |
|---------------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)            | 588.44   | Element                | Left OB | Channel |
| Right OB<br>Vel Head (ft) | 0.67     | wt. n-val.             | 0.024   | 0.064   |
| W.S. Elev (ft)            | 587.78   | Reach Len. (ft)        | 24.97   | 25.00   |
| 32.13<br>Crit W.S. (ft)   | 585.01   | Flow Area (sq ft)      | 44.08   | 269.14  |
| E.G. Slope (ft/ft)        | 0.006487 | Area (sq ft)           | 44.08   | 269.14  |
| Q Total (cfs)             | 2021.00  | Flow (cfs)             | 352.82  | 1668.18 |
| Top width (ft)            | 57.83    | Top width (ft)         | 21.74   | 36.09   |
| Vel Total (ft/s)          | 6.45     | Avg. Vel. (ft/s)       | 8.00    | 6.20    |
| Max Chl Dpth (ft)         | 12.78    | Hydr. Depth (ft)       | 2.03    | 7.46    |
| Conv. Total (cfs)         | 25092.1  | Conv. (cfs)            | 4380.5  | 20711.6 |
| Length wtd. (ft)          | 24.99    | Wetted Per. (ft)       | 22.36   | 44.38   |
| Min ch El (ft)            | 575.00   | Shear (lb/sq ft)       | 0.80    | 2.46    |
| Alpha<br>0.00             | 1.03     | Stream Power (lb/ft s) | 300.00  | 0.00    |
| Frctn Loss (ft)           | 0.15     | Cum Volume (acre-ft)   | 1.67    | 11.42   |
| 2.91<br>C & E Loss (ft)   | 0.01     | Cum SA (acres)         | 1.22    | 1.25    |
| 0.98                      |          |                        |         |         |

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2565.90

## INPUT

**Description:**

| Station | Elevation | Data   | num=   | 150    |        |        |        |        |        |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Sta     | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0       | 638.14    | 2.09   | 638.06 | 3.43   | 638    | 4.76   | 637.33 | 6.75   | 636.34 |
| 8.79    | 635.31    | 9.42   | 635    | 14.83  | 632.28 | 15.37  | 632    | 17.86  | 630.75 |
| 19.94   | 629.7     | 22.09  | 628.63 | 24.28  | 627.52 | 26.54  | 626.39 | 28.92  | 625.19 |
| 30.68   | 624.31    | 32.88  | 623    | 33.27  | 622.79 | 34.62  | 622    | 35.27  | 621.65 |
| 36.39   | 621       | 37.38  | 620.48 | 38.21  | 620    | 39.58  | 619.24 | 40.09  | 619    |
| 41.93   | 618       | 43.89  | 617    | 45.83  | 616    | 46.76  | 615.57 | 47.2   | 615.38 |
| 50.39   | 614.08    | 51.61  | 613.57 | 55.46  | 612    | 57.94  | 611    | 58.4   | 610.82 |
| 62.91   | 609       | 65.4   | 608    | 65.76  | 607.88 | 66.36  | 607.88 | 67.12  | 607.85 |
| 79.82   | 607       | 87.52  | 606.26 | 91.02  | 606    | 93.1   | 604.64 | 94.21  | 603.8  |
| 95.79   | 602.62    | 97.94  | 601    | 99.24  | 600    | 100.05 | 599.44 | 100.63 | 599    |
| 101.47  | 598.34    | 103.25 | 597    | 104.99 | 595.7  | 105.91 | 595    | 107.24 | 594    |
| 108.26  | 593.21    | 109.93 | 592    | 110.75 | 591.38 | 112.29 | 590.23 | 113.9  | 589.02 |
| 114.65  | 588.43    | 116.21 | 587    | 116.34 | 586.89 | 117.3  | 586    | 118.39 | 585    |
| 119.55  | 584.68    | 120.95 | 584.54 | 121.89 | 584.51 | 126.13 | 584.46 | 129.75 | 584.44 |
| 130.71  | 584.45    | 130.89 | 584.47 | 132.49 | 584.51 | 134.13 | 584.44 | 136.41 | 584.32 |
| 136.81  | 584.32    | 137.14 | 584    | 138.35 | 583.1  | 139.12 | 582.58 | 139.96 | 582    |
| 141.46  | 581       | 142.41 | 580.38 | 146.17 | 578    | 147.23 | 577.26 | 147.62 | 577    |
| 147.74  | 576.86    | 148.33 | 576    | 149.67 | 575.96 | 150.63 | 576    | 151.88 | 577    |
| 152.26  | 577.29    | 153.13 | 578    | 153.24 | 577.58 | 154.38 | 578.99 | 154.47 | 578.99 |
| 154.78  | 578       | 155.62 | 578.58 | 156.49 | 579.15 | 157.74 | 579.62 | 158.8  | 580    |
| 159.15  | 580.11    | 162.8  | 581    | 165.67 | 581.69 | 170.36 | 583    | 172.19 | 583.52 |
| 173.72  | 584       | 176.04 | 584.81 | 176.53 | 585.02 | 178.59 | 586    | 179.2  | 586.28 |
| 180.71  | 587       | 187.08 | 590.02 | 189.08 | 591    | 191.06 | 592    | 192.09 | 592.6  |
| 192.83  | 593       | 193.19 | 593.09 | 195.53 | 593.69 | 196.51 | 594    | 198.45 | 594.38 |
| 204.32  | 595.54    | 206.74 | 596    | 208.26 | 596.3  | 211.89 | 597    | 214.76 | 597.56 |
| 217.04  | 598       | 218.74 | 598.34 | 222.93 | 599.17 | 224.57 | 599.49 | 225.83 | 599.65 |
| 226.44  | 599.67    | 226.61 | 599.7  | 227.93 | 599.79 | 229.07 | 599.94 | 232.47 | 601    |
| 235.17  | 601.46    | 238.69 | 602    | 242.35 | 602.54 | 246.51 | 603    | 252.75 | 603    |
| 255.08  | 603.01    | 269.32 | 603.23 | 269.69 | 603.24 | 276.45 | 603.34 | 281.64 | 603.41 |
| 284.62  | 603.46    | 288.07 | 603.5  | 293.55 | 603.59 | 294.38 | 603.6  | 300    | 603.68 |

|                    |       |        |       |        |       |        |       |        |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| Manning's n values |       | num= 8 |       |        |       |        |       |        |       |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .07   | 65.4   | .024  | 91.02  | .07   | 119.55 | .024  | 136.41 | .07   |
| 147.74             | .04   | 151.88 | .027  | 193.19 | .035  |        |       |        |       |

|           |        |        |          |       |         |       |              |        |
|-----------|--------|--------|----------|-------|---------|-------|--------------|--------|
| Bank Sta: | Left   | Right  | Lengths: | Left  | Channel | Right | Coeff Contr. | Expan. |
|           | 136.41 | 193.19 |          | 62.79 | 63.51   | 72.59 | .1           | .3     |

CROSS SECTION OUTPUT Profile #50-YR

|                           |          |                   |         |         |
|---------------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)            | 588.28   | Element           | Left OB | Channel |
| Right OB<br>Vel Head (ft) | 0.63     | wt. n-Val.        | 0.025   | 0.067   |
| W.S. Elev (ft)            | 587.65   | Reach Len. (ft)   | 62.79   | 63.51   |
| 72.59<br>Crit W.S. (ft)   |          | Flow Area (sq ft) | 60.72   | 290.76  |
| E.G. Slope (ft/ft)        | 0.005458 | Area (sq ft)      | 60.72   | 290.76  |
| Q Total (cfs)             | 2021.00  | Flow (cfs)        | 543.97  | 1477.03 |

|           |        |        |      |                  |              |        |       |        |        |  |
|-----------|--------|--------|------|------------------|--------------|--------|-------|--------|--------|--|
|           |        |        |      | LemonCreekEX.rep |              |        |       |        |        |  |
| 0         | .024   | 9.81   | .035 | 74.66            | .024         | 97.93  | .07   | 137.04 | .024   |  |
| 141.76    | .07    | 147.43 | .04  | 157.06           | .07          | 174.92 | .035  |        |        |  |
| Bank Sta: | Left   | Right  |      | Lengths:         | Left Channel | Right  | Coeff | Contr. | Expan. |  |
|           | 141.76 | 174.92 |      |                  | 170.56       | 175.2  |       | .1     | .3     |  |
|           |        |        |      |                  |              | 183.4  |       |        |        |  |

|                           |          |                        |         |         |
|---------------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)            | 587.80   | Element                | Left OB | Channel |
| Right OB<br>Vel Head (ft) | 1.00     | wt. n-val.             | 0.035   | 0.062   |
| W.S. Elev (ft)            | 586.81   | Reach Len. (ft)        | 170.56  | 175.20  |
| 183.40<br>Crit W.S. (ft)  |          | Flow Area (sq ft)      | 54.18   | 201.57  |
| E.G. Slope (ft/ft)        | 0.009196 | Area (sq ft)           | 54.18   | 201.57  |
| Q Total (cfs)             | 2021.00  | Flow (cfs)             | 506.37  | 1514.63 |
| Top width (ft)            | 43.34    | Top Width (ft)         | 15.41   | 27.93   |
| Vel Total (ft/s)          | 7.90     | Avg. Vel. (ft/s)       | 9.35    | 7.51    |
| Max Chl Dpth (ft)         | 10.94    | Hydr. Depth (ft)       | 3.52    | 7.22    |
| Conv. Total (cfs)         | 21074.8  | Conv. (cfs)            | 5280.4  | 15794.4 |
| Length wtd. (ft)          | 174.65   | Wetted Per. (ft)       | 16.68   | 34.41   |
| Min Ch El (ft)            | 575.87   | Shear (lb/sq ft)       | 1.87    | 3.36    |
| Alpha<br>0.00             | 1.03     | Stream Power (lb/ft s) | 300.00  | 0.00    |
| Frctn Loss (ft)           | 2.44     | Cum Volume (acre-ft)   | 1.56    | 10.90   |
| 2.91<br>C & E Loss (ft)   | 0.04     | Cum SA (acres)         | 1.18    | 1.17    |
| 0.98                      |          |                        |         |         |

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

| INPUT        |           |       |        |       |        |       |        |       |        |
|--------------|-----------|-------|--------|-------|--------|-------|--------|-------|--------|
| Description: |           |       |        |       |        |       |        |       |        |
| Station      | Elevation | Data  | num=   | 150   |        |       |        |       |        |
| Sta          | Elev      | Sta   | Elev   | Sta   | Elev   | Sta   | Elev   | Sta   | Elev   |
| 0            | 629.96    | .27   | 629.83 | 1.91  | 629    | 3.56  | 628.17 | 3.88  | 628    |
| 6.16         | 626.85    | 7.84  | 626    | 9.51  | 625.15 | 11.79 | 624    | 12.11 | 623.85 |
| 13.78        | 623       | 15.46 | 622.15 | 17.76 | 621.04 | 19.79 | 620    | 21.75 | 619    |
| 23.46        | 618.12    | 25.55 | 617.1  | 25.74 | 617    | 28.08 | 615.9  | 29.8  | 615    |
| 30.17        | 614.8     | 31.74 | 614    | 31.77 | 613.98 | 35.49 | 612    | 36.59 | 611.43 |
| 37.29        | 611       | 38.02 | 610.65 | 39.22 | 610    | 40.2  | 609.5  | 42.1  | 608.49 |

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| INPUT        |           |        |        |        |        |        |        |        |        |     |      |
|--------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| Description: |           |        |        |        |        |        |        |        |        |     |      |
| Station      | Elevation | Data   | num=   | 150    |        |        |        |        |        |     |      |
| Sta          | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 15.0         | 638.01    | 6.59   | 638    | 9.81   | 638    | 11.91  | 637.57 | 14.55  | 637    |     |      |
| 22.57        | 636.45    | 16.78  | 635.75 | 18.15  | 635    | 19.89  | 634    | 21.35  | 633.2  |     |      |
| 15.17        | 632.78    | 24.09  | 631.7  | 25.38  | 631    | 25.96  | 630.7  | 27.24  | 630    |     |      |
| 32.84        | 629.69    | 29.11  | 629    | 29.75  | 628.67 | 30.98  | 628    | 31.62  | 627.67 |     |      |
| 27.84        | 627       | 33.55  | 626.64 | 34.72  | 626    | 35.43  | 625.63 | 36.59  | 625    |     |      |
| 38.69        | 623.88    | 40.5   | 622.95 | 43.21  | 621.54 | 44.3   | 620.96 | 46.09  | 620    |     |      |
| 46.39        | 619.85    | 49.83  | 618    | 50.41  | 617.7  | 51.71  | 617    | 52.54  | 616.56 |     |      |
| 53.65        | 616       | 55.14  | 615.24 | 55.58  | 615    | 56.05  | 614.78 | 57.6   | 614    |     |      |
| 58.88        | 613.35    | 61     | 612.29 | 63.56  | 611    | 65.56  | 610    | 67.57  | 609    |     |      |
| 69.31        | 608.27    | 69.86  | 608    | 72.19  | 607    | 74.66  | 606    | 75.99  | 605.94 |     |      |
| 97.93        | 605       | 99.17  | 604    | 100.04 | 603.27 | 100.38 | 603    | 101.57 | 602.03 |     |      |
| 101.77       | 601.86    | 102.42 | 601.39 | 105.06 | 599.8  | 107    | 598.62 | 108.03 | 598    |     |      |
| 109.67       | 597       | 110.71 | 596.36 | 112.56 | 595.23 | 114.56 | 594    | 114.6  | 593.97 |     |      |
| 116.5        | 592.82    | 119.48 | 591    | 123.91 | 588.3  | 125.85 | 587.11 | 126.12 | 586.95 |     |      |
| 127.67       | 586       | 130.95 | 584    | 132.06 | 583.01 | 132.84 | 582.88 | 137.04 | 582    |     |      |
| 138.3        | 581.99    | 139.46 | 581.99 | 139.74 | 582    | 141.76 | 582    | 142.07 | 582    |     |      |
| 143.38       | 581       | 145.08 | 579.95 | 146.11 | 579    | 146.17 | 578.93 | 146.8  | 578    |     |      |
| 147.43       | 577       | 148.02 | 576    | 149.12 | 575.97 | 151.95 | 575.87 | 155.77 | 576    |     |      |
| 157.06       | 577       | 157.94 | 577.71 | 159.4  | 578.87 | 159.77 | 579.18 | 161.54 | 580.6  |     |      |
| 164.42       | 582.96    | 165.67 | 584    | 166.82 | 585    | 167.99 | 585.99 | 168.43 | 585.97 |     |      |
| 168.5        | 586       | 169.92 | 586.96 | 170    | 587    | 171.52 | 588    | 172.18 | 588.4  |     |      |
| 173.06       | 589       | 174.73 | 590    | 174.92 | 590    | 175.97 | 590.01 | 179.55 | 590.12 |     |      |
| 183.68       | 590.22    | 183.97 | 590.23 | 193.99 | 591    | 195.47 | 591.06 | 201.28 | 591.33 |     |      |
| 214.26       | 591.89    | 214.89 | 591.93 | 216.23 | 592    | 216.35 | 592    | 217.38 | 592.07 |     |      |
| 217.68       | 592.08    | 228.19 | 592.56 | 230.94 | 592.6  | 234.22 | 592.67 | 239.47 | 593    |     |      |
| 240.91       | 593.55    | 242.13 | 594    | 244.47 | 594.89 | 245.98 | 595.43 | 247.41 | 595.89 |     |      |
| 248.31       | 596.13    | 252.26 | 597    | 254.05 | 597.39 | 254.28 | 597.46 | 255.63 | 598    |     |      |
| 256.01       | 598.16    | 259.17 | 599.67 | 259.89 | 600    | 261.53 | 600.55 | 263.1  | 601    |     |      |
| 266.18       | 601.32    | 271.42 | 602    | 277.98 | 602.33 | 278.08 | 602.34 | 280.77 | 602.45 |     |      |
| 287.06       | 602.79    | 288.85 | 602.9  | 290.28 | 602.97 | 290.78 | 603    | 300    | 603    |     |      |

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| LemonCreekEX.rep |        |        |        |        |        |        |        |        |        |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 43.01            | 608    | 44.03  | 607.46 | 44.88  | 607    | 46.77  | 606    | 48.62  | 605    |
| 48.98            | 604.99 | 49.76  | 604.99 | 58.77  | 604.54 | 63.29  | 604.29 | 68.57  | 604    |
| 69.37            | 604    | 72.46  | 603.63 | 74.62  | 603    | 74.74  | 602.91 | 76.78  | 601.48 |
| 78.29            | 600.43 | 79.85  | 599.35 | 80.35  | 599    | 81.43  | 598.26 | 83.24  | 597    |
| 84.84            | 595.9  | 85.48  | 595.49 | 86.3   | 595.05 | 86.52  | 594.94 | 88.28  | 594    |
| 88.65            | 593.81 | 90.17  | 593    | 92.07  | 592    | 92.84  | 591.59 | 94.99  | 590.46 |
| 95.86            | 590    | 97.31  | 589.24 | 99.64  | 588    | 101.47 | 587.04 | 103.4  | 586    |
| 103.7            | 585.81 | 104.94 | 585    | 108.99 | 584.08 | 109.23 | 584    | 109.36 | 583.93 |
| 111.26           | 583    | 112.66 | 582.13 | 114.82 | 581    | 116.58 | 580.05 | 118.62 | 578.93 |
| 122.11           | 577    | 123.3  | 576.35 | 124.11 | 575.9  | 125.73 | 575    | 127.54 | 574    |
| 127.91           | 573.78 | 129.25 | 573    | 132.3  | 573    | 132.56 | 573.29 | 133.23 | 574    |
| 134.2            | 574.95 | 135.3  | 576    | 136.39 | 577    | 137.56 | 577.97 | 137.84 | 578.21 |
| 138.79           | 579    | 139.87 | 580    | 140.49 | 580.47 | 141.12 | 581    | 142.57 | 581.66 |
| 144.33           | 582.31 | 146.19 | 583    | 148.17 | 583.73 | 148.46 | 583.77 | 149.48 | 583.88 |
| 149.62           | 583.9  | 150.08 | 583.94 | 150.66 | 583.98 | 151.06 | 583.98 | 152.67 | 583.88 |
| 155.85           | 583.72 | 160.04 | 583.61 | 162    | 583.48 | 162.66 | 583.48 | 163.84 | 583.55 |
| 164.44           | 583.56 | 166.16 | 583.62 | 166.37 | 583.64 | 166.76 | 583.7  | 168.06 | 584    |
| 169.99           | 584.43 | 172.79 | 585    | 174    | 585.19 | 177.19 | 585.73 | 177.79 | 585.83 |
| 178.52           | 586    | 179.27 | 586.19 | 182.51 | 587    | 185.71 | 587.5  | 188.35 | 587.64 |
| 192.24           | 587.89 | 192.61 | 587.9  | 193.17 | 587.9  | 195.35 | 588    | 200.6  | 588    |
| 204.74           | 588.87 | 205.32 | 589    | 210.2  | 590    | 210.22 | 590    | 217.69 | 591    |
| 228.63           | 591.82 | 230.95 | 592    | 231.94 | 592.05 | 233.28 | 592.13 | 251.47 | 593    |
| 255.44           | 593.21 | 257.41 | 593.28 | 258.09 | 593.3  | 271.11 | 593.83 | 275.19 | 593.99 |
| 275.8            | 593.99 | 277.45 | 594    | 288.69 | 594.45 | 289.24 | 594.47 | 300    | 594.91 |

| Manning's n Values |       |        |       |        |       |        |       |        |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .07   | 48.62  | .024  | 72.46  | .07   | 104.94 | .024  | 108.99 | .07   |
| 127.54             | .04   | 133.23 | .07   | 149.62 | .024  | 166.37 | .035  |        |       |

| Bank Sta: Left | Right  | Lengths: Left | Channel | Right | Coeff | Contr. | Expan. |
|----------------|--------|---------------|---------|-------|-------|--------|--------|
| 108.99         | 149.62 | 55.09         | 56.19   | 66.43 |       | .1     | .3     |

# CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 585.32   | Element                | Left OB | Channel |
|--------------------|----------|------------------------|---------|---------|
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 1.38     | Wt. n-Val.             |         | 0.066   |
| 0.024              |          |                        |         |         |
| W.S. Elev (ft)     | 583.94   | Reach Len. (ft)        | 55.09   | 56.19   |
| 66.43              |          |                        |         |         |
| Crit W.S. (ft)     | 582.51   | Flow Area (sq ft)      |         | 211.69  |
| 4.40               |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.023801 | Area (sq ft)           |         | 211.69  |
| 4.40               |          |                        |         |         |
| Q Total (cfs)      | 2021.00  | Flow (cfs)             |         | 2003.46 |
| 17.54              |          |                        |         |         |
| Top width (ft)     | 56.97    | Top Width (ft)         |         | 40.29   |
| 16.68              |          |                        |         |         |
| Vel Total (ft/s)   | 9.35     | Avg. Vel. (ft/s)       |         | 9.46    |
| 3.98               |          |                        |         |         |
| Max Chl Dpth (ft)  | 10.94    | Hydr. Depth (ft)       |         | 5.25    |
| 0.26               |          |                        |         |         |
| Conv. Total (cfs)  | 13099.9  | Conv. (cfs)            |         | 12986.2 |
| 113.7              |          |                        |         |         |
| Length wtd. (ft)   | 58.92    | wetted Per. (ft)       |         | 46.72   |
| 16.73              |          |                        |         |         |
| Min Ch El (ft)     | 573.00   | Shear (lb/sq ft)       |         | 6.73    |
| 0.39               |          |                        |         |         |
| Alpha              | 1.02     | Stream Power (lb/ft s) | 300.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.12     | Cum Volume (acre-ft)   | 1.45    | 10.07   |
| 2.90               |          |                        |         |         |
| C & E Loss (ft)    | 0.30     | Cum SA (acres)         | 1.15    | 1.03    |
| 0.94               |          |                        |         |         |

## LemonCreekEX.rep

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.  
Note: Manning's n values were composited to a single value in the main channel.

## CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2271.00

| INPUT        |           |        |        |        |        |        |        |        |        |
|--------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Description: |           |        |        |        |        |        |        |        |        |
| Station      | Elevation | Data   | num=   | 150    |        |        |        |        |        |
| Sta          | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0            | 629.96    | .76    | 629.56 | 1.86   | 629    | 3      | 628.44 | 7.8    | 626    |
| 8.52         | 625.65    | 13.74  | 623    | 16.66  | 621.53 | 18.61  | 620.5  | 23.87  | 617.84 |
| 26.09        | 617       | 28.77  | 616    | 29.9   | 615.56 | 31.4   | 615    | 33     | 614.39 |
| 33.82        | 614       | 35.84  | 613.24 | 36.87  | 612.77 | 38.75  | 612    | 41.97  | 610.59 |
| 45.31        | 609.07    | 47.72  | 608    | 47.97  | 607.88 | 48.17  | 607.85 | 52.53  | 607    |
| 58.65        | 606       | 59.06  | 605.88 | 59.83  | 605.81 | 60.92  | 605.62 | 62.22  | 605.36 |
| 64.5         | 604.79    | 67.49  | 604    | 68.29  | 603.53 | 69.41  | 603    | 70.22  | 602.51 |
| 71.16        | 602       | 71.98  | 601.48 | 73.78  | 600.41 | 76.05  | 600.35 | 79.83  | 600    |
| 83.82        | 599.62    | 85.22  | 599.54 | 85.75  | 599    | 86.68  | 598.01 | 87.24  | 597.45 |
| 87.66        | 597       | 88.34  | 596.31 | 88.62  | 596    | 89.48  | 595.15 | 90.05  | 594.57 |
| 91.21        | 593.86    | 93.17  | 592.64 | 95.82  | 591    | 99.27  | 588.81 | 102.14 | 587    |
| 103.06       | 586.4     | 103.7  | 586    | 104.85 | 585    | 105.02 | 584.89 | 106.98 | 583.73 |
| 109.03       | 584       | 110.26 | 584.11 | 110.81 | 584.12 | 111.94 | 584.06 | 112.87 | 584.09 |
| 114.1        | 583.73    | 116.75 | 583    | 121.82 | 581.65 | 124.29 | 581    | 128.55 | 580.27 |
| 129.06       | 579.99    | 132.9  | 579    | 135.37 | 578.39 | 136.91 | 578    | 140.02 | 577.23 |
| 140.5        | 576.95    | 141.9  | 576    | 142.07 | 575.77 | 143.11 | 575    | 143.43 | 574.66 |
| 144.29       | 574       | 144.65 | 573.6  | 145.39 | 573    | 151.62 | 572.74 | 153.61 | 572.73 |
| 159.16       | 572.84    | 161.92 | 572.83 | 167.81 | 572.92 | 169.76 | 572.97 | 170.9  | 572.97 |
| 172.24       | 573       | 172.6  | 574    | 173.3  | 576    | 173.68 | 577    | 173.87 | 577.62 |
| 174          | 577.59    | 174.28 | 577.54 | 183.09 | 577.66 | 197.31 | 577.12 | 200.91 | 577.32 |
| 201.1        | 577.57    | 201.17 | 577.54 | 201.46 | 578    | 201.91 | 578.25 | 202.96 | 578.5  |
| 203.29       | 579       | 204.65 | 579.75 | 209.52 | 582.36 | 213.48 | 584.4  | 214.73 | 585.02 |
| 216.77       | 586       | 218.87 | 587    | 220.56 | 587.83 | 221.28 | 588.17 | 224.67 | 589.81 |
| 225.96       | 590.42    | 226.39 | 591    | 226.77 | 591.47 | 227.59 | 592.54 | 228.73 | 592    |
| 230.91       | 592       | 235.28 | 591.99 | 237.53 | 591.99 | 245.11 | 592    | 245.56 | 593    |
| 246.14       | 594.17    | 246.27 | 594.25 | 248.11 | 595    | 258.91 | 595    | 260.87 | 594.86 |
| 268.69       | 594.93    | 273.93 | 595    | 277.71 | 595    | 279.26 | 596    | 279.73 | 596.29 |
| 280.83       | 597       | 284.03 | 599    | 284.63 | 599.37 | 285.2  | 599.63 | 288.66 | 601    |
| 290          | 601.56    | 291.12 | 602    | 293.15 | 602.82 | 296.23 | 604.08 | 298.89 | 605.41 |
| 300.7        | 606.38    | 303.77 | 608    | 304.76 | 608.51 | 306.77 | 609.56 | 307.59 | 610    |

| Manning's n Values |       |        |       |       |       |        |       |        |       |
|--------------------|-------|--------|-------|-------|-------|--------|-------|--------|-------|
| Sta                | n Val | Sta    | n Val | Sta   | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .07   | 73.78  | .024  | 85.22 | .07   | 106.98 | .024  | 112.87 | .07   |
| 140.02             | .07   | 144.65 | .04   | 172.6 | .07   | 174    | .024  | 200.91 | .07   |
| 228.73             | .024  | 277.71 | .07   |       |       |        |       |        |       |

| Bank Sta: Left | Right | Lengths: Left | Channel | Right | Coeff | Contr. | Expan. |
|----------------|-------|---------------|---------|-------|-------|--------|--------|
| 140.02         | 174   | 21.66         | 25      | 41.57 |       | .1     | .3     |

# CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft) | 584.91 | Element | Left OB | Channel |
|----------------|--------|---------|---------|---------|
| Right OB       |        |         |         |         |

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.  
Note: Manning's n values were composited to a single value in the main channel.

RIVER: LemonCreek  
REACH: Reach1 RS: 2246.00

[illegible]

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 584.83   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.74     | Wt. n-Val.             | 0.069   | 0.060   |
| 0.025              |          |                        |         |         |
| W.S. Elev (ft)     | 584.09   | Reach Len. (ft)        | 33.12   | 29.64   |
| 31.84              |          |                        |         |         |
| Crit w.s. (ft)     | 583.01   | Flow Area (sq ft)      | 92.69   | 172.63  |
| 295.10             |          |                        |         |         |
| E.G. slope (ft/ft) | 0.002037 | Area (sq ft)           | 92.69   | 172.63  |
| 295.10             |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 187.82  | 700.27  |
| 2293.90            |          |                        |         |         |
| Top width (ft)     | 109.32   | Top width (ft)         | 33.78   | 16.67   |
| 58.87              |          |                        |         |         |
| Vel Total (ft/s)   | 5.68     | Avg. Vel. (ft/s)       | 2.03    | 4.06    |
| 7.77               |          |                        |         |         |
| Max Chl Dpth (ft)  | 13.09    | Hydr. Depth (ft)       | 2.74    | 10.36   |
| 5.01               |          |                        |         |         |
| Conv. Total (cfs)  | 70494.1  | Conv. (cfs)            | 4161.1  | 15513.8 |
| 50819.2            |          |                        |         |         |
| Length Wtd. (ft)   | 29.64    | Wetted Per. (ft)       | 34.55   | 24.96   |
| 60.68              |          |                        |         |         |
| Min Ch El (ft)     | 571.00   | Shear (lb/sq ft)       | 0.34    | 0.88    |
| 0.62               |          |                        |         |         |
| Alpha              | 1.47     | Stream Power (lb/ft s) | 297.88  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    |          | Cum Volume (acre-ft)   | 1.33    | 9.53    |
| 2.47               |          |                        |         |         |
| C & E Loss (ft)    |          | Cum SA (acres)         | 1.11    | 0.97    |
| 0.85               |          |                        |         |         |

RIVER: LemonCreek  
REACH: Reach1 RS: 2230.01

INPUT  
Description: Culvert #3  
Distance from Upstream XS = 5  
Deck/Roadway width = 22  
Weir Coefficient = 2.6  
Upstream Deck/Roadway Coordinates  
num= 5  
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
143.25 578.95 148.54 583 151.54 583  
154.54 583 159.92 579

Upstream Bridge Cross Section Data  
Station Elevation Data num= 149  
Sta Elev Sta Elev Sta Elev Sta Elev  
0 629.97 2.49 628.83 8.06 626 10.58 624.76 12.06 624  
13.56 623.24 16.19 621.92 17.96 621 19.86 620 21.91 618.97  
24.47 618 27.15 617 29.74 616.04 32.51 615 35.12 614  
35.48 613.87 37.7 613 39.73 612.19 40.95 611.73 43.65 610.52  
44.89 610 45.94 609.52 47.18 609 49.1 608.15 49.51 608.12  
50.23 608 56.2 607.05 57.57 606.78 60.68 606 63.07 605.41  
64.69 605 68.19 604.14 68.74 604 69.09 603.86 70.92 603  
72.51 602.05 75.21 600.46 75.96 600 76.18 599.99 78.39 599.63  
84.93 599 87.26 598.66 87.76 598.46 88.5 598.13 88.69 598.13  
89.95 596.84 92.83 595 93.54 594.57 95.5 593.33 97.63 592  
99.18 591 100.75 590 101.35 589.6 103.42 588.27 106.88 586.01  
108.07 585 108.79 584.5 110.82 583.28 111.39 583.36 112.56 583.58  
113 583.65 114.35 583.77 114.79 583.78 115.49 583.66 117.93 583  
119.87 582.49 123.98 581.38 125.45 581 126.82 580.77 129.46 580.59  
130.06 580.54 135.94 580 139.02 579.38 143.21 579 143.25 578.95  
143.56 578.59 143.89 578 144.29 577 144.93 576.06 145.07 576  
145.85 575.02 146.88 574.05 146.95 574 147.83 573.1 147.97 573  
149.67 571 154.52 571 155.35 572.35 155.92 573 156.34 573.64  
156.53 574 156.97 574.66 157.15 575 157.6 575.69 157.77 576  
158.87 577.73 159.02 578 159.65 579 159.92 579 160.3 579.33 579  
184.1 578.25 184.19 578.18 186.46 578.06 195.49 578.28 203.42 578.09  
206.47 578 210.72 580 212.87 581 215.31 582.15 216.25 582.63  
217.01 583.06 220.92 585.32 223.84 587 225.59 588 227.63 589.15  
228.04 589.17 229.49 589.34 231.81 589.38 233.04 589.37 233.93 589.5  
235.9 589.82 238.02 590.1 238.39 590.2 239.62 591 241.08 591.81  
241.55 592 242.47 592.31 243.62 592.67 244.49 593 247.97 593.27  
250.15 593.3 252.18 593.32 254.12 593.46 256.5 593.66 258.19 593.82  
259.86 594 266.92 594.78 269.03 595 269.9 595.31 272.28 596  
276.5 598.29 277.79 599 280.98 600.73 282.84 601.75 286.97 604  
292.44 607 294.24 608 295.91 608.91 297.88 610

Manning's n Values num= 13  
Sta n Val Sta n Val Sta n Val Sta n Val  
0 .07 75.96 .024 87.26 .07 110.82 .024 114.79 .07  
147.97 .04 155.35 .07 159.92 .024 206.47 .07 227.63 .024  
238.02 .07 247.97 .024 269.03 .07

Bank Sta: Left Right Coeff Contr. Expan.  
143.25 159.92 .1 .3  
Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 148.54 583 F  
154.54 297.88 583 F

Downstream Deck/Roadway Coordinates  
num= 5  
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
140.58 580.94 151.07 583 154.07 583  
157.07 583 162.25 580

Downstream Bridge Cross Section Data  
Station Elevation Data num= 145

LemonCreekEX.rep  
Sta Elev Sta Elev Sta Elev Sta Elev  
0 629.09 1.88 628.17 5.09 627 9.1 625.55 12.51 624.3  
13.35 624 15.6 623.18 16.24 622.94 19.16 621.88 21.52 621  
23.49 620.23 24.63 619.8 30.46 617.37 32.03 616.71 36.15 615  
37.7 614.36 39.63 613.65 41.21 613 43.64 612.03 43.93 611.95  
47.79 611 51.67 610 52.22 609.99 52.8 609.83 57.99 609  
60.61 608.23 64.59 607.07 64.85 607 67.15 606.32 68.39 605.94  
71.54 605 72.77 604.64 76.66 603.47 78.19 603 79.34 602.67  
83.32 601.49 85 601 86.31 600.59 88.25 599.47 88.99 599  
92.2 597.19 94.78 595.72 94.9 595.69 96.08 595.27 96.46 595.18  
97.8 595 104.7 594.15 105.45 594.08 106.8 594.09 107.02 594  
108.69 593 111.91 591.01 111.93 590.99 113.77 590 116.24 589  
118.94 587.89 121.14 587 121.52 586.84 126.1 585 126.72 584.74  
128.62 584 130.37 583.3 131.83 582.7 133.4 582.08 133.63 582  
137.03 581.51 138.1 581.43 139.26 581.32 140.48 581 140.58 580.94  
140.88 580.75 141.93 580 143.52 579 144.46 578.43 146.75 577  
147.96 576.23 149.54 575.24 149.82 575.09 152.36 571 157.27 571  
157.96 577.48 159.91 578.63 162.25 580 168.35 580 171.35 579.17  
173.85 579.08 177.91 579.19 181.28 579.1 184.34 579 185.22 578.99  
185.93 579 187.73 579 191.62 578.81 192.5 578.74 193.51 578.69  
199.04 578.36 199.71 578.33 200.78 578.32 201.94 578.28 202.97 578.28  
204.07 578.36 207.26 579 209.22 579.82 213.46 581.53 214.66 582  
219.08 583.78 219.5 583.94 220.34 584.18 220.97 584.3 221.45 584.37  
226.59 584.47 226.86 584.48 228.2 584.62 229.03 584.74 230.56 585  
231.14 585.16 233.78 586.41 235.05 587 237.23 588 238.82 588.74  
239.4 589 241.41 589.93 243.22 591 244.87 592 245.93 592.6  
246.6 593 248.34 594 258.15 594.67 261.84 594.91 263.51 595  
267.29 595.29 276.49 596 277.15 596.1 279.28 597 280.88 597.89  
286.33 600.87 288.37 601.98 288.41 602.01 291.58 603.73 292.06 604  
294.28 605.22 298.33 607.42 299.38 608 302.01 609.44 302.6 609.75

Manning's n values num= 13  
Sta n Val Sta n Val Sta n Val Sta n Val  
0 .07 97.8 .024 106.8 .07 133.63 .024 140.58 .07  
149.82 .04 157.96 .07 162.25 .024 204.07 .07 221.45 .024  
231.14 .07 248.34 .024 276.49 .07

Bank Sta: Left Right Coeff Contr. Expan.  
140.58 162.25 .1 .3  
Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 151.07 583 F  
157.07 302.6 583 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .98  
Elevation at which weir flow begins =  
Energy head used in spillway design =  
Spillway height used in design =  
Weir crest shape = Broad Crested

Number of Culverts = 1  
Culvert Name Shape Rise Span  
Culvert #1 Circular 6  
FHWA Chart # 2 - Corrugated Metal Pipe Culvert  
FHWA Scale # 1 - Headwall  
Solution Criteria = Highest U.S. EG  
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef  
Exit Loss Coef  
1 5 22 .024 .024 0 .5  
Upstream Elevation = 571  
Centerline Station = 151.54  
Downstream Elevation = 571

LemonCreekEX.rep  
Centerline Station = 154.07

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2216.36

INPUT  
Description:  
Station Elevation Data num= 145

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 629.09 | 1.88   | 628.17 | 5.09   | 627    | 9.1    | 625.55 | 12.51  | 624.3  |
| 13.35  | 624    | 15.6   | 623.18 | 16.24  | 622.94 | 19.16  | 621.88 | 21.52  | 621    |
| 23.49  | 620.23 | 24.63  | 619.8  | 30.46  | 617.37 | 32.03  | 616.71 | 36.15  | 615    |
| 37.7   | 614.36 | 39.63  | 613.65 | 41.21  | 613    | 43.64  | 612.03 | 43.93  | 611.95 |
| 47.79  | 611    | 51.67  | 610    | 52.22  | 609.99 | 52.8   | 609.83 | 57.99  | 609    |
| 60.61  | 608.23 | 64.59  | 607.07 | 64.85  | 607    | 67.15  | 606.32 | 68.39  | 605.94 |
| 71.54  | 605    | 72.77  | 604.64 | 76.66  | 603.47 | 78.19  | 603    | 79.34  | 602.67 |
| 83.32  | 601.49 | 85     | 601    | 86.31  | 600.59 | 88.25  | 599.47 | 88.99  | 599    |
| 92.2   | 597.19 | 94.78  | 595.72 | 94.9   | 595.69 | 96.08  | 595.27 | 96.46  | 595.18 |
| 97.8   | 595    | 104.7  | 594.15 | 105.45 | 594.08 | 106.8  | 594.09 | 107.02 | 594    |
| 108.69 | 593    | 111.91 | 591.01 | 111.93 | 590.99 | 113.77 | 590    | 116.24 | 589    |
| 118.94 | 587.89 | 121.14 | 587    | 121.52 | 586.84 | 126.1  | 585    | 126.72 | 584.74 |
| 128.62 | 584    | 130.37 | 583.3  | 131.83 | 582.7  | 133.4  | 582.08 | 133.63 | 582    |
| 137.03 | 581.51 | 138.1  | 581.43 | 139.26 | 581.32 | 140.48 | 581    | 140.58 | 580.94 |
| 140.88 | 580.75 | 141.93 | 580    | 143.52 | 579    | 144.46 | 578.43 | 146.75 | 577    |
| 147.96 | 576.23 | 149.54 | 575.24 | 149.82 | 575.09 | 152.36 | 571    | 157.27 | 571    |
| 157.96 | 577.48 | 159.91 | 578.63 | 162.25 | 580    | 168.35 | 580    | 171.35 | 579.17 |
| 173.85 | 579.08 | 177.91 | 579.19 | 181.28 | 579.1  | 184.34 | 579    | 185.22 | 578.99 |
| 185.93 | 579    | 187.73 | 579    | 191.62 | 578.81 | 192.5  | 578.74 | 193.51 | 578.69 |
| 199.04 | 578.36 | 199.71 | 578.33 | 200.78 | 578.32 | 201.94 | 578.28 | 202.97 | 578.28 |
| 204.07 | 578.36 | 207.26 | 579    | 209.22 | 579.82 | 213.46 | 581.53 | 214.66 | 582    |
| 219.08 | 583.78 | 219.5  | 583.94 | 220.34 | 584.18 | 220.97 | 584.3  | 221.45 | 584.37 |
| 226.59 | 584.47 | 226.86 | 584.48 | 228.2  | 584.62 | 229.03 | 584.74 | 230.56 | 585    |
| 231.14 | 585.16 | 233.78 | 586.41 | 235.05 | 587    | 237.23 | 588    | 238.82 | 588.74 |
| 239.4  | 589    | 241.41 | 589.93 | 243.22 | 591    | 244.87 | 592    | 245.93 | 592.6  |
| 246.6  | 593    | 248.34 | 594    | 258.15 | 594.67 | 261.84 | 594.91 | 263.51 | 595    |
| 267.29 | 595.29 | 276.49 | 596    | 277.15 | 596.1  | 279.28 | 597    | 280.88 | 597.89 |
| 286.33 | 600.87 | 288.37 | 601.98 | 288.41 | 602.01 | 291.58 | 603.73 | 292.06 | 604    |
| 294.28 | 605.22 | 298.33 | 607.42 | 299.38 | 608    | 302.01 | 609.44 | 302.6  | 609.75 |

Manning's n Values

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .07   | 97.8   | .024  | 106.8  | .07   | 133.63 | .024  |
| 149.82 | .04   | 157.96 | .07   | 162.25 | .024  | 204.07 | .07   |
| 231.14 | .07   | 248.34 | .024  | 276.49 | .07   |        |       |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
140.58 162.25 29.71 17.36 12.78 .1 .3

Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 151.07 583 F  
157.07 302.6 583 F

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft) | 584.44 | Element           | Left OB | Channel |
|----------------|--------|-------------------|---------|---------|
| Right OB       |        |                   |         |         |
| Vel Head (ft)  | 1.44   | Wt. n-Val.        | 0.025   | 0.056   |
| 0.026          |        |                   |         |         |
| W.S. Elev (ft) | 583.01 | Reach Len. (ft)   | 29.71   | 17.36   |
| 12.78          |        |                   |         |         |
| Crit W.S. (ft) | 583.01 | Flow Area (sq ft) | 11.56   | 155.18  |
| 198.69         |        |                   |         |         |

LemonCreekEX.rep

| E.G. Slope (ft/ft) | 0.006525 | Area (sq ft)           | 11.56  | 155.18  |
|--------------------|----------|------------------------|--------|---------|
| 198.69             |          |                        |        |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 67.20  | 951.97  |
| 2162.82            |          |                        |        |         |
| Top width (ft)     | 86.08    | Top width (ft)         | 9.50   | 21.67   |
| 54.91              |          |                        |        |         |
| Vel Total (ft/s)   | 8.71     | Avg. Vel. (ft/s)       | 5.81   | 6.13    |
| 10.89              |          |                        |        |         |
| Max Chl Dpth (ft)  | 12.01    | Hydr. Depth (ft)       | 1.22   | 7.16    |
| 3.62               |          |                        |        |         |
| Conv. Total (cfs)  | 39391.7  | Conv. (cfs)            | 832.0  | 11785.0 |
| 26774.7            |          |                        |        |         |
| Length wtd. (ft)   | 14.85    | wetted Per. (ft)       | 9.79   | 32.16   |
| 55.90              |          |                        |        |         |
| Min Ch El (ft)     | 571.00   | Shear (lb/sq ft)       | 0.48   | 1.97    |
| 1.45               |          |                        |        |         |
| Alpha              | 1.22     | Stream Power (lb/ft s) | 302.60 | 0.00    |
| 0.00               |          |                        |        |         |
| Frctn Loss (ft)    | 0.09     | Cum Volume (acre-ft)   | 1.33   | 9.13    |
| 2.47               |          |                        |        |         |
| C & E Loss (ft)    | 0.10     | Cum SA (acres)         | 1.09   | 0.96    |
| 0.81               |          |                        |        |         |

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: 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.  
Note: Manning's n values were composited to a single value in the main channel.

## CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2199.00

INPUT  
Description:  
Station Elevation Data num= 150

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 630    | 1.59   | 629.41 | 2.76   | 629    | 4.04   | 628.57 | 5.58   | 628    |
| 7.1    | 627.49 | 8.6    | 627    | 13.45  | 625.36 | 16.54  | 624.31 | 17.43  | 624    |
| 19.7   | 623.23 | 20.4   | 623    | 22.88  | 622.16 | 23.37  | 622    | 29.17  | 620.04 |
| 30.89  | 619.45 | 34.81  | 618    | 39.5   | 616.33 | 40.47  | 615.96 | 41.36  | 615.64 |
| 43.08  | 615    | 46.08  | 614.01 | 48.76  | 613.37 | 50.22  | 613    | 55.03  | 611.8  |
| 56.23  | 611.79 | 57.71  | 611.74 | 63.68  | 611.43 | 66.22  | 611.31 | 70.8   | 611.18 |
| 72.68  | 611.13 | 75.74  | 611    | 75.81  | 610.98 | 78.22  | 610.02 | 83.99  | 608    |
| 86.88  | 607    | 89.81  | 606    | 90.91  | 605.64 | 92.79  | 605    | 93.99  | 604.66 |
| 95.04  | 604.41 | 95.44  | 604.34 | 96.68  | 604.16 | 99.06  | 603.83 | 99.51  | 603.72 |
| 100.12 | 603.63 | 100.63 | 603.49 | 103.1  | 602    | 104.73 | 601    | 108.02 | 599    |
| 109.86 | 597.89 | 113.3  | 595.83 | 114.72 | 595    | 115.92 | 594.26 | 116.9  | 593.67 |
| 118.63 | 592.66 | 119.78 | 592    | 121.45 | 591    | 122.23 | 590.97 | 129.78 | 590.24 |
| 131.66 | 590.17 | 132.16 | 590    | 132.97 | 590    | 137.52 | 589.72 | 140.82 | 589.53 |
| 142.13 | 589.39 | 144.68 | 589.08 | 145.28 | 589    | 145.51 | 588.92 | 146.98 | 587.41 |
| 147.71 | 586.59 | 148.29 | 586    | 148.68 | 585.57 | 149.83 | 584.42 | 150.63 | 583.56 |
| 151.76 | 582.43 | 153.8  | 580.36 | 155.17 | 579    | 156.77 | 577.38 | 158.17 | 576    |
| 160.8  | 573.35 | 161.17 | 573    | 163.16 | 571    | 165.22 | 570.95 | 168.28 | 570.92 |
| 170.41 | 570.96 | 173.35 | 571    | 174.61 | 571.99 | 174.64 | 572    | 176.09 | 573.47 |
| 177.65 | 575    | 180.41 | 577.73 | 180.69 | 578    | 181.58 | 579    | 182.54 | 580    |
| 183.12 | 580    | 183.73 | 580    | 185.5  | 579    | 189.81 | 579.09 | 190.46 | 579.11 |
| 192.29 | 579.14 | 197.01 | 579.03 | 199.91 | 579.08 | 207.41 | 579.11 | 214.44 | 579.14 |

| LemonCreekEX.rep                    |          |                        |        |         |         |        |        |        |        |  |
|-------------------------------------|----------|------------------------|--------|---------|---------|--------|--------|--------|--------|--|
| 219.8                               | 579.01   | 220.67                 | 579.1  | 221.54  | 579.25  | 222.1  | 579.37 | 223.64 | 580    |  |
| 225.92                              | 580.95   | 226.06                 | 581    | 229.71  | 582.02  | 232.49 | 582.66 | 233.08 | 582.7  |  |
| 233.84                              | 582.72   | 235.23                 | 582.73 | 236.25  | 582.8   | 238.04 | 583    | 242.17 | 583.55 |  |
| 243.61                              | 584      | 243.82                 | 584.09 | 245.74  | 585     | 249.99 | 587    | 252.01 | 587.92 |  |
| 254.2                               | 588.93   | 256.49                 | 590    | 258.67  | 591     | 260.83 | 592    | 262.77 | 592.89 |  |
| 264.65                              | 594      | 269.09                 | 594.3  | 275.28  | 595     | 286.51 | 595.87 | 288.16 | 596    |  |
| 294.26                              | 596.9    | 294.69                 | 597.1  | 296.3   | 598     | 300.3  | 600.18 | 302.15 | 601.2  |  |
| 305.45                              | 603      | 305.54                 | 603.04 | 307.28  | 604     | 307.57 | 604.15 | 309.11 | 605    |  |
| 310.94                              | 606      | 312.73                 | 606.97 | 314.59  | 608     | 316.74 | 609.17 | 318.26 | 610.02 |  |
| Manning's n Values                  |          |                        |        |         |         |        |        |        |        |  |
| Sta                                 | n Val    | Sta                    | n Val  | Sta     | n Val   | Sta    | n Val  | Sta    | n Val  |  |
| 0                                   | .07      | 55.03                  | .024   | 75.81   | .07     | 121.45 | .024   | 145.51 | .07    |  |
| 161.17                              | .04      | 174.61                 | .07    | 183.12  | .024    | 222.1  | .07    | 233.08 | .024   |  |
| 242.17                              | .07      | 264.65                 | .024   | 294.26  | .07     |        |        |        |        |  |
| CROSS SECTION OUTPUT Profile #50-YR |          |                        |        |         |         |        |        |        |        |  |
| E.G. Elev (ft)                      | 583.69   | Element                |        | Left OB | Channel |        |        |        |        |  |
| Right OB                            |          |                        |        |         |         |        |        |        |        |  |
| Vel Head (ft)                       | 1.11     | wt. n-val.             |        |         | 0.060   |        |        |        |        |  |
| 0.025                               |          |                        |        |         |         |        |        |        |        |  |
| W.S. Elev (ft)                      | 582.58   | Reach Len. (ft)        |        | 107.55  | 114.90  |        |        |        |        |  |
| 122.27                              |          |                        |        |         |         |        |        |        |        |  |
| Crit W.S. (ft)                      |          | Flow Area (sq ft)      |        |         | 253.72  |        |        |        |        |  |
| 148.95                              |          |                        |        |         |         |        |        |        |        |  |
| E.G. Slope (ft/ft)                  | 0.006052 | Area (sq ft)           |        |         | 253.72  |        |        |        |        |  |
| 148.95                              |          |                        |        |         |         |        |        |        |        |  |
| Q Total (cfs)                       | 3182.00  | Flow (cfs)             |        |         | 1676.05 |        |        |        |        |  |
| 1505.96                             |          |                        |        |         |         |        |        |        |        |  |
| Top width (ft)                      | 80.56    | Top width (ft)         |        |         | 31.51   |        |        |        |        |  |
| 49.04                               |          |                        |        |         |         |        |        |        |        |  |
| Vel Total (ft/s)                    | 7.90     | Avg. Vel. (ft/s)       |        |         | 6.61    |        |        |        |        |  |
| 10.11                               |          |                        |        |         |         |        |        |        |        |  |
| Max Chl Dpth (ft)                   | 11.66    | Hydr. Depth (ft)       |        |         | 8.05    |        |        |        |        |  |
| 3.04                                |          |                        |        |         |         |        |        |        |        |  |
| Conv. Total (cfs)                   | 40903.9  | Conv. (cfs)            |        |         | 21545.2 |        |        |        |        |  |
| 19358.7                             |          |                        |        |         |         |        |        |        |        |  |
| Length wtd. (ft)                    | 117.18   | Wetted Per. (ft)       |        |         | 40.01   |        |        |        |        |  |
| 49.87                               |          |                        |        |         |         |        |        |        |        |  |
| Min Ch El (ft)                      | 570.92   | Shear (lb/sq ft)       |        |         | 2.40    |        |        |        |        |  |
| 1.13                                |          |                        |        |         |         |        |        |        |        |  |
| Alpha                               | 1.14     | Stream Power (lb/ft s) |        | 318.26  | 0.00    |        |        |        |        |  |
| 0.00                                |          |                        |        |         |         |        |        |        |        |  |
| Frctn Loss (ft)                     | 0.86     | Cum Volume (acre-ft)   |        | 1.33    | 9.05    |        |        |        |        |  |
| 2.42                                |          |                        |        |         |         |        |        |        |        |  |
| C & E Loss (ft)                     | 0.01     | Cum SA (acres)         |        | 1.09    | 0.95    |        |        |        |        |  |
| 0.80                                |          |                        |        |         |         |        |        |        |        |  |

Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2084.10

INPUT  
Description:  
Station Elevation Data num= 150

| LemonCreekEX.rep                    |          |                   |        |         |         |        |        |        |        |  |
|-------------------------------------|----------|-------------------|--------|---------|---------|--------|--------|--------|--------|--|
| Sta                                 | Elev     | Sta               | Elev   | Sta     | Elev    | Sta    | Elev   | Sta    | Elev   |  |
| 0                                   | 611.61   | 6.15              | 611    | 13.36   | 610.15  | 13.61  | 610.13 | 14.39  | 610.03 |  |
| 15.56                               | 610.01   | 18.92             | 610.03 | 22.67   | 610.03  | 25.45  | 610.05 | 28.94  | 610.01 |  |
| 30.06                               | 610      | 31.26             | 609.89 | 31.31   | 609.88  | 33.73  | 609.71 | 34.08  | 609.68 |  |
| 34.44                               | 609.63   | 34.58             | 609.57 | 35.55   | 609     | 39.11  | 607    | 40.4   | 606.28 |  |
| 40.89                               | 606      | 42.67             | 605    | 44.21   | 604.15  | 45.16  | 603.61 | 46.25  | 603    |  |
| 47.19                               | 602.48   | 48.02             | 602    | 49      | 601.45  | 50.28  | 600.74 | 51.57  | 600    |  |
| 53.34                               | 599      | 54.04             | 598.61 | 55.11   | 598     | 55.98  | 597.51 | 56.86  | 597    |  |
| 58.11                               | 596.31   | 59.94             | 595.28 | 60.39   | 595     | 60.99  | 594.68 | 63.42  | 593.31 |  |
| 63.93                               | 593      | 65.53             | 592.14 | 65.76   | 592     | 66.73  | 591.48 | 67.56  | 591    |  |
| 69.11                               | 590.13   | 69.35             | 590    | 70.43   | 589.39  | 72.8   | 588    | 74.53  | 587    |  |
| 74.84                               | 586.83   | 76.26             | 586    | 79.27   | 586     | 84.31  | 585.9  | 91.78  | 585.76 |  |
| 101.34                              | 585.72   | 104.03            | 585.68 | 106.2   | 585.63  | 109.22 | 585.55 | 120.47 | 585.06 |  |
| 121.46                              | 585      | 121.55            | 585    | 121.57  | 585     | 122.62 | 584    | 123.95 | 582.63 |  |
| 124.55                              | 582      | 125.2             | 581.33 | 125.51  | 581     | 126.36 | 580.13 | 126.47 | 580    |  |
| 129.26                              | 577      | 130.17            | 576    | 130.24  | 575.93  | 131.16 | 574.9  | 132.11 | 573.86 |  |
| 132.89                              | 573      | 133.02            | 572.84 | 133.78  | 572     | 134.62 | 571    | 134.79 | 570.77 |  |
| 135.5                               | 570      | 135.71            | 569.66 | 135.79  | 569.64  | 136.11 | 569.63 | 137.29 | 569.66 |  |
| 141.19                              | 569.65   | 145.13            | 569.67 | 147.54  | 569.91  | 148.08 | 569.98 | 148.42 | 569.98 |  |
| 148.55                              | 570      | 150.16            | 571    | 151.76  | 572     | 153.17 | 572.87 | 153.42 | 573.03 |  |
| 154.97                              | 574      | 155.86            | 574.55 | 156.55  | 575     | 156.9  | 575.24 | 158.11 | 576    |  |
| 159.14                              | 576.71   | 159.62            | 577    | 161.12  | 578     | 162.59 | 579    | 162.61 | 579    |  |
| 165.44                              | 579.12   | 184.09            | 580    | 186     | 581     | 188.13 | 582.12 | 189.46 | 583    |  |
| 190.22                              | 583.41   | 191.05            | 584    | 191.86  | 584.48  | 192.78 | 585    | 193.51 | 585.44 |  |
| 194.96                              | 586.33   | 196.04            | 587    | 197.03  | 587.6   | 197.63 | 588    | 199.49 | 589.19 |  |
| 200.73                              | 590      | 201.28            | 590.35 | 204.93  | 592.73  | 205.34 | 593    | 206.83 | 594    |  |
| 207.33                              | 594.2    | 208.91            | 595    | 211.97  | 595.55  | 212.69 | 595.6  | 218.33 | 595.77 |  |
| 221.26                              | 595.93   | 224.31            | 595.95 | 225.05  | 596     | 226.74 | 597    | 227.07 | 597.18 |  |
| 229.47                              | 598.53   | 230.32            | 599    | 231.69  | 599.77  | 233.9  | 601    | 235.75 | 602.04 |  |
| 237.85                              | 603.21   | 239.26            | 604    | 241.66  | 605.34  | 242.85 | 606    | 243.58 | 606.41 |  |
| 244.65                              | 607      | 245.68            | 607.58 | 246.44  | 608     | 249.03 | 609.44 | 250    | 609.97 |  |
| Manning's n Values                  |          |                   |        |         |         |        |        |        |        |  |
| Sta                                 | n Val    | Sta               | n Val  | Sta     | n Val   | Sta    | n Val  | Sta    | n Val  |  |
| 0                                   | .035     | 31.31             | .07    | 76.26   | .024    | 121.55 | .07    | 134.79 | .04    |  |
| 150.16                              | .07      | 162.61            | .024   | 184.09  | .07     | 211.97 | .024   | 225.05 | .07    |  |
| CROSS SECTION OUTPUT Profile #50-YR |          |                   |        |         |         |        |        |        |        |  |
| E.G. Elev (ft)                      | 582.83   | Element           |        | Left OB | Channel |        |        |        |        |  |
| Right OB                            |          |                   |        |         |         |        |        |        |        |  |
| Vel Head (ft)                       | 1.16     | wt. n-val.        |        |         | 0.060   |        |        |        |        |  |
| 0.024                               |          |                   |        |         |         |        |        |        |        |  |
| W.S. Elev (ft)                      | 581.67   | Reach Len. (ft)   |        | 202.44  | 208.44  |        |        |        |        |  |
| 211.80                              |          |                   |        |         |         |        |        |        |        |  |
| Crit W.S. (ft)                      |          | Flow Area (sq ft) |        |         | 318.75  |        |        |        |        |  |
| 49.32                               |          |                   |        |         |         |        |        |        |        |  |
| E.G. Slope (ft/ft)                  | 0.008989 | Area (sq ft)      |        |         | 318.75  |        |        |        |        |  |
| 49.32                               |          |                   |        |         |         |        |        |        |        |  |
| Q Total (cfs)                       | 3182.00  | Flow (cfs)        |        |         | 2718.39 |        |        |        |        |  |
| 463.61                              |          |                   |        |         |         |        |        |        |        |  |
| Top width (ft)                      | 62.40    | Top width (ft)    |        |         | 37.74   |        |        |        |        |  |
| 24.66                               |          |                   |        |         |         |        |        |        |        |  |
| Vel Total (ft/s)                    | 8.65     | Avg. Vel. (ft/s)  |        |         | 8.53    |        |        |        |        |  |
| 9.40                                |          |                   |        |         |         |        |        |        |        |  |
| Max Chl Dpth (ft)                   | 12.04    | Hydr. Depth (ft)  |        |         | 8.45    |        |        |        |        |  |
| 2.00                                |          |                   |        |         |         |        |        |        |        |  |
| Conv. Total (cfs)                   | 33561.0  | Conv. (cfs)       |        |         | 28671.2 |        |        |        |        |  |
| 4889.8                              |          |                   |        |         |         |        |        |        |        |  |
| Length wtd. (ft)                    | 208.69   | Wetted Per. (ft)  |        |         | 45.75   |        |        |        |        |  |
| 25.09                               |          |                   |        |         |         |        |        |        |        |  |
| Min Ch El (ft)                      | 569.63   | Shear (lb/sq ft)  |        |         | 3.91    |        |        |        |        |  |
|                                     |          |                   |        |         |         |        |        |        |        |  |

|                                                                             |      |                        |        |      |
|-----------------------------------------------------------------------------|------|------------------------|--------|------|
| LemonCreekEX.rep                                                            |      |                        |        |      |
| 1.10<br>Alpha<br>0.00<br>Frctn Loss (ft)<br>2.14<br>C & E Loss (ft)<br>0.69 | 1.00 | Stream Power (lb/ft s) | 250.00 | 0.00 |
|                                                                             | 1.87 | Cum Volume (acre-ft)   | 1.33   | 8.30 |
|                                                                             | 0.02 | Cum SA (acres)         | 1.09   | 0.86 |

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.

Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1875.66

#### INPUT Description:

| Station Elevation Data |        | num=   | 150    |        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Sta                    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0                      | 592.1  | 92     | 592    | 5.5    | 591.67 | 6.14   | 591.66 | 7.2    | 591.68 |
| 7.67                   | 591.67 | 10.27  | 591.56 | 16.72  | 591.31 | 17.3   | 591.29 | 18.84  | 591.33 |
| 20.57                  | 591.42 | 25.08  | 592    | 33.29  | 592.98 | 33.47  | 593    | 34.09  | 593.02 |
| 34.88                  | 593.02 | 36.99  | 593.05 | 39.52  | 593.22 | 40.35  | 593.18 | 47.02  | 593    |
| 49.86                  | 592.89 | 51.26  | 592.89 | 52.94  | 592.84 | 54.45  | 592.8  | 55.74  | 592.8  |
| 56.26                  | 592.79 | 59.36  | 592.86 | 60.06  | 592.81 | 60.58  | 592.82 | 61.07  | 592.81 |
| 61.44                  | 592.75 | 63.13  | 592    | 64.47  | 591.46 | 67.38  | 590.3  | 68.16  | 590    |
| 69.92                  | 589.23 | 70.51  | 589    | 72.18  | 588.14 | 72.5   | 588    | 74.3   | 587.05 |
| 75.52                  | 586.4  | 76.24  | 586    | 76.61  | 585.86 | 77.17  | 585.87 | 79.56  | 585.69 |
| 88.4                   | 585    | 89.33  | 584.98 | 91.08  | 584.86 | 94.24  | 584.7  | 96.13  | 584.59 |
| 97.43                  | 584.51 | 100.65 | 584.3  | 105.04 | 584    | 113.95 | 583.36 | 115.96 | 583.22 |
| 119.26                 | 583    | 119.29 | 583    | 120.86 | 582    | 121.96 | 581.33 | 122.99 | 580.65 |
| 124.02                 | 580    | 125.41 | 579.13 | 125.88 | 578.83 | 127.13 | 578    | 127.77 | 577.6  |
| 128.67                 | 577    | 129.53 | 576.46 | 130.24 | 576    | 131.85 | 575.02 | 131.91 | 574.97 |
| 133.33                 | 574    | 135.2  | 572.82 | 136.42 | 572    | 137.25 | 571.48 | 137.96 | 571    |
| 139.26                 | 570.18 | 140.38 | 569.46 | 141.05 | 569    | 141.31 | 568.85 | 142.58 | 568    |
| 143.93                 | 567.13 | 144.31 | 566.87 | 146.25 | 565.58 | 147.09 | 565    | 156.76 | 565    |
| 158.06                 | 567    | 158.45 | 567.59 | 158.68 | 568    | 159.29 | 569    | 159.47 | 569.24 |
| 159.94                 | 570    | 160.34 | 570.63 | 160.54 | 571    | 160.8  | 571.41 | 161.46 | 572.49 |
| 161.72                 | 573    | 162.14 | 573.69 | 162.3  | 574    | 162.9  | 575    | 163.45 | 576    |
| 163.85                 | 576.63 | 164.04 | 577    | 164.58 | 578    | 165.85 | 579    | 166.32 | 579.23 |
| 167.12                 | 579.52 | 167.65 | 579.68 | 168.24 | 579.81 | 168.43 | 579.82 | 169.03 | 579.99 |
| 170.33                 | 579.98 | 171.55 | 580    | 171.69 | 580.08 | 173.98 | 581    | 175.79 | 581.75 |
| 176.36                 | 582    | 178.1  | 582.73 | 179.66 | 583.32 | 181.85 | 584    | 183.67 | 584.48 |
| 185.08                 | 584.82 | 185.79 | 585    | 187.92 | 585.49 | 189.96 | 586    | 191.28 | 586.32 |
| 194.94                 | 587.24 | 197.93 | 588    | 199.47 | 588.32 | 199.97 | 588.53 | 200.82 | 588.78 |
| 201.73                 | 589    | 202.84 | 589    | 217.02 | 589.83 | 219.94 | 590    | 221.55 | 590.57 |
| 222.79                 | 591    | 224.31 | 591.52 | 226.95 | 592.43 | 228.09 | 592.81 | 228.64 | 593    |
| 230.1                  | 593.49 | 233.19 | 594.52 | 234.65 | 595    | 237.23 | 595.84 | 237.74 | 596    |
| 239.92                 | 596.71 | 242.63 | 597.6  | 245.14 | 598.42 | 247.64 | 599.23 | 250    | 600    |

|                    |       |        |       |        |       |        |       |        |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| Manning's n Values |       | num=   | 8     |        |       |        |       |        |       |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .035  | 61.07  | .07   | 143.93 | .04   | 158.06 | .07   | 169.03 | .024  |
| 171.69             | .07   | 201.73 | .024  | 219.94 | .07   |        |       |        |       |

|                |        |               |         |        |       |        |        |
|----------------|--------|---------------|---------|--------|-------|--------|--------|
| Bank Sta: Left | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
| 119.26         | 165.85 | 106.62        | 105.37  | 108.86 | .1    |        | .3     |

CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| LemonCreekEX.rep   |          |                        |         |         |
| E.G. Elev (ft)     | 580.94   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 1.09     | wt. n-Val.             |         | 0.062   |
| 0.070              |          |                        |         |         |
| W.S. Elev (ft)     | 579.85   | Reach Len. (ft)        | 106.62  | 105.37  |
| 108.86             |          |                        |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft)      |         | 380.50  |
| 0.94               |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.008925 | Area (sq ft)           |         | 380.50  |
| 0.94               |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             |         | 3181.10 |
| 0.90               |          |                        |         |         |
| Top width (ft)     | 44.30    | Top Width (ft)         |         | 41.60   |
| 2.70               |          |                        |         |         |
| Vel Total (ft/s)   | 8.34     | Avg. Vel. (ft/s)       |         | 8.36    |
| 0.96               |          |                        |         |         |
| Max Chl Dpth (ft)  | 14.85    | Hydr. Depth (ft)       |         | 9.15    |
| 0.35               |          |                        |         |         |
| Conv. Total (cfs)  | 33681.3  | Conv. (cfs)            |         | 33671.8 |
| 9.5                |          |                        |         |         |
| Length wtd. (ft)   | 105.66   | wetted Per. (ft)       |         | 53.71   |
| 2.85               |          |                        |         |         |
| Min Ch El (ft)     | 565.00   | Shear (lb/sq ft)       |         | 3.95    |
| 0.18               |          |                        |         |         |
| Alpha              | 1.00     | Stream Power (lb/ft s) | 250.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.61     | Cum Volume (acre-ft)   | 1.33    | 6.62    |
| 2.02               |          |                        |         |         |
| C & E Loss (ft)    | 0.05     | Cum SA (acres)         | 1.09    | 0.67    |
| 0.63               |          |                        |         |         |

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.

Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1770.29

#### INPUT Description:

| Station Elevation Data |        | num=   | 150    |        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Sta                    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0                      | 587.96 | 1.24   | 587.93 | 4.22   | 587.9  | 6.94   | 587.87 | 8.57   | 587.86 |
| 10.32                  | 587.84 | 19.03  | 587.76 | 26.31  | 587.7  | 26.7   | 587.7  | 27.67  | 587.69 |
| 35.01                  | 587.78 | 39.77  | 587.94 | 43.35  | 587.96 | 43.81  | 587.97 | 43.96  | 588    |
| 44.49                  | 588.02 | 48.07  | 588.02 | 54.87  | 588    | 58.66  | 587.94 | 60.28  | 587.86 |
| 66.25                  | 587.74 | 66.55  | 587.73 | 74.06  | 587    | 76.56  | 586.16 | 77.02  | 586    |
| 79.03                  | 585.32 | 79.99  | 585    | 84.35  | 584.71 | 94.89  | 584    | 96.12  | 583.67 |
| 96.62                  | 583.58 | 98.21  | 583    | 98.23  | 582.98 | 98.95  | 582.31 | 99.3   | 582    |
| 99.63                  | 581.7  | 100.41 | 581    | 101.07 | 580.28 | 101.38 | 580    | 101.7  | 579.72 |
| 102.43                 | 579    | 102.76 | 578.71 | 103.53 | 578    | 103.87 | 577.69 | 104.65 | 577    |
| 106.87                 | 575    | 107.65 | 574.28 | 107.96 | 574    | 108.7  | 573.35 | 109.09 | 573    |
| 110.18                 | 572    | 110.41 | 571.8  | 111.31 | 571    | 111.6  | 570.73 | 112.43 | 570    |
| 113.15                 | 569.37 | 113.56 | 569    | 114.24 | 568.4  | 114.69 | 568    | 115.62 | 567.16 |
| 116.93                 | 566    | 118.38 | 565.98 | 121.34 | 565.96 | 123.94 | 565.98 | 124.68 | 565.99 |
| 125.68                 | 566    | 125.79 | 566.11 | 125.94 | 566.24 | 126.24 | 566.45 | 126.52 | 566.63 |
| 127.13                 | 567.03 | 128.66 | 568    | 128.82 | 568.11 | 130.23 | 569    | 131.82 | 570    |
| 133.42                 | 571    | 133.94 | 571.34 | 135    | 572    | 135.64 | 572.43 | 136.55 | 573    |
| 137.66                 | 573.75 | 138.03 | 573.86 | 138.28 | 574    | 138.42 | 574.15 | 138.45 | 574.17 |

| LemonCreekEX.rep                                                     |          |                        |         |         |        |        |        |        |        |  |
|----------------------------------------------------------------------|----------|------------------------|---------|---------|--------|--------|--------|--------|--------|--|
| 139.59                                                               | 574.21   | 141.45                 | 574.36  | 143.16  | 574.51 | 144.24 | 574.6  | 145.58 | 574.66 |  |
| 145.88                                                               | 574.67   | 146.08                 | 574.69  | 146.29  | 574.73 | 147.29 | 574.99 | 147.34 | 575    |  |
| 151.26                                                               | 576      | 155.28                 | 576.93  | 155.57  | 577    | 157.74 | 577.51 | 159.77 | 578    |  |
| 160.68                                                               | 578.23   | 162.92                 | 579     | 164.24  | 579.44 | 165.88 | 580    | 168.54 | 580.92 |  |
| 168.92                                                               | 581.05   | 171.61                 | 582     | 173.64  | 582.77 | 174.27 | 583    | 175.96 | 583    |  |
| 177.22                                                               | 582.9    | 177.68                 | 582.91  | 179.43  | 582.94 | 180.82 | 583    | 186.75 | 583.74 |  |
| 187.02                                                               | 583.79   | 187.98                 | 584     | 188.81  | 584.15 | 192.9  | 585    | 194.77 | 585    |  |
| 200.79                                                               | 585.21   | 207.03                 | 585.41  | 208.75  | 585.41 | 211.97 | 585.44 | 212.28 | 585.45 |  |
| 213.74                                                               | 586      | 215.12                 | 586.51  | 216.35  | 587    | 217.91 | 587.58 | 219.05 | 588    |  |
| 220.77                                                               | 588.64   | 221.75                 | 589     | 224.44  | 590    | 226.64 | 590.82 | 227.13 | 591    |  |
| 229.56                                                               | 591.9    | 229.82                 | 592     | 232.51  | 593    | 232.52 | 593    | 235.06 | 594    |  |
| 236.69                                                               | 594.64   | 237.6                  | 595     | 239.48  | 595.74 | 240.12 | 596    | 242.26 | 596.86 |  |
| 242.64                                                               | 597.01   | 245.01                 | 598     | 246.86  | 598.75 | 247.97 | 599.19 | 250    | 600.02 |  |
| Manning's n Values                                                   |          |                        |         |         |        |        |        |        |        |  |
| Sta                                                                  | n Val    | Sta                    | n Val   | Sta     | n Val  | Sta    | n Val  | Sta    | n Val  |  |
| 0                                                                    | .035     | 79.99                  | .024    | 94.89   | .07    | 107.96 | .04    | 138.42 | .024   |  |
| 146.08                                                               | .07      | 174.27                 | .024    | 212.28  | .07    |        |        |        |        |  |
| Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. |          |                        |         |         |        |        |        |        |        |  |
| 98.23                                                                | 138.42   |                        | 180.61  | 176.46  | 170.99 |        | .1     |        | .3     |  |
| CROSS SECTION OUTPUT Profile #50-YR                                  |          |                        |         |         |        |        |        |        |        |  |
| E.G. Elev (ft)                                                       | 580.28   | Element                | Left OB | Channel |        |        |        |        |        |  |
| Right OB                                                             |          |                        |         |         |        |        |        |        |        |  |
| Vel Head (ft)                                                        | 0.92     | wt. n-val.             |         | 0.046   |        |        |        |        |        |  |
| 0.033                                                                |          |                        |         |         |        |        |        |        |        |  |
| W.S. Elev (ft)                                                       | 579.36   | Reach Len. (ft)        | 180.61  | 176.46  |        |        |        |        |        |  |
| 170.99                                                               |          |                        |         |         |        |        |        |        |        |  |
| Crit W.S. (ft)                                                       |          | Flow Area (sq ft)      |         | 334.33  |        |        |        |        |        |  |
| 81.72                                                                |          |                        |         |         |        |        |        |        |        |  |
| E.G. Slope (ft/ft)                                                   | 0.004033 | Area (sq ft)           |         | 334.33  |        |        |        |        |        |  |
| 81.72                                                                |          |                        |         |         |        |        |        |        |        |  |
| Q Total (cfs)                                                        | 3182.00  | Flow (cfs)             |         | 2647.34 |        |        |        |        |        |  |
| 534.66                                                               |          |                        |         |         |        |        |        |        |        |  |
| Top width (ft)                                                       | 61.93    | Top width (ft)         |         | 36.35   |        |        |        |        |        |  |
| 25.58                                                                |          |                        |         |         |        |        |        |        |        |  |
| Vel Total (ft/s)                                                     | 7.65     | Avg. Vel. (ft/s)       |         | 7.92    |        |        |        |        |        |  |
| 6.54                                                                 |          |                        |         |         |        |        |        |        |        |  |
| Max chl Dpth (ft)                                                    | 13.40    | Hydr. Depth (ft)       |         | 9.20    |        |        |        |        |        |  |
| 3.20                                                                 |          |                        |         |         |        |        |        |        |        |  |
| Conv. Total (cfs)                                                    | 50108.1  | Conv. (cfs)            |         | 41688.6 |        |        |        |        |        |  |
| 8419.5                                                               |          |                        |         |         |        |        |        |        |        |  |
| Length wtd. (ft)                                                     | 175.07   | wetted Per. (ft)       |         | 43.89   |        |        |        |        |        |  |
| 26.21                                                                |          |                        |         |         |        |        |        |        |        |  |
| Min Ch El (ft)                                                       | 565.96   | Shear (lb/sq ft)       |         | 1.92    |        |        |        |        |        |  |
| 0.78                                                                 |          |                        |         |         |        |        |        |        |        |  |
| Alpha                                                                | 1.01     | Stream Power (lb/ft s) | 250.00  | 0.00    |        |        |        |        |        |  |
| 0.00                                                                 |          |                        |         |         |        |        |        |        |        |  |
| Frctn Loss (ft)                                                      | 0.51     | Cum Volume (acre-ft)   | 1.33    | 5.76    |        |        |        |        |        |  |
| 1.91                                                                 |          |                        |         |         |        |        |        |        |        |  |
| C & E Loss (ft)                                                      | 0.07     | Cum SA (acres)         | 1.09    | 0.57    |        |        |        |        |        |  |
| 0.59                                                                 |          |                        |         |         |        |        |        |        |        |  |

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1593.83

| LemonCreekEX.rep                                                     |           |                        |         |         |        |        |        |        |        |  |
|----------------------------------------------------------------------|-----------|------------------------|---------|---------|--------|--------|--------|--------|--------|--|
| INPUT                                                                |           |                        |         |         |        |        |        |        |        |  |
| Description:                                                         |           |                        |         |         |        |        |        |        |        |  |
| Station                                                              | Elevation | Data                   | num=    | 48      |        |        |        |        |        |  |
| Sta                                                                  | Elev      | Sta                    | Elev    | Sta     | Elev   | Sta    | Elev   | Sta    | Elev   |  |
| 0                                                                    | 582.3     | 14.19                  | 582.25  | 18.36   | 582.15 | 30.74  | 581.77 | 38.83  | 581.53 |  |
| 42.65                                                                | 581.26    | 45.07                  | 581.03  | 47.59   | 580.81 | 53.38  | 581.04 | 59.12  | 581.16 |  |
| 68.11                                                                | 581.05    | 74.02                  | 580.89  | 82.51   | 580.69 | 84.18  | 580.68 | 90.23  | 580.89 |  |
| 91.02                                                                | 580.9     | 91.55                  | 580.88  | 95.24   | 580.74 | 100.58 | 580.29 | 102.15 | 580    |  |
| 102.88                                                               | 579.87    | 102.97                 | 579.85  | 114.77  | 569.5  | 120.75 | 564.25 | 120.8  | 564.26 |  |
| 122.33                                                               | 564.26    | 126.98                 | 564.28  | 127.2   | 564.29 | 127.64 | 564.66 | 133.94 | 570.51 |  |
| 134.85                                                               | 570.91    | 135.83                 | 570.93  | 143.73  | 571.03 | 160.54 | 576.19 | 172.63 | 579.54 |  |
| 181.51                                                               | 580.45    | 197.91                 | 582.13  | 199.26  | 581.62 | 205.79 | 581.59 | 210.25 | 581.58 |  |
| 211.46                                                               | 581.67    | 211.76                 | 581.83  | 211.9   | 581.83 | 219.98 | 585.54 | 231.41 | 590.76 |  |
| 235.29                                                               | 592.8     | 242.29                 | 596.31  | 250     | 599.97 |        |        |        |        |  |
| Manning's n Values                                                   |           |                        |         |         |        |        |        |        |        |  |
| Sta                                                                  | n Val     | Sta                    | n Val   | Sta     | n Val  | Sta    | n Val  | Sta    | n Val  |  |
| 0                                                                    | .024      | 47.59                  | .035    | 95.24   | .07    | 102.15 | .04    | 134.85 | .024   |  |
| 143.73                                                               | .07       | 197.91                 | .024    | 219.98  | .07    |        |        |        |        |  |
| Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. |           |                        |         |         |        |        |        |        |        |  |
| 102.15                                                               | 134.85    |                        | 130.55  | 127.96  | 126.93 |        | .1     |        | .3     |  |
| CROSS SECTION OUTPUT Profile #50-YR                                  |           |                        |         |         |        |        |        |        |        |  |
| E.G. Elev (ft)                                                       | 579.70    | Element                | Left OB | Channel |        |        |        |        |        |  |
| Right OB                                                             |           |                        |         |         |        |        |        |        |        |  |
| Vel Head (ft)                                                        | 0.68      | wt. n-val.             |         | 0.040   |        |        |        |        |        |  |
| 0.035                                                                |           |                        |         |         |        |        |        |        |        |  |
| W.S. Elev (ft)                                                       | 579.02    | Reach Len. (ft)        | 130.55  | 127.96  |        |        |        |        |        |  |
| 126.93                                                               |           |                        |         |         |        |        |        |        |        |  |
| Crit W.S. (ft)                                                       |           | Flow Area (sq ft)      |         | 305.32  |        |        |        |        |        |  |
| 176.71                                                               |           |                        |         |         |        |        |        |        |        |  |
| E.G. Slope (ft/ft)                                                   | 0.002200  | Area (sq ft)           |         | 305.32  |        |        |        |        |        |  |
| 176.71                                                               |           |                        |         |         |        |        |        |        |        |  |
| Q Total (cfs)                                                        | 3182.00   | Flow (cfs)             |         | 2097.10 |        |        |        |        |        |  |
| 1084.90                                                              |           |                        |         |         |        |        |        |        |        |  |
| Top width (ft)                                                       | 66.82     | Top width (ft)         |         | 30.93   |        |        |        |        |        |  |
| 35.89                                                                |           |                        |         |         |        |        |        |        |        |  |
| Vel Total (ft/s)                                                     | 6.60      | Avg. Vel. (ft/s)       |         | 6.87    |        |        |        |        |        |  |
| 6.14                                                                 |           |                        |         |         |        |        |        |        |        |  |
| Max chl Dpth (ft)                                                    | 14.77     | Hydr. Depth (ft)       |         | 9.87    |        |        |        |        |        |  |
| 4.92                                                                 |           |                        |         |         |        |        |        |        |        |  |
| Conv. Total (cfs)                                                    | 67845.6   | Conv. (cfs)            |         | 44713.8 |        |        |        |        |        |  |
| 23131.8                                                              |           |                        |         |         |        |        |        |        |        |  |
| Length wtd. (ft)                                                     | 127.64    | wetted Per. (ft)       |         | 39.01   |        |        |        |        |        |  |
| 37.05                                                                |           |                        |         |         |        |        |        |        |        |  |
| Min Ch El (ft)                                                       | 564.25    | Shear (lb/sq ft)       |         | 1.07    |        |        |        |        |        |  |
| 0.65                                                                 |           |                        |         |         |        |        |        |        |        |  |
| Alpha                                                                | 1.01      | Stream Power (lb/ft s) | 250.00  | 0.00    |        |        |        |        |        |  |
| 0.00                                                                 |           |                        |         |         |        |        |        |        |        |  |
| Frctn Loss (ft)                                                      | 0.19      | Cum Volume (acre-ft)   | 1.33    | 4.46    |        |        |        |        |        |  |
| 1.41                                                                 |           |                        |         |         |        |        |        |        |        |  |
| C & E Loss (ft)                                                      | 0.10      | Cum SA (acres)         | 1.09    | 0.44    |        |        |        |        |        |  |
| 0.47                                                                 |           |                        |         |         |        |        |        |        |        |  |

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1465.87

INPUT

| LemonCreekEX.rep |           |        |        |        |        |        |        |        |        |  |
|------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| Description:     |           |        |        |        |        |        |        |        |        |  |
| Station          | Elevation | Data   | num=   | 56     |        |        |        |        |        |  |
| Sta              | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |  |
| 0                | 581.05    | .64    | 581.03 | 8.21   | 580.78 | 30.05  | 580.19 | 30.44  | 580.18 |  |
| 30.68            | 580.17    | 30.85  | 580.17 | 35     | 580.06 | 64.49  | 579.31 | 75     | 578.56 |  |
| 75.57            | 578.53    | 75.74  | 578.53 | 75.96  | 578.53 | 95.91  | 578.32 | 97.12  | 578.25 |  |
| 112.13           | 578.01    | 118.98 | 578.51 | 119.66 | 578.55 | 120.98 | 578.5  | 122.02 | 578.44 |  |
| 128.32           | 578.09    | 138.05 | 578.27 | 142.4  | 578.2  | 144.72 | 577.91 | 152.12 | 578.01 |  |
| 161.22           | 577.84    | 170.05 | 577.54 | 170.37 | 577.57 | 171.03 | 577.49 | 171.78 | 577.11 |  |
| 171.84           | 577.09    | 184.66 | 571.44 | 188.44 | 566.17 | 189.75 | 563.7  | 193.87 | 563.11 |  |
| 197.7            | 563.25    | 198.6  | 563.87 | 199.94 | 564.31 | 204.04 | 565.41 | 205.5  | 568.71 |  |
| 210.04           | 568.95    | 228.15 | 572.96 | 237.14 | 576.15 | 239.45 | 576.66 | 242.76 | 577.37 |  |
| 248.91           | 577.48    | 256.41 | 578.75 | 263.98 | 579.64 | 265.4  | 579.7  | 270.89 | 580.07 |  |
| 274.27           | 580.16    | 285.04 | 580.11 | 304.35 | 589.17 | 316.82 | 595.15 | 323.27 | 598.38 |  |
| 325              | 599.18    |        |        |        |        |        |        |        |        |  |

|                    |       |        |       |        |       |       |       |        |       |  |
|--------------------|-------|--------|-------|--------|-------|-------|-------|--------|-------|--|
| Manning's n Values |       |        |       |        |       |       |       |        |       |  |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta   | n Val | Sta    | n Val |  |
| 0                  | .024  | 161.22 | .07   | 171.78 | .04   | 205.5 | .024  | 210.04 | .04   |  |
| 228.15             | .07   | 270.89 | .024  | 304.35 | .07   |       |       |        |       |  |

|           |        |       |          |       |         |       |       |        |        |  |
|-----------|--------|-------|----------|-------|---------|-------|-------|--------|--------|--|
| Bank Sta: | Left   | Right | Lengths: | Left  | Channel | Right | Coeff | Contr. | Expan. |  |
|           | 171.78 | 205.5 |          | 40.45 | 39.95   | 45.44 |       | .1     | .3     |  |

#### CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |  |
|--------------------|----------|------------------------|---------|---------|--|
| E.G. Elev (ft)     | 579.41   | Element                | Left OB | Channel |  |
| Right OB           |          |                        |         |         |  |
| Vel Head (ft)      | 0.36     | wt. n-Val.             | 0.028   | 0.040   |  |
| 0.036              |          |                        |         |         |  |
| W.S. Elev (ft)     | 579.05   | Reach Len. (ft)        | 40.45   | 39.95   |  |
| 45.44              |          |                        |         |         |  |
| Crit W.S. (ft)     |          | Flow Area (sq ft)      | 88.52   | 353.49  |  |
| 263.49             |          |                        |         |         |  |
| E.G. Slope (ft/ft) | 0.001086 | Area (sq ft)           | 88.52   | 353.49  |  |
| 263.49             |          |                        |         |         |  |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 141.63  | 1799.07 |  |
| 1241.30            |          |                        |         |         |  |
| Top width (ft)     | 190.76   | Top width (ft)         | 103.61  | 33.72   |  |
| 53.44              |          |                        |         |         |  |
| Vel Total (ft/s)   | 4.51     | Avg. Vel. (ft/s)       | 1.60    | 5.09    |  |
| 4.71               |          |                        |         |         |  |
| Max Chl Dpth (ft)  | 15.94    | Hydr. Depth (ft)       | 0.85    | 10.48   |  |
| 4.93               |          |                        |         |         |  |
| Conv. Total (cfs)  | 96551.3  | Conv. (cfs)            | 4297.6  | 54589.2 |  |
| 37664.6            |          |                        |         |         |  |
| Length wtd. (ft)   | 41.15    | wetted Per. (ft)       | 103.79  | 41.71   |  |
| 54.69              |          |                        |         |         |  |
| Min Ch El (ft)     | 563.11   | Shear (lb/sq ft)       | 0.06    | 0.57    |  |
| 0.33               |          |                        |         |         |  |
| Alpha              | 1.15     | Stream Power (lb/ft s) | 325.00  | 0.00    |  |
| 0.00               |          |                        |         |         |  |
| Frctn Loss (ft)    | 0.06     | Cum Volume (acre-ft)   | 1.20    | 3.50    |  |
| 0.76               |          |                        |         |         |  |
| C & E Loss (ft)    | 0.00     | Cum SA (acres)         | 0.93    | 0.34    |  |
| 0.34               |          |                        |         |         |  |

#### CROSS SECTION

RIVER: LemonCreek  
 REACH: Reach1 RS: 1425.92

| LemonCreekEX.rep |           |        |        |        |        |        |        |        |        |  |
|------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| INPUT            |           |        |        |        |        |        |        |        |        |  |
| Description:     |           |        |        |        |        |        |        |        |        |  |
| Station          | Elevation | Data   | num=   | 74     |        |        |        |        |        |  |
| Sta              | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |  |
| 0                | 580.97    | 4.35   | 580.86 | 14.41  | 580.79 | 26.58  | 580.43 | 35     | 580.11 |  |
| 58.81            | 579.22    | 80.96  | 578.53 | 87.2   | 578.37 | 89.25  | 578.22 | 93.27  | 578.09 |  |
| 104.21           | 577.68    | 115    | 577.47 | 118.41 | 577.46 | 120.16 | 577.45 | 120.35 | 577.45 |  |
| 120.61           | 577.44    | 135.45 | 577.24 | 138.08 | 577.05 | 140.46 | 576.81 | 151.84 | 577.16 |  |
| 155.21           | 577.27    | 160.03 | 577.22 | 163    | 577.22 | 163.65 | 577.22 | 164.44 | 577.22 |  |
| 177.25           | 577.2     | 181.74 | 577.18 | 193.13 | 577.13 | 206.94 | 576.86 | 217.76 | 577    |  |
| 221.48           | 574.97    | 223.31 | 574.56 | 223.33 | 574.57 | 224.21 | 573.34 | 224.89 | 563.51 |  |
| 228.69           | 563.51    | 230.99 | 563.51 | 242.37 | 563.51 | 244.65 | 563.51 | 244.83 | 563.51 |  |
| 244.89           | 563.51    | 247.69 | 573.13 | 248.26 | 573.38 | 248.36 | 573.95 | 248.54 | 573.83 |  |
| 253.19           | 573.81    | 261.95 | 577.35 | 262.76 | 577.82 | 266.54 | 577.85 | 273.43 | 577.88 |  |
| 274.65           | 577.86    | 275.02 | 577.89 | 281.87 | 578.11 | 284.14 | 578.16 | 286.65 | 578.29 |  |
| 291.46           | 578.43    | 296.34 | 578.7  | 298.95 | 578.72 | 306.05 | 579.28 | 309.83 | 579.54 |  |
| 315.91           | 579.8     | 317.68 | 579.93 | 321.7  | 580.29 | 321.86 | 580.3  | 329.53 | 580.8  |  |
| 331.61           | 581.12    | 335.36 | 582.59 | 340.46 | 584.89 | 352.04 | 589.82 | 357.12 | 592.41 |  |
| 358.39           | 593.02    | 359.43 | 593.49 | 361.11 | 594.15 | 365    | 595.4  |        |        |  |

|                    |       |        |       |        |       |        |       |        |       |  |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--|
| Manning's n Values |       |        |       |        |       |        |       |        |       |  |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |  |
| 0                  | .024  | 217.76 | .07   | 223.31 | .04   | 248.36 | .024  | 281.87 | .035  |  |
| 329.53             | .07   |        |       |        |       |        |       |        |       |  |

|                  |        |        |           |       |         |       |       |        |        |  |
|------------------|--------|--------|-----------|-------|---------|-------|-------|--------|--------|--|
| Bank Sta:        | Left   | Right  | Lengths:  | Left  | Channel | Right | Coeff | Contr. | Expan. |  |
|                  | 217.76 | 262.76 |           | 26.56 | 26.5    | 28.7  |       | .1     | .3     |  |
| Ineffective Flow |        |        | num=      | 2     |         |       |       |        |        |  |
| Sta L            | Sta R  | Elev   | Permanent |       |         |       |       |        |        |  |
| 0                | 224.89 | 577.34 | F         |       |         |       |       |        |        |  |
| 244.89           | 365    | 577.34 | F         |       |         |       |       |        |        |  |

#### CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |  |
|--------------------|----------|------------------------|---------|---------|--|
| E.G. Elev (ft)     | 579.35   | Element                | Left OB | Channel |  |
| Right OB           |          |                        |         |         |  |
| Vel Head (ft)      | 0.40     | wt. n-Val.             | 0.024   | 0.040   |  |
| 0.026              |          |                        |         |         |  |
| W.S. Elev (ft)     | 578.96   | Reach Len. (ft)        | 26.56   | 26.50   |  |
| 28.70              |          |                        |         |         |  |
| Crit W.S. (ft)     | 572.75   | Flow Area (sq ft)      | 223.19  | 428.32  |  |
| 29.49              |          |                        |         |         |  |
| E.G. Slope (ft/ft) | 0.001749 | Area (sq ft)           | 223.19  | 428.32  |  |
| 29.49              |          |                        |         |         |  |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 751.47  | 2366.88 |  |
| 63.65              |          |                        |         |         |  |
| Top width (ft)     | 234.65   | Top width (ft)         | 150.47  | 45.00   |  |
| 39.18              |          |                        |         |         |  |
| Vel Total (ft/s)   | 4.67     | Avg. Vel. (ft/s)       | 3.37    | 5.53    |  |
| 2.16               |          |                        |         |         |  |
| Max Chl Dpth (ft)  | 15.45    | Hydr. Depth (ft)       | 1.48    | 9.52    |  |
| 0.75               |          |                        |         |         |  |
| Conv. Total (cfs)  | 76085.4  | Conv. (cfs)            | 17968.6 | 56594.9 |  |
| 1521.9             |          |                        |         |         |  |
| Length wtd. (ft)   | 26.50    | wetted Per. (ft)       | 150.53  | 63.97   |  |
| 39.21              |          |                        |         |         |  |
| Min Ch El (ft)     | 563.51   | Shear (lb/sq ft)       | 0.16    | 0.73    |  |
| 0.08               |          |                        |         |         |  |
| Alpha              | 1.17     | Stream Power (lb/ft s) | 365.00  | 0.00    |  |
| 0.00               |          |                        |         |         |  |
| Frctn Loss (ft)    |          | Cum Volume (acre-ft)   | 1.05    | 3.14    |  |
| 0.61               |          |                        |         |         |  |
| C & E Loss (ft)    |          | Cum SA (acres)         | 0.82    | 0.30    |  |
| 0.29               |          |                        |         |         |  |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

## CULVERT

RIVER: LemonCreek  
 REACH: Reach1 RS: 1412.68

## INPUT

Description: Culvert #2  
 Distance from Upstream XS = 5  
 Deck/Roadway width = 16.5  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

| num= | Sta    | Hi     | Cord | Lo | Cord | Sta    | Hi     | Cord | Lo | Cord | Sta    | Hi     | Cord | Lo | Cord |
|------|--------|--------|------|----|------|--------|--------|------|----|------|--------|--------|------|----|------|
| 17   | 217.76 | 577    |      |    |      | 224.89 | 577.34 |      |    |      | 224.89 | 577.34 |      |    |      |
|      | 225.79 | 577.34 |      |    |      | 227.13 | 577.34 |      |    |      | 229.18 | 577.34 |      |    |      |
|      | 230.78 | 577.34 |      |    |      | 231.95 | 577.34 |      |    |      | 234.89 | 577.34 |      |    |      |
|      | 237.83 | 577.34 |      |    |      | 239    | 577.34 |      |    |      | 240.6  | 577.34 |      |    |      |
|      | 242.65 | 577.34 |      |    |      | 243.99 | 577.34 |      |    |      | 244.89 | 577.34 |      |    |      |
|      | 244.89 | 577.34 |      |    |      | 262.76 | 577.82 |      |    |      |        |        |      |    |      |

## Upstream Bridge Cross Section Data

| Station | Elevation | Data   | num=   | 74     | Sta    | Elev   | Sta    | Elev   | Sta    | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|------|-----|------|-----|------|-----|------|
| 0       | 580.97    | 4.35   | 580.86 | 14.41  | 580.79 | 26.58  | 580.43 | 35     | 580.11 |      |     |      |     |      |     |      |
| 58.81   | 579.22    | 80.96  | 578.53 | 87.2   | 578.37 | 89.25  | 578.22 | 93.27  | 578.09 |      |     |      |     |      |     |      |
| 104.21  | 577.68    | 115    | 577.47 | 118.41 | 577.46 | 120.16 | 577.45 | 120.35 | 577.45 |      |     |      |     |      |     |      |
| 120.61  | 577.44    | 135.45 | 577.24 | 138.08 | 577.05 | 140.46 | 576.81 | 151.84 | 577.16 |      |     |      |     |      |     |      |
| 155.21  | 577.27    | 160.03 | 577.22 | 163    | 577.22 | 163.65 | 577.22 | 164.44 | 577.22 |      |     |      |     |      |     |      |
| 177.25  | 577.2     | 181.74 | 577.18 | 193.13 | 577.13 | 206.94 | 576.86 | 217.76 | 577    |      |     |      |     |      |     |      |
| 221.48  | 574.97    | 223.31 | 574.56 | 223.33 | 574.57 | 224.21 | 573.34 | 224.89 | 563.51 |      |     |      |     |      |     |      |
| 228.69  | 563.51    | 230.99 | 563.51 | 242.37 | 563.51 | 244.65 | 563.51 | 244.83 | 563.51 |      |     |      |     |      |     |      |
| 244.89  | 563.51    | 247.69 | 573.13 | 248.26 | 573.38 | 248.36 | 573.95 | 248.54 | 573.83 |      |     |      |     |      |     |      |
| 253.19  | 573.81    | 261.95 | 577.35 | 262.76 | 577.82 | 266.54 | 577.85 | 273.43 | 577.88 |      |     |      |     |      |     |      |
| 274.65  | 577.86    | 275.02 | 577.89 | 281.87 | 578.11 | 284.14 | 578.16 | 286.65 | 578.29 |      |     |      |     |      |     |      |
| 291.46  | 578.43    | 296.34 | 578.7  | 298.95 | 578.72 | 306.05 | 579.28 | 309.83 | 579.54 |      |     |      |     |      |     |      |
| 315.91  | 579.8     | 317.68 | 579.93 | 321.7  | 580.29 | 321.86 | 580.3  | 329.53 | 580.8  |      |     |      |     |      |     |      |
| 331.61  | 581.12    | 335.36 | 582.59 | 340.46 | 584.89 | 352.04 | 589.82 | 357.12 | 592.41 |      |     |      |     |      |     |      |
| 358.39  | 593.02    | 359.43 | 593.49 | 361.11 | 594.15 | 365    | 595.4  |        |        |      |     |      |     |      |     |      |

## Manning's n Values

| num= | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta | n Val |
|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|-----|-------|
| 6    | 0      | .024  | 217.76 | .07   | 223.31 | .04   | 248.36 | .024  | 281.87 | .035  |     |       |
|      | 329.53 | .07   |        |       |        |       |        |       |        |       |     |       |

Bank Sta: Left 217.76 Right 262.76 Coeff Contr. .1 Expan. .3

| Ineffective Flow | num=   | 2      | Sta L | Sta R | Elev | Permanent |
|------------------|--------|--------|-------|-------|------|-----------|
| 0                | 224.89 | 577.34 | F     |       |      |           |
| 244.89           | 365    | 577.34 | F     |       |      |           |

## Downstream Deck/Roadway Coordinates

| num= | Sta    | Hi     | Cord | Lo | Cord | Sta    | Hi     | Cord | Lo | Cord | Sta    | Hi     | Cord | Lo | Cord |
|------|--------|--------|------|----|------|--------|--------|------|----|------|--------|--------|------|----|------|
| 17   | 179.99 | 573.89 |      |    |      | 185.12 | 577.34 |      |    |      | 185.12 | 577.34 |      |    |      |
|      | 186.02 | 577.34 |      |    |      | 187.36 | 577.34 |      |    |      | 189.41 | 577.34 |      |    |      |
|      | 191.01 | 577.34 |      |    |      | 192.18 | 577.34 |      |    |      | 195.12 | 577.34 |      |    |      |
|      | 198.06 | 577.34 |      |    |      | 199.23 | 577.34 |      |    |      | 200.83 | 577.34 |      |    |      |
|      | 202.88 | 577.34 |      |    |      | 204.22 | 577.34 |      |    |      | 205.12 | 577.34 |      |    |      |
|      | 205.12 | 577.34 |      |    |      | 212.17 | 576.66 |      |    |      |        |        |      |    |      |

## Downstream Bridge Cross Section Data

| Station | Elevation | Data   | num=   | 68     | Sta    | Elev   | Sta    | Elev   | Sta    | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|------|-----|------|-----|------|-----|------|
| 0       | 579.12    | 10.22  | 578.74 | 28.4   | 578.17 | 43.55  | 577.66 | 48.32  | 577.48 |      |     |      |     |      |     |      |
| 50.63   | 577.44    | 57.08  | 577.19 | 71.18  | 576.72 | 77.96  | 576.39 | 79.87  | 576.31 |      |     |      |     |      |     |      |
| 80      | 576.31    | 81.47  | 576.33 | 92.04  | 576.52 | 97.17  | 576.55 | 106.43 | 576.57 |      |     |      |     |      |     |      |
| 109.48  | 576.51    | 112.08 | 576.46 | 120.05 | 576.44 | 124.76 | 576.35 | 135.21 | 576.22 |      |     |      |     |      |     |      |
| 136.92  | 576.21    | 138.11 | 576.25 | 138.71 | 576.18 | 144.25 | 575.71 | 145.95 | 575.7  |      |     |      |     |      |     |      |
| 153.01  | 575.63    | 157.4  | 575.68 | 163.01 | 575.37 | 168.11 | 573.62 | 173.95 | 574.5  |      |     |      |     |      |     |      |
| 179.54  | 573.92    | 179.99 | 573.89 | 180.08 | 573.34 | 185.12 | 563.39 | 186.91 | 563.39 |      |     |      |     |      |     |      |
| 187.62  | 563.39    | 189.25 | 563.39 | 195.87 | 563.39 | 199.62 | 563.39 | 200.25 | 563.39 |      |     |      |     |      |     |      |
| 205.12  | 563.39    | 208.93 | 574.42 | 212.17 | 576.66 | 219.47 | 577.14 | 219.84 | 577.15 |      |     |      |     |      |     |      |
| 220.38  | 577.17    | 220.73 | 577.2  | 220.78 | 577.21 | 224.87 | 577.36 | 228.09 | 577.35 |      |     |      |     |      |     |      |
| 230.61  | 577.41    | 234.87 | 577.68 | 235.99 | 577.67 | 238.24 | 577.85 | 241.83 | 577.86 |      |     |      |     |      |     |      |
| 242.59  | 577.89    | 244.09 | 578.01 | 249.1  | 578.63 | 265.61 | 580.49 | 267.13 | 580.62 |      |     |      |     |      |     |      |
| 269.22  | 580.84    | 285.42 | 583.1  | 286.2  | 583.17 | 289.3  | 583.37 | 302.9  | 583    |      |     |      |     |      |     |      |
| 307.74  | 584.91    | 312.07 | 586.94 | 330    | 593.68 |        |        |        |        |      |     |      |     |      |     |      |

## Manning's n Values

| num= | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta | n Val |
|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|-----|-------|
| 7    | 0      | .024  | 163.01 | .07   | 173.95 | .04   | 208.93 | .07   | 220.73 | .024  |     |       |
|      | 241.83 | .035  | 289.3  | .07   |        |       |        |       |        |       |     |       |

Bank Sta: Left 179.99 Right 212.17 Coeff Contr. .1 Expan. .3

| Ineffective Flow | num=   | 2      | Sta L | Sta R | Elev | Permanent |
|------------------|--------|--------|-------|-------|------|-----------|
| 0                | 185.12 | 577.34 | F     |       |      |           |
| 205.12           | 330    | 577.34 | F     |       |      |           |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .98  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span  
 Culvert #1 Arch 10.25 13.5  
 FHWA Chart # 41- Arch; Corrugated metal  
 FHWA Scale # 1 - 90 Degree headwall  
 Solution Criteria = Highest U.S. EG  
 Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef  
 Exit Loss Coef

|            |                             |      |      |      |   |    |
|------------|-----------------------------|------|------|------|---|----|
| 1          | 5                           | 16.5 | .024 | .024 | 0 | .5 |
| Upstream   | Elevation = 563.51          |      |      |      |   |    |
|            | Centerline Station = 234.89 |      |      |      |   |    |
| Downstream | Elevation = 563.39          |      |      |      |   |    |
|            | Centerline Station = 195.12 |      |      |      |   |    |

## CROSS SECTION

RIVER: LemonCreek  
 REACH: Reach1 RS: 1399.42

## INPUT

| Description: | Station | Elevation | Data  | num=   | 68   | Sta    | Elev  | Sta    | Elev  | Sta    | Elev | Sta | Elev |
|--------------|---------|-----------|-------|--------|------|--------|-------|--------|-------|--------|------|-----|------|
|              | 0       | 579.12    | 10.22 | 578.74 | 28.4 | 578.17 | 43.55 | 577.66 | 48.32 | 577.48 |      |     |      |

LemonCreekEX.rep

|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 50.63  | 577.44 | 57.08  | 577.19 | 71.18  | 576.72 | 77.96  | 576.39 | 79.87  | 576.31 |
| 80     | 576.31 | 81.47  | 576.33 | 92.04  | 576.52 | 97.17  | 576.55 | 106.43 | 576.57 |
| 109.48 | 576.51 | 112.08 | 576.46 | 120.05 | 576.44 | 124.76 | 576.35 | 135.21 | 576.22 |
| 136.92 | 576.21 | 138.11 | 576.25 | 138.71 | 576.18 | 144.25 | 575.71 | 145.95 | 575.7  |
| 153.01 | 575.63 | 157.4  | 575.68 | 163.01 | 575.37 | 168.11 | 573.62 | 173.95 | 574.5  |
| 179.54 | 573.92 | 179.99 | 573.89 | 180.08 | 573.34 | 185.12 | 563.39 | 186.91 | 563.39 |
| 187.62 | 563.39 | 189.25 | 563.39 | 195.87 | 563.39 | 199.62 | 563.39 | 200.25 | 563.39 |
| 205.12 | 563.39 | 208.93 | 574.42 | 212.17 | 576.66 | 219.47 | 577.14 | 219.84 | 577.15 |
| 220.38 | 577.17 | 220.73 | 577.2  | 220.78 | 577.21 | 224.87 | 577.36 | 228.09 | 577.35 |
| 230.61 | 577.41 | 234.87 | 577.68 | 235.99 | 577.67 | 238.24 | 577.85 | 241.83 | 577.86 |
| 242.59 | 577.89 | 244.09 | 578.01 | 249.1  | 578.63 | 265.61 | 580.49 | 267.13 | 580.62 |
| 269.22 | 580.84 | 285.42 | 583.1  | 286.2  | 583.17 | 289.3  | 583.37 | 302.9  | 583    |
| 307.74 | 584.91 | 312.07 | 586.94 | 330    | 593.68 |        |        |        |        |

Manning's n values num= 7

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .024  | 163.01 | .07   | 173.95 | .04   | 208.93 | .07   | 220.73 | .024  |
| 241.83 | .035  | 289.3  | .07   |        |       |        |       |        |       |

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

|        |        |       |       |       |    |    |
|--------|--------|-------|-------|-------|----|----|
| 179.99 | 212.17 | 34.16 | 31.45 | 35.82 | .1 | .3 |
|--------|--------|-------|-------|-------|----|----|

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev   | Permanent |
|--------|--------|--------|-----------|
| 0      | 185.12 | 577.34 | F         |
| 205.12 | 330    | 577.34 | F         |

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 577.23   | Element                | Left OB | Channel |
|--------------------|----------|------------------------|---------|---------|
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 4.60     | wt. n-Val.             |         | 0.040   |
| W.S. Elev (ft)     | 572.63   | Reach Len. (ft)        | 34.16   | 31.45   |
| 35.82              |          |                        |         |         |
| Crit W.S. (ft)     | 572.63   | Flow Area (sq ft)      |         | 184.89  |
| E.G. Slope (ft/ft) | 0.011063 | Area (sq ft)           |         | 221.29  |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             |         | 3182.00 |
| Top width (ft)     | 27.88    | Top width (ft)         |         | 27.88   |
| Vel Total (ft/s)   | 17.21    | Avg. vel. (ft/s)       |         | 17.21   |
| Max Chl Dpth (ft)  | 9.24     | Hydr. Depth (ft)       |         | 9.24    |
| Conv. Total (cfs)  | 30252.5  | Conv. (cfs)            |         | 30252.5 |
| Length wtd. (ft)   | 31.46    | Wetted Per. (ft)       |         | 20.00   |
| Min Ch El (ft)     | 563.39   | Shear (lb/sq ft)       |         | 6.38    |
| Alpha              | 1.00     | Stream Power (lb/ft s) | 330.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.28     | Cum Volume (acre-ft)   | 1.05    | 2.80    |
| 0.61               |          |                        |         |         |
| C & E Loss (ft)    | 0.90     | Cum SA (acres)         | 0.77    | 0.28    |
| 0.28               |          |                        |         |         |

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

LemonCreekEX.rep

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.

Warning: When the Manning's n value for the channel was composited, the computed n value was larger [smaller] than the largest [smallest] user entered n value. The n value has been set to the largest [smallest] entered value. The user may wish to examine this cross section and enter a single n value for the entire channel.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1367.97

INPUT

Description:

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 578.03 | 11.26  | 577.67 | 11.56  | 577.66 | 12.18  | 577.65 | 33.49  | 577.11 |
| 46.64  | 576.09 | 47.94  | 576.03 | 57.97  | 576.14 | 61.16  | 576.18 | 65     | 576.2  |
| 67.13  | 576.21 | 87.05  | 576.07 | 97.5   | 575.87 | 102.08 | 575.86 | 107.16 | 575.66 |
| 117.61 | 575.38 | 123.94 | 575.29 | 125.7  | 575.27 | 134.74 | 574.73 | 135.28 | 574.63 |
| 138.23 | 574.36 | 140.98 | 574.05 | 141.28 | 573.98 | 141.92 | 573.83 | 149.49 | 572.48 |
| 155.29 | 571.84 | 157.62 | 571.66 | 158.29 | 571.41 | 171.55 | 569.51 | 172.34 | 569.01 |
| 173.83 | 568.75 | 183.44 | 563.33 | 184.24 | 562.82 | 185.4  | 562.66 | 194.1  | 562.66 |
| 194.61 | 562.65 | 196.69 | 564.51 | 208.63 | 576.44 | 213.77 | 576.23 | 214.74 | 576.32 |
| 223.47 | 576.85 | 226.34 | 576.92 | 236.92 | 578.81 | 263.1  | 582.94 | 273.65 | 584.48 |
| 280.65 | 584.57 | 287.86 | 584.61 | 290.24 | 584.68 | 297.75 | 584.71 | 308.35 | 584.7  |
| 309.88 | 584.66 | 310.89 | 584.7  | 311.45 | 584.72 | 315    | 585.8  |        |        |

Manning's n values num= 7

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .024  | 125.7  | .07   | 157.62 | .04   | 208.63 | .035  | 226.34 | .07   |
| 273.65 | .024  | 308.35 | .07   |        |       |        |       |        |       |

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

|        |        |        |       |        |    |    |
|--------|--------|--------|-------|--------|----|----|
| 157.62 | 208.63 | 111.51 | 110.1 | 108.69 | .1 | .3 |
|--------|--------|--------|-------|--------|----|----|

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 575.17   | Element           | Left OB | Channel |
|--------------------|----------|-------------------|---------|---------|
| Right OB           |          |                   |         |         |
| Vel Head (ft)      | 1.60     | wt. n-Val.        | 0.070   | 0.040   |
| W.S. Elev (ft)     | 573.57   | Reach Len. (ft)   | 111.51  | 110.10  |
| 108.69             |          |                   |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft) | 15.78   | 308.77  |
| E.G. Slope (ft/ft) | 0.007479 | Area (sq ft)      | 15.78   | 308.77  |
| Q Total (cfs)      | 3182.00  | Flow (cfs)        | 30.81   | 3151.19 |
| Top width (ft)     | 62.39    | Top width (ft)    | 14.25   | 48.14   |

|                   |         |                                      |        |         |
|-------------------|---------|--------------------------------------|--------|---------|
| Vel Total (ft/s)  | 9.80    | LemonCreekEX.rep<br>Avg. Vel. (ft/s) | 1.95   | 10.21   |
| Max Chl Dpth (ft) | 10.92   | Hydr. Depth (ft)                     | 1.11   | 6.41    |
| Conv. Total (cfs) | 36793.5 | Conv. (cfs)                          | 356.2  | 36437.3 |
| Length wtd. (ft)  | 110.14  | wetted Per. (ft)                     | 14.39  | 54.53   |
| Min Ch El (ft)    | 562.65  | Shear (lb/sq ft)                     | 0.51   | 2.64    |
| Alpha<br>0.00     | 1.07    | Stream Power (lb/ft s)               | 315.00 | 0.00    |
| Frctn Loss (ft)   | 0.67    | Cum Volume (acre-ft)                 | 1.05   | 2.61    |
| C & E Loss (ft)   | 0.09    | Cum SA (acres)                       | 0.76   | 0.26    |

|                            |         |                                      |        |         |
|----------------------------|---------|--------------------------------------|--------|---------|
| Max Chl Dpth (ft)          | 11.32   | LemonCreekEX.rep<br>Hydr. Depth (ft) | 2.16   | 8.73    |
| 2.08<br>Conv. Total (cfs)  | 44940.5 | Conv. (cfs)                          | 5738.1 | 35288.3 |
| 3914.1<br>Length wtd. (ft) | 106.75  | wetted Per. (ft)                     | 39.33  | 33.16   |
| 27.57<br>Min Ch El (ft)    | 561.79  | Shear (lb/sq ft)                     | 0.67   | 2.34    |
| 0.65<br>Alpha              | 1.27    | Stream Power (lb/ft s)               | 305.00 | 0.00    |
| 0.00<br>Frctn Loss (ft)    | 0.36    | Cum Volume (acre-ft)                 | 0.92   | 1.90    |
| 0.54<br>C & E Loss (ft)    | 0.19    | Cum SA (acres)                       | 0.70   | 0.16    |

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: LemonCreek  
REACH: Reach1 RS: 1257.87

INPUT  
Description:  
Station Elevation Data num= 47

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 575.12 | 5.82   | 574.51 | 11.09  | 574.72 | 22.9   | 574.59 |
| 49.87  | 574.6  | 53.32  | 574.51 | 55     | 574.48 | 72.29  | 573.87 |
| 85.74  | 573.85 | 87.33  | 573.76 | 90.3   | 573.54 | 104.8  | 572.5  |
| 125.13 | 569.65 | 133.71 | 568.83 | 135.42 | 568.73 | 137.08 | 567.62 |
| 144.24 | 562.55 | 144.35 | 562.57 | 145.18 | 562.02 | 150.35 | 561.79 |
| 154.38 | 562.04 | 158.03 | 565.21 | 163.85 | 569.43 | 174.47 | 570.56 |
| 193.84 | 573.59 | 198.71 | 574.33 | 205.91 | 574.58 | 211.56 | 574.75 |
| 214.98 | 577.17 | 216.92 | 578.01 | 227.71 | 582.3  | 233.96 | 582.73 |
| 240.05 | 582.87 | 255.36 | 583.2  | 268.25 | 583.61 | 276.38 | 583.82 |
| 296.29 | 584.31 | 305    | 585.14 |        |        |        |        |

Manning's n Values num= 5

| Sta | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|--------|-------|
| 0   | .024  | 125.13 | .07   | 135.42 | .04   | 163.85 | .035  |
|     |       |        |       |        |       |        |       |

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

|        |        |        |        |        |    |    |
|--------|--------|--------|--------|--------|----|----|
| 135.42 | 163.85 | 106.69 | 106.66 | 107.08 | .1 | .3 |
|--------|--------|--------|--------|--------|----|----|

#### CROSS SECTION OUTPUT Profile #50-YR

|                             |          |                   |         |         |
|-----------------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)              | 574.42   | Element           | Left OB | Channel |
| Right OB<br>Vel Head (ft)   | 1.31     | wt. n-Val.        | 0.041   | 0.040   |
| 0.035<br>W.S. Elev (ft)     | 573.11   | Reach Len. (ft)   | 106.69  | 106.66  |
| 107.08<br>Crit W.S. (ft)    |          | Flow Area (sq ft) | 84.55   | 248.23  |
| 56.89<br>E.G. Slope (ft/ft) | 0.005013 | Area (sq ft)      | 84.55   | 248.23  |
| 56.89<br>Q Total (cfs)      | 3182.00  | Flow (cfs)        | 406.28  | 2498.58 |
| 277.14<br>Top width (ft)    | 94.80    | Top width (ft)    | 39.07   | 28.43   |
| 27.30<br>Vel Total (ft/s)   | 8.17     | Avg. vel. (ft/s)  | 4.81    | 10.07   |
| 4.87                        |          |                   |         |         |

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1151.21

INPUT  
Description:  
Station Elevation Data num= 41

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 574.05 | .61    | 574.05 | 3.41   | 574    | 23.95  | 573.69 |
| 48.47  | 573.28 | 56.23  | 573.12 | 65     | 572.88 | 72.67  | 572.78 |
| 78.29  | 572.7  | 110.55 | 571.92 | 130.46 | 570.51 | 136.44 | 570.2  |
| 151.31 | 569.21 | 152.9  | 568.02 | 155.43 | 567.03 | 160.05 | 563.27 |
| 168.49 | 561.02 | 169.83 | 560.85 | 175.07 | 565.16 | 177.24 | 567.55 |
| 181.91 | 567.76 | 187.87 | 567.66 | 201.88 | 570.09 | 211.02 | 571.85 |
| 220.44 | 573.27 | 221.32 | 573.74 | 221.89 | 574.07 | 234.15 | 574.05 |
| 241.95 | 574.07 | 246.4  | 574.09 | 252.13 | 574.21 | 258.87 | 574.38 |
| 278.39 | 575.01 |        |        |        |        |        |        |

Manning's n Values num= 6

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .024  | 141.14 | .07   | 151.31 | .04   | 178.87 | .024  |
| 221.89 | .035  |        |       |        |       |        |       |

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

|        |        |      |    |       |    |    |
|--------|--------|------|----|-------|----|----|
| 151.31 | 178.87 | 21.5 | 20 | 21.56 | .1 | .3 |
|--------|--------|------|----|-------|----|----|

#### CROSS SECTION OUTPUT Profile #50-YR

|                              |          |                   |         |         |
|------------------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)               | 573.87   | Element           | Left OB | Channel |
| Right OB<br>Vel Head (ft)    | 0.69     | wt. n-Val.        | 0.033   | 0.040   |
| 0.026<br>W.S. Elev (ft)      | 573.18   | Reach Len. (ft)   | 21.50   | 20.00   |
| 21.56<br>Crit W.S. (ft)      |          | Flow Area (sq ft) | 141.68  | 250.61  |
| 135.62<br>E.G. Slope (ft/ft) | 0.002394 | Area (sq ft)      | 141.68  | 250.61  |
| 135.62<br>Q Total (cfs)      | 3182.00  | Flow (cfs)        | 447.83  | 1767.18 |
| 966.99                       |          |                   |         |         |

|                   |         |                        |        |
|-------------------|---------|------------------------|--------|
| LemonCreekEX.rep  |         |                        |        |
| Top width (ft)    | 166.72  | Top width (ft)         | 98.16  |
| 41.00             |         |                        |        |
| Vel Total (ft/s)  | 6.03    | Avg. Vel. (ft/s)       | 3.16   |
| 7.13              |         |                        |        |
| Max Chl Dpth (ft) | 12.33   | Hydr. Depth (ft)       | 1.44   |
| 3.31              |         |                        |        |
| Conv. Total (cfs) | 65038.4 | Conv. (cfs)            | 9153.4 |
| 19764.9           |         |                        |        |
| Length wtd. (ft)  | 20.90   | Wetted Per. (ft)       | 98.26  |
| 41.48             |         |                        |        |
| Min Ch El (ft)    | 560.85  | Shear (lb/sq ft)       | 0.22   |
| 0.49              |         |                        |        |
| Alpha             | 1.22    | Stream Power (lb/ft s) | 278.39 |
| 0.00              |         |                        |        |
| Frctn Loss (ft)   | 0.06    | Cum Volume (acre-ft)   | 0.64   |
| 0.30              |         |                        |        |
| C & E Loss (ft)   | 0.03    | Cum SA (acres)         | 0.53   |
| 0.16              |         |                        |        |

# CROSS SECTION

RIVER: LemonCreek  
 REACH: Reach1 RS: 1131.21

INPUT  
 Description:  
 Station Elevation Data

|               |               |
|---------------|---------------|
| num=          | 56            |
| Sta Elev      | Sta Elev      |
| 0 574.01      | 4.97 573.99   |
| 49.5 573.22   | 71.6 572.76   |
| 90.54 572.53  | 93.26 572.54  |
| 128.11 571.63 | 132.99 571.29 |
| 157.89 569.9  | 174.95 568.87 |
| 180.16 567.24 | 180.31 567.16 |
| 184.91 559.97 | 187.35 559.97 |
| 190.6 567.36  | 194.01 567.28 |
| 227.94 571.03 | 230.94 571.54 |
| 241.2 573.95  | 243.53 573.67 |
| 267.8 573.99  | 274.32 574.2  |
| 307.64 575    |               |

Manning's n Values

|            |           |
|------------|-----------|
| num=       | 6         |
| Sta n Val  | Sta n Val |
| 0 .024     | 174.95    |
| 241.2 .035 |           |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 179.44 190.6 29.92 29.5 29.66 .1 .3

Ineffective Flow

|                   |           |
|-------------------|-----------|
| num=              | 2         |
| Sta L Sta R Elev  | Permanent |
| 0 182.29 567      | F         |
| 188.29 307.64 567 | F         |

# CROSS SECTION OUTPUT Profile #50-YR

|                |        |                   |         |         |
|----------------|--------|-------------------|---------|---------|
| E.G. Elev (ft) | 573.79 | Element           | Left OB | Channel |
| Right OB       |        |                   |         |         |
| Vel Head (ft)  | 0.61   | wt. n-val.        | 0.026   | 0.040   |
| 0.036          |        |                   |         |         |
| W.S. Elev (ft) | 573.18 | Reach Len. (ft)   | 29.92   | 29.50   |
| 29.66          |        |                   |         |         |
| Crit W.S. (ft) | 572.01 | Flow Area (sq ft) | 213.80  | 121.40  |

|                    |          |                        |         |
|--------------------|----------|------------------------|---------|
| LemonCreekEX.rep   |          |                        |         |
| 187.70             |          |                        |         |
| E.G. Slope (ft/ft) | 0.003521 | Area (sq ft)           | 213.80  |
| 187.70             |          |                        |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 1098.32 |
| 1231.72            |          |                        |         |
| Top width (ft)     | 188.62   | Top width (ft)         | 128.13  |
| 49.34              |          |                        |         |
| Vel Total (ft/s)   | 6.09     | Avg. Vel. (ft/s)       | 5.14    |
| 6.56               |          |                        |         |
| Max Chl Dpth (ft)  | 13.21    | Hydr. Depth (ft)       | 1.67    |
| 3.80               |          |                        |         |
| Conv. Total (cfs)  | 53623.7  | Conv. (cfs)            | 18509.1 |
| 20757.1            |          |                        |         |
| Length wtd. (ft)   | 29.50    | Wetted Per. (ft)       | 128.46  |
| 49.85              |          |                        |         |
| Min Ch El (ft)     | 559.97   | Shear (lb/sq ft)       | 0.37    |
| 0.83               |          |                        |         |
| Alpha              | 1.05     | Stream Power (lb/ft s) | 307.64  |
| 0.00               |          |                        |         |
| Frctn Loss (ft)    |          | Cum Volume (acre-ft)   | 0.55    |
| 0.22               |          |                        |         |
| C & E Loss (ft)    |          | Cum SA (acres)         | 0.47    |
| 0.14               |          |                        |         |

# CULVERT

RIVER: LemonCreek  
 REACH: Reach1 RS: 1116.46

INPUT  
 Description: Culvert #1  
 Distance from Upstream XS = 5  
 Deck/Roadway width = 19.5  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

|                     |                     |
|---------------------|---------------------|
| num=                | 5                   |
| Sta Hi Cord Lo Cord | Sta Hi Cord Lo Cord |
| 179.44 567.5        | 182.29 567          |
| 188.29 567          | 190.6 567.36        |

Upstream Bridge Cross Section Data

|               |               |
|---------------|---------------|
| num=          | 56            |
| Sta Elev      | Sta Elev      |
| 0 574.01      | 4.97 573.99   |
| 49.5 573.22   | 71.6 572.76   |
| 90.54 572.53  | 93.26 572.54  |
| 128.11 571.63 | 132.99 571.29 |
| 157.89 569.9  | 174.95 568.87 |
| 180.16 567.24 | 180.31 567.16 |
| 184.91 559.97 | 187.35 559.97 |
| 190.6 567.36  | 194.01 567.28 |
| 227.94 571.03 | 230.94 571.54 |
| 241.2 573.95  | 243.53 573.67 |
| 267.8 573.99  | 274.32 574.2  |
| 307.64 575    |               |

Manning's n Values

|            |           |
|------------|-----------|
| num=       | 6         |
| Sta n Val  | Sta n Val |
| 0 .024     | 174.95    |
| 241.2 .035 |           |

Bank Sta: Left Right Coeff Contr. Expan.  
 179.44 190.6 .1 .3

LemonCreekEX.rep

Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 182.29 567 F  
188.29 307.64 567 F

Downstream Deck/Roadway Coordinates  
num= 5  
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
226.16 566.13 227.57 566 230.57 566  
233.57 566 234.94 566.56

Downstream Bridge Cross Section Data  
Station Elevation Data num= 57  
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
0 574.02 9.15 573.94 19.18 573.92 27.18 573.89 33.87 573.74  
44.19 573.56 57.75 573.2 62.71 573.11 75.17 573.26 75.18 573.26  
85.07 572.68 92.85 572.52 110.31 572.24 110.94 572.23 112.16 572.21  
128.15 572.02 130 571.98 133.58 571.98 140.76 571.96 151.15 571.79  
159.87 571.59 172.48 571.05 179.53 570.73 191.32 569.9 202.32 569.33  
209.06 568.53 217.82 567.31 225.47 566.09 226.14 566.03 226.16 566.13  
226.2 563.93 228.43 559.8 231.96 559.8 233.64 559.8 233.66 564.92  
234.91 566.51 234.94 566.56 235.13 566.57 241.94 566.79 242.93 567.2  
243.22 567.22 243.64 567.27 268.02 569.4 279.43 571.66 282 572.16  
283.99 573.41 284.29 573.6 284.64 573.59 288.92 573.42 302.16 573.35  
314.49 573.39 328.11 573.64 334.73 573.77 342.32 573.96 354.44 574.36  
366.2 574.89 369.09 575.01

Manning's n Values num= 6  
Sta n Val Sta n Val Sta n Val Sta n Val  
0 .024 217.82 .035 226.16 .04 234.94 .035 268.02 .07  
284.29 .035

Bank Sta: Left Right Coeff Contr. Expan.  
226.16 234.94 .1 .3

Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 227.57 566 F  
233.57 369.09 566 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .98  
Elevation at which weir flow begins =  
Energy head used in spillway design =  
Spillway height used in design =  
Weir crest shape = Broad Crested

Number of Culverts = 1

| Culvert Name | Shape    | Rise | Span |
|--------------|----------|------|------|
| Culvert #1   | Circular | 6    |      |

FWHA Chart # 2 - Corrugated Metal Pipe Culvert  
FWHA Scale # 1 - Headwall  
Solution Criteria = Highest U.S. EG  
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef  
Exit Loss Coef

| 1                                                           | 5 | 19.5 | .024 | .024 | 0 | .5 |
|-------------------------------------------------------------|---|------|------|------|---|----|
| Upstream Elevation = 559.97<br>Centerline Station = 185.29  |   |      |      |      |   |    |
| Downstream Elevation = 559.8<br>Centerline Station = 230.57 |   |      |      |      |   |    |

CROSS SECTION

LemonCreekEX.rep

RIVER: LemonCreek  
REACH: Reach1 RS: 1101.71

INPUT  
Description:  
Station Elevation Data num= 57  
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
0 574.02 9.15 573.94 19.18 573.92 27.18 573.89 33.87 573.74  
44.19 573.56 57.75 573.2 62.71 573.11 75.17 573.26 75.18 573.26  
85.07 572.68 92.85 572.52 110.31 572.24 110.94 572.23 112.16 572.21  
128.15 572.02 130 571.98 133.58 571.98 140.76 571.96 151.15 571.79  
159.87 571.59 172.48 571.05 179.53 570.73 191.32 569.9 202.32 569.33  
209.06 568.53 217.82 567.31 225.47 566.09 226.14 566.03 226.16 566.13  
226.2 563.93 228.43 559.8 231.96 559.8 233.64 559.8 233.66 564.92  
234.91 566.51 234.94 566.56 235.13 566.57 241.94 566.79 242.93 567.2  
243.22 567.22 243.64 567.27 268.02 569.4 279.43 571.66 282 572.16  
283.99 573.41 284.29 573.6 284.64 573.59 288.92 573.42 302.16 573.35  
314.49 573.39 328.11 573.64 334.73 573.77 342.32 573.96 354.44 574.36  
366.2 574.89 369.09 575.01

Manning's n Values num= 6  
Sta n Val Sta n Val Sta n Val Sta n Val  
0 .024 217.82 .035 226.16 .04 234.94 .035 268.02 .07  
284.29 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
226.16 234.94 22.46 20.19 28.45 .1 .3

Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 227.57 566 F  
233.57 369.09 566 F

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 573.32   | Element                | Left OB | channel |
|--------------------|----------|------------------------|---------|---------|
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.51     | wt. n-Val.             | 0.027   | 0.040   |
| 0.037              |          |                        |         |         |
| W.S. Elev (ft)     | 572.82   | Reach Len. (ft)        | 22.46   | 20.19   |
| 28.45              |          |                        |         |         |
| Crit W.S. (ft)     | 571.33   | Flow Area (sq ft)      | 269.49  | 101.81  |
| 190.67             |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.003017 | Area (sq ft)           | 269.49  | 101.81  |
| 190.67             |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 1417.26 | 629.46  |
| 1135.28            |          |                        |         |         |
| Top width (ft)     | 200.28   | Top width (ft)         | 143.40  | 8.78    |
| 48.10              |          |                        |         |         |
| Vel Total (ft/s)   | 5.66     | Avg. Vel. (ft/s)       | 5.26    | 6.18    |
| 5.95               |          |                        |         |         |
| Max Chl Dpth (ft)  | 13.02    | Hydr. Depth (ft)       | 1.88    | 11.60   |
| 3.96               |          |                        |         |         |
| Conv. Total (cfs)  | 57929.3  | Conv. (cfs)            | 25801.7 | 11459.5 |
| 20668.1            |          |                        |         |         |
| Length wtd. (ft)   | 22.84    | wetted Per. (ft)       | 143.79  | 19.30   |
| 48.74              |          |                        |         |         |
| Min Ch El (ft)     | 559.80   | shear (lb/sq ft)       | 0.35    | 0.99    |
| 0.74               |          |                        |         |         |
| Alpha              | 1.01     | Stream Power (lb/ft s) | 369.09  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.05     | Cum Volume (acre-ft)   | 0.55    | 0.80    |
| 0.22               |          |                        |         |         |
| C & E Loss (ft)    | 0.03     | Cum SA (acres)         | 0.38    | 0.07    |
| 0.11               |          |                        |         |         |

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: LemonCreek  
REACH: Reach1 RS: 1081.52

| INPUT        |           |        |        |        |        |        |        |        |        |     |      |
|--------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| Description: |           |        |        |        |        |        |        |        |        |     |      |
| Station      | Elevation | Data   | num=   | 63     |        |        |        |        |        |     |      |
| Sta          | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 0            | 574.01    | 7.48   | 573.93 | 14.13  | 573.85 | 21.99  | 573.81 | 38.86  | 573.45 |     |      |
| 39.16        | 572.45    | 39.33  | 573.44 | 55.81  | 573.06 | 64.55  | 572.9  | 71.87  | 573.02 |     |      |
| 71.87        | 572.98    | 81.77  | 572.53 | 87.31  | 572.39 | 91     | 572.36 | 105    | 572.19 |     |      |
| 116.01       | 571.93    | 123.74 | 571.84 | 134.72 | 571.62 | 138.16 | 571.53 | 140    | 571.52 |     |      |
| 140.46       | 571.53    | 143.48 | 571.5  | 157.99 | 571.46 | 165.81 | 571.47 | 172.26 | 571.33 |     |      |
| 184.28       | 570.88    | 188.83 | 570.68 | 199.69 | 569.83 | 207.76 | 569.2  | 221    | 568.49 |     |      |
| 226.17       | 568.16    | 227.13 | 567.85 | 227.31 | 567.3  | 232.03 | 559.4  | 232.32 | 559.3  |     |      |
| 232.41       | 558.84    | 243.37 | 559.95 | 247.38 | 560.79 | 247.72 | 560.86 | 250.28 | 564.08 |     |      |
| 252.24       | 564.39    | 254.13 | 565.49 | 254.67 | 566.3  | 260.6  | 567.3  | 268.95 | 567.76 |     |      |
| 273.75       | 568.38    | 286.99 | 571.84 | 290.79 | 572.66 | 291.69 | 572.85 | 292.55 | 572.97 |     |      |
| 297.03       | 572.87    | 302.42 | 572.84 | 308.86 | 572.79 | 325.44 | 572.95 | 335.5  | 573.18 |     |      |
| 342.26       | 573.31    | 356.16 | 573.54 | 358.72 | 573.62 | 371.52 | 574.05 | 380.23 | 574.58 |     |      |
| 385.14       | 574.84    | 387.34 | 574.93 | 388.33 | 575    |        |        |        |        |     |      |

|           |          |        |                                                                                                   |          |              |        |       |              |       |        |
|-----------|----------|--------|---------------------------------------------------------------------------------------------------|----------|--------------|--------|-------|--------------|-------|--------|
| Manning's | n Values |        |                                                                                                   | num=     | 4            |        |       |              |       |        |
| Sta       | n Val    | Sta    | n Val                                                                                             | Sta      | n Val        | Sta    | n Val | Sta          | n Val |        |
| 0         | .024     | 226.17 | . 04</td <td>268.95</td> <td>.07</td> <td>292.55</td> <td></td> <td></td> <td>.035</td> <td></td> | 268.95   | .07          | 292.55 |       |              | .035  |        |
| Bank Sta: | Left     | Right  |                                                                                                   | Lengths: | Left Channel | Right  |       | Coeff Contr. |       | Expan. |
|           | 226.17   | 260.6  |                                                                                                   |          | 78.48        | 81.52  | 87.79 |              | .1    | .3     |

## CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 573.24   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.39     | Wt. n-val.             | 0.024   | 0.040   |
| 0.050              |          |                        |         |         |
| W.S. Elev (ft)     | 572.85   | Reach Len. (ft)        | 78.48   | 81.52   |
| 87.79              |          |                        |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft)      | 254.93  | 355.22  |
| 106.41             |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.001423 | Area (sq ft)           | 254.93  | 355.22  |
| 106.41             |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 841.99  | 2056.32 |
| 283.69             |          |                        |         |         |
| Top width (ft)     | 231.31   | Top Width (ft)         | 151.43  | 34.43   |
| 45.45              |          |                        |         |         |
| Vel Total (ft/s)   | 4.44     | Avg. Vel. (ft/s)       | 3.30    | 5.79    |
| 2.67               |          |                        |         |         |
| Max Chl Dpth (ft)  | 14.01    | Hydr. Depth (ft)       | 1.68    | 10.32   |
| 2.34               |          |                        |         |         |
| Conv. Total (cfs)  | 84366.6  | Conv. (cfs)            | 22324.3 | 54520.8 |
| 7521.5             |          |                        |         |         |
| Length wtd. (ft)   | 81.12    | wetted Per. (ft)       | 151.55  | 42.30   |
| 46.05              |          |                        |         |         |
| Min ch El (ft)     | 558.84   | Shear (lb/sq ft)       | 0.15    | 0.75    |
| 0.21               |          |                        |         |         |
| Alpha              | 1.28     | Stream Power (lb/ft s) | 388.33  | 0.00    |
| 0.00               |          |                        |         |         |

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1000.00

| INPUT        |           |        |        |        |        |        |        |        |        |     |      |
|--------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| Description: |           |        |        |        |        |        |        |        |        |     |      |
| Station      | Elevation | Data   | num=   | 49     |        |        |        |        |        |     |      |
| Sta          | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 0            | 573.05    | 2.18   | 573    | 16.59  | 572.68 | 18.87  | 572.64 | 19.93  | 572.61 |     |      |
| 36.51        | 572.28    | 46.38  | 572.08 | 55.78  | 571.89 | 69.2   | 571.54 | 70.65  | 571.5  |     |      |
| 72.89        | 571.5     | 89.91  | 571.54 | 98.49  | 571.5  | 114    | 571.23 | 128.58 | 570.9  |     |      |
| 135          | 570.77    | 138.28 | 570.68 | 141.28 | 570.9  | 146.02 | 571.05 | 151.48 | 570.84 |     |      |
| 159.59       | 570.57    | 210.91 | 571.74 | 211.68 | 570.64 | 212    | 570.57 | 222.25 | 558.79 |     |      |
| 222.33       | 558.73    | 222.38 | 558.72 | 230.04 | 558.61 | 236.21 | 558.6  | 242.58 | 558.89 |     |      |
| 242.92       | 558.89    | 243.04 | 559.1  | 243.09 | 559.13 | 245.22 | 572.07 | 245.25 | 572.09 |     |      |
| 249          | 570.43    | 251.06 | 571.05 | 257.59 | 571.89 | 283.06 | 572.85 | 290.81 | 572.91 |     |      |
| 294.37       | 573.08    | 294.46 | 573.09 | 297.07 | 573.16 | 302.35 | 573.2  | 308.43 | 572.96 |     |      |
| 308.73       | 572.96    | 327.86 | 572.95 | 332.19 | 572.97 | 335    | 572.97 |        |        |     |      |

|                    |        |                       |       |        |              |        |       |
|--------------------|--------|-----------------------|-------|--------|--------------|--------|-------|
| Manning's n values |        | num= 4                |       |        |              |        |       |
| Sta                | n Val  | Sta                   | n Val | Sta    | n Val        | Sta    | n Val |
| 0                  | .024   | 210.91                | .04   | 245.22 | .035         | 283.06 | .024  |
| Bank Sta: Left     | Right  | Lengths: Left Channel |       | Right  | Coeff Contr. | Expan. |       |
| 210.91             | 245.22 | 9.02                  |       | 0      | 4.06         | .1     | .3    |

## CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 573.08   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.58     | wt. n-val.             | 0.024   | 0.040   |
| 0.035              |          |                        |         |         |
| W.S. Elev (ft)     | 572.50   | Reach Len. (ft)        |         |         |
|                    |          |                        |         |         |
| Crit W.S. (ft)     | 567.17   | Flow Area (sq ft)      | 207.97  | 384.50  |
| 19.95              |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.002213 | Area (sq ft)           | 207.97  | 384.50  |
| 19.95              |          |                        |         |         |
| Q Total (cfs)      | 3255.00  | Flow (cfs)             | 653.71  | 2570.28 |
| 31.00              |          |                        |         |         |
| Top width (ft)     | 248.32   | Top width (ft)         | 185.45  | 34.31   |
| 28.55              |          |                        |         |         |
| Vel Total (ft/s)   | 5.31     | Avg. Vel. (ft/s)       | 3.14    | 6.68    |
| 1.55               |          |                        |         |         |
| Max Chl Dpth (ft)  | 13.90    | Hydr. Depth (ft)       | 1.12    | 11.21   |
| 0.70               |          |                        |         |         |
| Conv. Total (cfs)  | 69188.7  | Conv. (cfs)            | 13895.4 | 54634.3 |
| 659.0              |          |                        |         |         |
| Length wtd. (ft)   |          | Wetted Per. (ft)       | 185.51  | 51.40   |
| 29.07              |          |                        |         |         |
| Min Ch El (ft)     | 558.60   | Shear (lb/sq ft)       | 0.15    | 1.03    |
| 0.09               |          |                        |         |         |
| Alpha              | 1.32     | Stream Power (lb/ft s) | 335.00  | 0.00    |
| 0.00               |          |                        |         |         |

Frctn Loss (ft) LemonCreekEX.rep  
Cum Volume (acre-ft)  
C & E Loss (ft) Cum SA (acres)

Reach1 1367.97 LemonCreekEX.rep .024 .07 .04 .035 .07  
Reach1 .024 .07 1257.87 .024 .07 .04 .035 .035  
Reach1 1151.21 .024 .07 .04 .024 .07  
Reach1 .035 1131.21 .024 .035 .04 .035 .07  
Reach1 .035 1116.46 Culvert  
Reach1 1101.71 .024 .035 .04 .035 .07  
Reach1 .035 1081.52 .024 .04 .07 .035  
Reach1 1000.00 .024 .04 .035 .024

# SUMMARY OF MANNING'S N VALUES

River:LemonCreek

| Reach  | River Sta. | n1      | n2   | n3   | n4   | n5   |
|--------|------------|---------|------|------|------|------|
| n6     | n8         | n9      | n10  | n11  | n12  | n13  |
| Reach1 | 3105.06    | .035    | .024 | .07  | .04  | .07  |
| .035   |            |         |      |      |      |      |
| Reach1 | 3034.83    | .035    | .024 | .07  | .04  | .07  |
| .024   |            |         |      |      |      |      |
| Reach1 | 2901.87    | .035    | .024 | .07  | .035 |      |
| Reach1 | 2778.59    | .035    | .024 | .07  | .04  | .07  |
| .035   |            |         |      |      |      |      |
| Reach1 | 2685.90    | .07     | .024 | .07  | .024 | .07  |
| .04    |            |         |      |      |      |      |
| Reach1 | 2660.90    | .07     | .024 | .07  | .024 | .07  |
| .04    |            |         |      |      |      |      |
| Reach1 | 2625.92    | Culvert |      |      |      |      |
| Reach1 | 2590.90    | .07     | .024 | .07  | .024 | .07  |
| .04    |            |         |      |      |      |      |
| Reach1 | 2565.90    | .07     | .024 | .07  | .024 | .07  |
| .04    |            |         |      |      |      |      |
| Reach1 | 2502.39    | .035    | .024 | .035 | .024 | .07  |
| .07    |            |         |      |      |      |      |
| Reach1 | 2327.19    | .035    | .07  | .024 | .07  | .024 |
| .04    |            |         |      |      |      |      |
| Reach1 | 2271.00    | .024    | .07  | .024 | .07  | .024 |
| .07    |            |         |      |      |      |      |
| Reach1 | 2246.00    | .07     | .07  | .024 | .07  | .024 |
| .04    |            |         |      |      |      |      |
| Reach1 | 2230.01    | Culvert |      |      |      |      |
| Reach1 | 2216.36    | .07     | .07  | .024 | .07  | .024 |
| .04    |            |         |      |      |      |      |
| Reach1 | 2199.00    | .07     | .07  | .024 | .07  | .024 |
| .04    |            |         |      |      |      |      |
| Reach1 | 2084.10    | .024    | .035 | .07  | .024 | .07  |
| .07    |            |         |      |      |      |      |
| Reach1 | 1875.66    | .035    | .07  | .04  | .07  | .024 |
| .07    |            |         |      |      |      |      |
| Reach1 | 1770.29    | .035    | .024 | .07  | .04  | .024 |
| .07    |            |         |      |      |      |      |
| Reach1 | 1593.83    | .024    | .035 | .07  | .04  | .024 |
| .07    |            |         |      |      |      |      |
| Reach1 | 1465.87    | .024    | .07  | .04  | .024 | .04  |
| .07    |            |         |      |      |      |      |
| Reach1 | 1425.92    | .024    | .07  | .04  | .024 | .035 |
| .07    |            |         |      |      |      |      |
| Reach1 | 1412.68    | Culvert |      |      |      |      |
| Reach1 | 1399.42    | .024    | .07  | .04  | .07  | .024 |
| .035   |            |         |      |      |      |      |

# SUMMARY OF REACH LENGTHS

River: LemonCreek

| Reach  | River Sta. | Left    | Channel | Right  |
|--------|------------|---------|---------|--------|
| Reach1 | 3105.06    | 73.02   | 70.23   | 61.56  |
| Reach1 | 3034.83    | 141.38  | 132.96  | 132.46 |
| Reach1 | 2901.87    | 123.39  | 123.28  | 123.54 |
| Reach1 | 2778.59    | 80.84   | 92.69   | 98.27  |
| Reach1 | 2685.90    | 32.36   | 25      | 27.91  |
| Reach1 | 2660.90    | 72.46   | 70      | 72.44  |
| Reach1 | 2625.92    | Culvert |         |        |
| Reach1 | 2590.90    | 24.97   | 25      | 32.13  |
| Reach1 | 2565.90    | 62.79   | 63.51   | 72.59  |
| Reach1 | 2502.39    | 170.56  | 175.2   | 183.4  |
| Reach1 | 2327.19    | 55.09   | 56.19   | 66.43  |
| Reach1 | 2271.00    | 21.66   | 25      | 41.57  |
| Reach1 | 2246.00    | 33.12   | 29.64   | 31.84  |
| Reach1 | 2230.01    | Culvert |         |        |
| Reach1 | 2216.36    | 29.71   | 17.36   | 12.78  |
| Reach1 | 2199.00    | 107.55  | 114.9   | 122.27 |
| Reach1 | 2084.10    | 202.44  | 208.44  | 211.8  |
| Reach1 | 1875.66    | 106.62  | 105.37  | 108.86 |
| Reach1 | 1770.29    | 180.61  | 176.46  | 170.99 |
| Reach1 | 1593.83    | 130.55  | 127.96  | 126.93 |
| Reach1 | 1465.87    | 40.45   | 39.95   | 45.44  |
| Reach1 | 1425.92    | 26.56   | 26.5    | 28.7   |
| Reach1 | 1412.68    | Culvert |         |        |
| Reach1 | 1399.42    | 34.16   | 31.45   | 35.82  |
| Reach1 | 1367.97    | 111.51  | 110.1   | 108.69 |
| Reach1 | 1257.87    | 106.69  | 106.66  | 107.08 |
| Reach1 | 1151.21    | 21.5    | 20      | 21.56  |
| Reach1 | 1131.21    | 29.92   | 29.5    | 29.66  |
| Reach1 | 1116.46    | Culvert |         |        |
| Reach1 | 1101.71    | 22.46   | 20.19   | 28.45  |
| Reach1 | 1081.52    | 78.48   | 81.52   | 87.79  |
| Reach1 | 1000.00    | 9.02    | 0       | 4.06   |

# SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: LemonCreek

| LemonCreekEX.rep |            |         |        |
|------------------|------------|---------|--------|
| Reach            | River Sta. | Contr.  | Expan. |
| Reach1           | 3105.06    | .1      | .3     |
| Reach1           | 3034.83    | .1      | .3     |
| Reach1           | 2901.87    | .1      | .3     |
| Reach1           | 2778.59    | .1      | .3     |
| Reach1           | 2685.90    | .1      | .3     |
| Reach1           | 2660.90    | .1      | .3     |
| Reach1           | 2625.92    | Culvert |        |
| Reach1           | 2590.90    | .1      | .3     |
| Reach1           | 2565.90    | .1      | .3     |
| Reach1           | 2502.39    | .1      | .3     |
| Reach1           | 2327.19    | .1      | .3     |
| Reach1           | 2271.00    | .1      | .3     |
| Reach1           | 2246.00    | .1      | .3     |
| Reach1           | 2230.01    | Culvert |        |
| Reach1           | 2216.36    | .1      | .3     |
| Reach1           | 2199.00    | .1      | .3     |
| Reach1           | 2084.10    | .1      | .3     |
| Reach1           | 1875.66    | .1      | .3     |
| Reach1           | 1770.29    | .1      | .3     |
| Reach1           | 1593.83    | .1      | .3     |
| Reach1           | 1465.87    | .1      | .3     |
| Reach1           | 1425.92    | .1      | .3     |
| Reach1           | 1412.68    | Culvert |        |
| Reach1           | 1399.42    | .1      | .3     |
| Reach1           | 1367.97    | .1      | .3     |
| Reach1           | 1257.87    | .1      | .3     |
| Reach1           | 1151.21    | .1      | .3     |
| Reach1           | 1131.21    | .1      | .3     |
| Reach1           | 1116.46    | Culvert |        |
| Reach1           | 1101.71    | .1      | .3     |
| Reach1           | 1081.52    | .1      | .3     |
| Reach1           | 1000.00    | .1      | .3     |

LemonCreekPR.rep

HEC-RAS Version 4.1.0 Jan 2010  
U.S. Army Corps of Engineers  
Hydrologic Engineering Center  
609 Second Street  
Davis, California

```

X   X   XXXXX   XXXX   XXXX   XX   XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
XXXXXXX XXXX   X   XXX XXXX   XXXXX XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
X   X   XXXXX   XXXX   X   X   X   X   XXXXX

```

#### PROJECT DATA

Project Title: Lemon Creek  
Project File : LemonCreek.prj  
Run Date and Time: 5/8/2014 8:13:57 AM

Project in English units

#### PLAN DATA

Plan Title: Lemon Creek\_PR\_No DS Culvert

Plan File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.p07

Geometry Title: Lemon Creek\_Pr\_7x14\_box\_no\_DS\_culvert  
Geometry File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.g18

Flow Title : Flow 01 PR  
Flow File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.f02

#### Plan Summary Information:

|            |                     |                        |
|------------|---------------------|------------------------|
| Number of: | Cross Sections = 27 | Multiple Openings = 0  |
|            | Culverts = 3        | Inline Structures = 0  |
|            | Bridges = 0         | 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: Flow 01 PR

Flow File : h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.f02

Flow Data (cfs)

| River      | Reach  | RS      | 50-YR |
|------------|--------|---------|-------|
| LemonCreek | Reach1 | 3105.07 | 2021  |
| LemonCreek | Reach1 | 2271.00 | 3182  |
| LemonCreek | Reach1 | 1000.00 | 3255  |

### Boundary Conditions

| River<br>Downstream             | Reach  | Profile | Upstream |
|---------------------------------|--------|---------|----------|
| LemonCreek<br>Known WS = 572.75 | Reach1 | 50-YR   |          |

## GEOMETRY DATA

Geometry Title: Lemon\_Creek\_Pr\_7x14\_box\_no\_DS\_culvert  
Geometry File :  
h:\pdata\137644\Calcs\Strmwater\Hydraulics\HEC-RAS\LemonCrk\LemonCreek.g18

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 3105.07

INPUT  
Description:

[illegible]

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LemonCreekPR.rep

|        |        |        |     |        |        |        |        |        |        |
|--------|--------|--------|-----|--------|--------|--------|--------|--------|--------|
| 154.99 | 594.71 | 155.81 | 595 | 156.22 | 595.79 | 157.44 | 596.81 | 158.87 | 598    |
| 159.53 | 598.54 | 160.08 | 599 | 160.7  | 599.51 | 161.95 | 600.55 | 162.92 | 601.35 |
| 164.89 | 602.97 | 164.92 | 603 | 166.14 | 604    | 166.55 | 604.34 | 167.36 | 605    |
| 168.3  | 605.78 | 168.58 | 606 | 169.53 | 606.77 | 169.8  | 607    | 171.01 | 607.98 |
| 172.11 | 608.79 | 172.28 | 609 | 172.75 | 609.56 | 237.38 | 609.33 | 250    | 609.29 |

| Manning's n values |       | num= 8 |       |        |       |       |       |       |       |
|--------------------|-------|--------|-------|--------|-------|-------|-------|-------|-------|
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta   | n Val | Sta   | n Val |
| 0                  | .035  | 45.17  | .024  | 50.73  | .035  | 93.16 | .024  | 99.63 | .07   |
| 135.59             | .04   | 150.55 | .07   | 172.75 | .024  |       |       |       |       |

|           |       |        |          |       |         |       |       |        |        |
|-----------|-------|--------|----------|-------|---------|-------|-------|--------|--------|
| Bank Sta: | Left  | Right  | Lengths: | Left  | Channel | Right | Coeff | Contr. | Expan. |
|           | 99.63 | 172.28 |          | 73.02 | 70.23   | 65.15 |       | .1     | .3     |

CROSS SECTION OUTPUT Profile #50-YR

|                           |          |                        |         |         |
|---------------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)            | 599.43   | Element                | Left OB | Channel |
| Right OB<br>Vel Head (ft) | 2.39     | wt. n-val.             |         | 0.058   |
| W.S. Elev (ft)            | 597.04   | Reach Len. (ft)        | 73.02   | 70.23   |
| 65.15<br>Crit W.S. (ft)   | 597.04   | Flow Area (sq ft)      |         | 162.87  |
| E.G. Slope (ft/ft)        | 0.036900 | Area (sq ft)           |         | 162.87  |
| Q Total (cfs)             | 2021.00  | Flow (cfs)             |         | 2021.00 |
| Top width (ft)            | 34.16    | Top Width (ft)         |         | 34.16   |
| Vel Total (ft/s)          | 12.41    | Avg. Vel. (ft/s)       |         | 12.41   |
| Max Chl Dpth (ft)         | 9.04     | Hydr. Depth (ft)       |         | 4.77    |
| Conv. Total (cfs)         | 10520.9  | Conv. (cfs)            |         | 10520.9 |
| Length wtd. (ft)          | 70.23    | Wetted Per. (ft)       |         | 40.95   |
| Min Ch El (ft)            | 588.00   | Shear (lb/sq ft)       |         | 9.16    |
| Alpha<br>0.00             | 1.00     | Stream Power (lb/ft s) | 250.00  | 0.00    |
| Frctn Loss (ft)           | 1.26     | Cum Volume (acre-ft)   | 1.91    | 14.18   |
| 2.67<br>C & E Loss (ft)   | 0.47     | Cum SA (acres)         | 0.84    | 1.75    |
| 0.91                      |          |                        |         |         |

```
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.
```

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Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1

RS: 3034.84

INPUT

Description:

| Station | Elevation | Data   | num=   | 150    |        |        |        |        |        |  |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| Sta     | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |  |
| 0       | 654.54    | .99    | 654    | 1.79   | 653.59 | 2.92   | 653    | 4.27   | 652.26 |  |
| 5.05    | 651.81    | 6.44   | 651    | 7.69   | 650.28 | 8.2    | 650    | 9      | 649.6  |  |
| 9.95    | 649.22    | 11.49  | 648.58 | 11.96  | 648.37 | 12.98  | 647.89 | 14.24  | 647.27 |  |
| 14.8    | 647       | 16.76  | 646.04 | 16.99  | 645.93 | 19.77  | 644.55 | 22.71  | 643.07 |  |
| 22.97   | 642.93    | 25.5   | 641.66 | 28.48  | 640.15 | 28.83  | 639.98 | 30.76  | 639    |  |
| 32.17   | 638.29    | 33.24  | 637.74 | 34.71  | 637    | 36.68  | 636    | 37.01  | 635.84 |  |
| 38.66   | 635       | 40.42  | 634.11 | 41.06  | 633.79 | 42.61  | 633    | 42.97  | 632.82 |  |
| 45.98   | 631.29    | 48.54  | 630    | 49.72  | 629.34 | 50.32  | 629    | 51.93  | 628    |  |
| 52.33   | 627.76    | 55.16  | 626    | 55.19  | 625.99 | 56.79  | 625    | 57.35  | 624.65 |  |
| 58.41   | 624       | 60.03  | 623    | 60.54  | 622.68 | 61.65  | 622    | 63.27  | 621    |  |
| 64.89   | 620.01    | 64.91  | 619.99 | 67.43  | 618.47 | 68.2   | 618    | 69.86  | 617    |  |
| 70.45   | 616.64    | 71.52  | 616    | 74.37  | 614.28 | 77.78  | 612.23 | 78.61  | 611.74 |  |
| 79.83   | 611       | 81.49  | 610    | 84.35  | 609.56 | 87.26  | 609.15 | 88.3   | 609    |  |
| 90.21   | 608.66    | 92.77  | 608.21 | 93.18  | 608.14 | 94.03  | 608    | 94.57  | 607.71 |  |
| 95.87   | 607       | 96.73  | 606.54 | 97.72  | 606    | 100.56 | 604.47 | 101.44 | 604    |  |
| 103.3   | 603       | 104.72 | 602.23 | 106.09 | 601.5  | 107.51 | 600.73 | 109.73 | 599.55 |  |
| 112.64  | 598       | 113.4  | 597.59 | 114.52 | 597    | 116.89 | 595.74 | 119.77 | 594.23 |  |
| 120.2   | 594       | 121.97 | 593.07 | 124.04 | 592    | 124.14 | 592    | 124.8  | 591.69 |  |
| 125.48  | 591.48    | 125.68 | 591.43 | 126.52 | 591.18 | 127.58 | 590.85 | 127.74 | 590.79 |  |
| 128.68  | 590.49    | 129.4  | 590.27 | 129.72 | 590.16 | 130.95 | 589.78 | 131.98 | 589.38 |  |
| 133.03  | 589       | 134.05 | 588.72 | 134.55 | 588.56 | 135.25 | 588.36 | 136.26 | 588    |  |
| 136.34  | 587.98    | 138.56 | 587.32 | 138.94 | 587.21 | 139.61 | 587    | 140.74 | 586.67 |  |
| 144.31  | 585.61    | 145.41 | 585.28 | 146.36 | 585    | 147.54 | 584.73 | 147.93 | 584.68 |  |
| 150.79  | 585       | 151.01 | 585    | 151.99 | 585.99 | 151.99 | 586    | 153.32 | 587.34 |  |
| 155.3   | 589.35    | 155.93 | 590    | 156.92 | 591    | 157.38 | 591.48 | 157.89 | 592    |  |
| 160.1   | 594.23    | 160.9  | 595    | 161.63 | 595.71 | 162.31 | 596.35 | 162.99 | 597    |  |
| 165.12  | 599       | 165.9  | 599.74 | 166.3  | 600.11 | 169.35 | 603    | 169.63 | 603.27 |  |
| 171.43  | 604.98    | 172.49 | 606    | 172.67 | 606.18 | 174.46 | 607.91 | 174.51 | 608.33 |  |
| 174.6   | 609       | 283.56 | 609    | 283.8  | 608.79 | 285.95 | 606.88 | 289.6  | 606.91 |  |
| 291.8   | 606.92    | 292.33 | 606.42 | 292.55 | 604.92 | 298.07 | 605.4  | 300    | 605.59 |  |

Manning's n values

| Sta   | n Val | Sta   | n Val | Sta   | n Val | Sta    | n Val | Sta    | n Val |
|-------|-------|-------|-------|-------|-------|--------|-------|--------|-------|
| 0     | .035  | 81.49 | .024  | 93.18 | .07   | 144.31 | .04   | 151.99 | .07   |
| 174.6 | .024  |       |       |       |       |        |       |        |       |

|           |       |        |          |        |         |       |       |        |       |
|-----------|-------|--------|----------|--------|---------|-------|-------|--------|-------|
| Bank Sta: | Left  | Right  | Lengths: | Left   | Channel | Right | Coeff | Contr. | Expan |
|           | 93.18 | 174.51 |          | 141.38 | 132.96  | 131.7 |       | .1     | .3    |

## CROSS SECTION OUTPUT Profile #50-YR

|                           |          |                   |         |         |
|---------------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)            | 596.43   | Element           | Left OB | Channel |
| Right OB<br>Vel Head (ft) | 0.82     | wt. n-val.        |         | 0.066   |
| w.s. Elev (ft)            | 595.61   | Reach Len. (ft)   | 141.38  | 132.96  |
| 131.70<br>Crit W.s. (ft)  |          | Flow Area (sq ft) |         | 278.62  |
| E.G. Slope (ft/ft)        | 0.010624 | Area (sq ft)      |         | 278.62  |
| Q Total (cfs)             | 2021.00  | Flow (cfs)        |         | 2021.00 |

LemonCreekPR.rep

|                   |         |                        |        |         |
|-------------------|---------|------------------------|--------|---------|
| Top width (ft)    | 44.39   | Top width (ft)         |        | 44.39   |
| Vel Total (ft/s)  | 7.25    | Avg. Vel. (ft/s)       |        | 7.25    |
| Max Chl Dpth (ft) | 10.93   | Hydr. Depth (ft)       |        | 6.28    |
| Conv. Total (cfs) | 19607.1 | Conv. (cfs)            |        | 19607.1 |
| Length wtd. (ft)  | 132.96  | wetted Per. (ft)       |        | 50.84   |
| Min Ch El (ft)    | 584.68  | Shear (lb/sq ft)       |        | 3.63    |
| Alpha<br>0.00     | 1.00    | Stream Power (lb/ft s) | 300.00 | 0.00    |
| Frctn Loss (ft)   | 0.87    | Cum Volume (acre-ft)   | 1.91   | 13.82   |
| C & E Loss (ft)   | 0.10    | Cum SA (acres)         | 0.84   | 1.69    |
| 0.91              |         |                        |        |         |

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: LemonCreek

REACH: Reach1

RS: 2901.88

INPUT

**Description:**

| Station | Elevation | Data   | num=   | 150    |        |        |        |        |        |     |      |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| Sta     | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 0       | 655.87    | 3.61   | 654    | 4.88   | 653.34 | 5.55   | 653    | 7.49   | 652    |     |      |
| 8.88    | 655.28    | 10     | 650.71 | 12.59  | 649.38 | 13.84  | 648.73 | 15.27  | 648    |     |      |
| 17.08   | 647.07    | 17.3   | 646.96 | 19.17  | 646    | 19.61  | 645.77 | 24.87  | 643.07 |     |      |
| 25.02   | 642.99    | 26.96  | 642    | 27.57  | 641.68 | 28.91  | 641    | 30.43  | 640.22 |     |      |
| 30.85   | 640       | 32.55  | 639.13 | 33.18  | 638.8  | 34.75  | 638    | 35.78  | 637.47 |     |      |
| 38.01   | 636.33    | 38.65  | 636    | 42.55  | 634    | 43.42  | 633.55 | 44.5   | 633    |     |      |
| 45.46   | 632.5     | 47.71  | 631.35 | 48.38  | 631    | 50.18  | 630    | 51.12  | 629.41 |     |      |
| 52.44   | 628.59    | 53.38  | 628    | 56.58  | 626    | 58.6   | 624.73 | 59.77  | 624    |     |      |
| 60.42   | 623.58    | 61.33  | 623    | 62.87  | 622    | 64.89  | 620.81 | 68.29  | 618.8  |     |      |
| 69.63   | 618       | 70.46  | 617.51 | 72.56  | 616.25 | 73.48  | 615.68 | 75.19  | 614.58 |     |      |
| 78.88   | 612.25    | 79.53  | 611.83 | 80.84  | 611    | 92.21  | 610    | 93.76  | 609.27 |     |      |
| 96.11   | 608.17    | 98.92  | 606.84 | 100.56 | 606    | 101.42 | 605.5  | 102.3  | 605    |     |      |
| 103.24  | 604.44    | 103.99 | 604    | 104.83 | 603.49 | 105.66 | 603    | 106.36 | 602.49 |     |      |
| 107.02  | 602       | 109.79 | 600.4  | 110.94 | 599.75 | 111.37 | 599.5  | 112.25 | 599    |     |      |
| 112.95  | 598.59    | 113.98 | 598    | 114.92 | 597.45 | 116.15 | 596.75 | 116.74 | 596.4  |     |      |
| 118.55  | 595.36    | 119.99 | 594.51 | 120.4  | 594.28 | 121.27 | 593.77 | 121.6  | 593.57 |     |      |
| 122.11  | 593.28    | 123.97 | 592.19 | 125.04 | 591.57 | 126.18 | 590.9  | 126.55 | 590.69 |     |      |
| 127.33  | 590.22    | 128.86 | 589.33 | 130.1  | 588.59 | 131.1  | 588    | 131.31 | 587.87 |     |      |
| 131.93  | 587.51    | 132.78 | 587    | 133.77 | 586.4  | 134.45 | 586    | 135.07 | 585.62 |     |      |
| 136.51  | 584.77    | 137.79 | 584    | 138.03 | 583.85 | 139.81 | 582.78 | 140.9  | 582.11 |     |      |
| 141.09  | 582       | 142.25 | 581.82 | 143.74 | 581.82 | 144.38 | 581.82 | 146.89 | 581.82 |     |      |
| 148.14  | 581.82    | 149.21 | 581.82 | 150.82 | 581.82 | 151.3  | 581.82 | 151.6  | 581.82 |     |      |
| 152.16  | 581.82    | 152.82 | 581.82 | 153.28 | 581.82 | 154.15 | 582    | 154.5  | 582.52 |     |      |
| 154.81  | 583       | 155.46 | 583.97 | 156.13 | 584.98 | 156.8  | 586    | 157.45 | 587    |     |      |
| 158.12  | 588.04    | 158.73 | 589    | 158.87 | 589.21 | 160    | 591    | 160.59 | 592    |     |      |
| 161.17  | 593       | 161.74 | 594    | 162.32 | 595    | 162.89 | 596    | 164.05 | 598    |     |      |
| 164.62  | 599       | 165.4  | 599.16 | 165.54 | 599.18 | 165.95 | 599.45 | 166.92 | 600.15 |     |      |
| 167.06  | 600.24    | 167.78 | 600.76 | 167.87 | 600.81 | 174.6  | 605    | 174.61 | 605    |     |      |
| 178.9   | 606.42    | 180.63 | 607    | 284.78 | 607    | 285.78 | 606.26 | 286.78 | 605.27 |     |      |
| 288.85  | 605.27    | 292.32 | 605.26 | 292.83 | 604.76 | 293.03 | 603.26 | 300    | 603.24 |     |      |

| LemonCreekPR.rep                    |          |                        |        |         |              |        |        |        |       |
|-------------------------------------|----------|------------------------|--------|---------|--------------|--------|--------|--------|-------|
| Manning's n Values                  |          |                        |        |         |              |        |        |        |       |
| Sta                                 | n Val    | Sta                    | n Val  | Sta     | n Val        | Sta    | n Val  | Sta    | n Val |
| 0                                   | .035     | 80.84                  | .024   | 92.21   | .07          | 142.25 | .04    | 153.28 | .07   |
| 165.54                              | .035     | 180.63                 | .024   |         |              |        |        |        |       |
| Bank Sta: Left                      | Right    | Lengths: Left Channel  |        | Right   | Coeff Contr. |        | Expan. |        |       |
| 92.21                               | 165.54   | 123.39                 | 123.28 | 123.92  | .1           |        | .3     |        |       |
| CROSS SECTION OUTPUT Profile #50-YR |          |                        |        |         |              |        |        |        |       |
| E.G. Elev (ft)                      | 595.46   | Element                |        | Left OB | Channel      |        |        |        |       |
| Right OB                            |          |                        |        |         |              |        |        |        |       |
| Vel Head (ft)                       | 0.47     | Wt. n-Val.             |        |         | 0.064        |        |        |        |       |
| W.S. Elev (ft)                      | 594.99   | Reach Len. (ft)        |        | 123.39  | 123.28       |        |        |        |       |
| 123.92                              |          |                        |        |         |              |        |        |        |       |
| Crit W.S. (ft)                      |          | Flow Area (sq ft)      |        |         | 367.50       |        |        |        |       |
| E.G. Slope (ft/ft)                  | 0.004403 | Area (sq ft)           |        |         | 367.50       |        |        |        |       |
| Q Total (cfs)                       | 2021.00  | Flow (cfs)             |        |         | 2021.00      |        |        |        |       |
| Top width (ft)                      | 43.13    | Top width (ft)         |        |         | 43.13        |        |        |        |       |
| Vel Total (ft/s)                    | 5.50     | Avg. Vel. (ft/s)       |        |         | 5.50         |        |        |        |       |
| Max Chl Dpth (ft)                   | 13.17    | Hydr. Depth (ft)       |        |         | 8.52         |        |        |        |       |
| Conv. Total (cfs)                   | 30457.4  | Conv. (cfs)            |        |         | 30457.4      |        |        |        |       |
| Length wtd. (ft)                    | 123.28   | Wetted Per. (ft)       |        |         | 53.90        |        |        |        |       |
| Min Ch El (ft)                      | 581.82   | Shear (lb/sq ft)       |        |         | 1.87         |        |        |        |       |
| Alpha                               | 1.00     | Stream Power (lb/ft s) |        | 300.00  | 0.00         |        |        |        |       |
| 0.00                                |          |                        |        |         |              |        |        |        |       |
| Frctn Loss (ft)                     | 0.83     | Cum Volume (acre-ft)   |        | 1.91    | 12.83        |        |        |        |       |
| 2.67                                |          |                        |        |         |              |        |        |        |       |
| C & E Loss (ft)                     | 0.03     | Cum SA (acres)         |        | 0.84    | 1.55         |        |        |        |       |
| 0.91                                |          |                        |        |         |              |        |        |        |       |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

Note: This may indicate the need for additional cross sections.  
Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2778.60

| INPUT        |           |       |        |       |        |       |        |       |        |      |
|--------------|-----------|-------|--------|-------|--------|-------|--------|-------|--------|------|
| Description: |           |       |        |       |        |       |        |       |        |      |
| Station      | Elevation | Data  | num=   | 139   | Sta    | Elev  | Sta    | Elev  | Sta    | Elev |
| Sta          | Elev      | Sta   | Elev   | Sta   | Elev   | Sta   | Elev   | Sta   | Elev   |      |
| 0            | 650.53    | 2.2   | 649.47 | 5.2   | 648    | 6.52  | 647.35 | 8.22  | 646.52 |      |
| 9.26         | 646       | 11.24 | 645    | 13.18 | 644    | 14.54 | 643.26 | 15.45 | 642.76 |      |
| 16.8         | 642       | 17.65 | 641.53 | 18.66 | 641    | 18.98 | 640.9  | 20.06 | 640.59 |      |
| 21.73        | 640.15    | 21.9  | 640.1  | 23.12 | 639.79 | 24.33 | 639.46 | 25.23 | 639.21 |      |
| 26.81        | 638.75    | 27.78 | 638.45 | 28.56 | 638.22 | 29.28 | 638    | 31.48 | 637.55 |      |
| 33.68        | 637.06    | 33.94 | 637    | 35.57 | 636    | 35.67 | 635.93 | 37.16 | 635    |      |

| LemonCreekPR.rep                    |          |                        |        |         |              |        |        |        |        |
|-------------------------------------|----------|------------------------|--------|---------|--------------|--------|--------|--------|--------|
| Manning's n Values                  |          |                        |        |         |              |        |        |        |        |
| Sta                                 | n Val    | Sta                    | n Val  | Sta     | n Val        | Sta    | n Val  | Sta    | n Val  |
| 38.42                               | 634.18   | 38.71                  | 634    | 39.96   | 633.38       | 40.72  | 633    | 42.33  | 632.3  |
| 45.15                               | 631.02   | 45.2                   | 631    | 46.77   | 630.15       | 47.07  | 630    | 48.04  | 629.44 |
| 49.25                               | 628.76   | 49.99                  | 628.38 | 51.73   | 627.52       | 52.74  | 627    | 53.46  | 626.59 |
| 54.86                               | 625.78   | 56.23                  | 625    | 56.42   | 624.91       | 58.23  | 624    | 58.55  | 623.8  |
| 59.85                               | 623      | 60.54                  | 622.63 | 61.7    | 622          | 63.22  | 621.15 | 64.92  | 620.17 |
| 65.22                               | 620      | 65.99                  | 619.53 | 66.64   | 619.18       | 67.57  | 618.64 | 67.8   | 618.52 |
| 68.65                               | 618      | 68.74                  | 618    | 69.28   | 617.71       | 74.24  | 615    | 74.56  | 614.8  |
| 75.15                               | 614.46   | 75.91                  | 614    | 77.29   | 613          | 78.35  | 612.22 | 79.17  | 611.63 |
| 81.07                               | 610.22   | 82.4                   | 609.22 | 83.1    | 608.69       | 84.02  | 608    | 85.34  | 607    |
| 88.39                               | 606.71   | 96.3                   | 606    | 99.2    | 605.37       | 99.83  | 605.26 | 101.08 | 605.02 |
| 101.18                              | 604.99   | 103.11                 | 604    | 105.4   | 603.29       | 106.47 | 603    | 108.31 | 602.49 |
| 109.97                              | 602      | 110.25                 | 601.86 | 112.88  | 600.53       | 113.9  | 600    | 115.09 | 599.41 |
| 115.9                               | 599      | 119.14                 | 597.38 | 121.43  | 596.22       | 122.68 | 595.59 | 123.84 | 595    |
| 124.56                              | 594.64   | 127.26                 | 593.26 | 128.05  | 592.86       | 129.73 | 592    | 130.77 | 591.47 |
| 132.14                              | 590.76   | 133.62                 | 590    | 133.9   | 589.86       | 136.66 | 588.42 | 139.07 | 587.17 |
| 139.69                              | 586.85   | 148.67                 | 579.35 | 150.79  | 579.35       | 157.76 | 586.7  | 158.21 | 587    |
| 158.6                               | 587.28   | 159.62                 | 588    | 160.54  | 588.67       | 161.01 | 589    | 162.47 | 590.06 |
| 163.78                              | 591      | 164.19                 | 591.3  | 165.16  | 592          | 166.08 | 592.66 | 167.85 | 593.94 |
| 167.96                              | 594.01   | 168.32                 | 594.29 | 169.22  | 594.96       | 169.26 | 595    | 169.87 | 595.07 |
| 171.91                              | 595.99   | 177.31                 | 598.42 | 178.25  | 598.84       | 178.32 | 598.88 | 180.81 | 600    |
| 183.18                              | 601.07   | 186.39                 | 602.56 | 188.78  | 603.68       | 191.57 | 605    | 193.75 | 606    |
| 223.92                              | 606      | 225.45                 | 605.69 | 232.18  | 605          | 300    | 605    |        |        |
| Manning's n Values                  |          |                        |        |         |              |        |        |        |        |
| Sta                                 | n Val    | Sta                    | n Val  | Sta     | n Val        | Sta    | n Val  | Sta    | n Val  |
| 0                                   | .035     | 85.34                  | .024   | 99.83   | .07          | 169.87 | .035   | 193.75 | .024   |
| Bank Sta: Left                      | Right    | Lengths: Left Channel  |        | Right   | Coeff Contr. |        | Expan. |        |        |
| 99.83                               | 169.87   | 80.84                  | 92.69  | 99.08   | .1           |        | .3     |        |        |
| CROSS SECTION OUTPUT Profile #50-YR |          |                        |        |         |              |        |        |        |        |
| E.G. Elev (ft)                      | 594.60   | Element                |        | Left OB | Channel      |        |        |        |        |
| Right OB                            |          |                        |        |         |              |        |        |        |        |
| Vel Head (ft)                       | 0.78     | Wt. n-Val.             |        |         | 0.070        |        |        |        |        |
| W.S. Elev (ft)                      | 593.81   | Reach Len. (ft)        |        | 80.84   | 92.69        |        |        |        |        |
| 99.08                               |          |                        |        |         |              |        |        |        |        |
| Crit W.S. (ft)                      |          | Flow Area (sq ft)      |        |         | 284.35       |        |        |        |        |
| E.G. Slope (ft/ft)                  | 0.011443 | Area (sq ft)           |        |         | 284.35       |        |        |        |        |
| Q Total (cfs)                       | 2021.00  | Flow (cfs)             |        |         | 2021.00      |        |        |        |        |
| Top width (ft)                      | 41.50    | Top width (ft)         |        |         | 41.50        |        |        |        |        |
| Vel Total (ft/s)                    | 7.11     | Avg. Vel. (ft/s)       |        |         | 7.11         |        |        |        |        |
| Max Chl Dpth (ft)                   | 14.46    | Hydr. Depth (ft)       |        |         | 6.85         |        |        |        |        |
| Conv. Total (cfs)                   | 18892.6  | Conv. (cfs)            |        |         | 18892.6      |        |        |        |        |
| Length wtd. (ft)                    | 92.69    | Wetted Per. (ft)       |        |         | 51.35        |        |        |        |        |
| Min Ch El (ft)                      | 579.35   | Shear (lb/sq ft)       |        |         | 3.96         |        |        |        |        |
| Alpha                               | 1.00     | Stream Power (lb/ft s) |        | 300.00  | 0.00         |        |        |        |        |
| 0.00                                |          |                        |        |         |              |        |        |        |        |
| Frctn Loss (ft)                     | 1.44     | Cum Volume (acre-ft)   |        | 1.91    | 11.91        |        |        |        |        |
| 2.67                                |          |                        |        |         |              |        |        |        |        |
| C & E Loss (ft)                     | 0.04     | Cum SA (acres)         |        | 0.84    | 1.43         |        |        |        |        |
| 0.91                                |          |                        |        |         |              |        |        |        |        |

LemonCreekPR.rep  
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: LemonCreek  
REACH: Reach1 RS: 2685.91

| INPUT Description: |           |        |        |        |        |        |        |        |        |
|--------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Station            | Elevation | Data   | num=   | 137    |        |        |        |        |        |
| Sta                | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0                  | 629.1     | .49    | 628.79 | 1.76   | 628    | 3.38   | 627    | 3.71   | 626.8  |
| 5.01               | 626       | 6.18   | 625.29 | 6.65   | 625    | 8.39   | 623.98 | 9.32   | 623.49 |
| 10.41              | 623       | 10.82  | 622.82 | 12.77  | 622    | 14.67  | 621.22 | 15.19  | 621    |
| 17.67              | 619.98    | 20.03  | 619    | 22.41  | 618    | 24.76  | 617    | 26.22  | 616.37 |
| 27.23              | 615.93    | 27.52  | 615.81 | 29.36  | 615    | 30.64  | 614.44 | 31.63  | 614    |
| 32.58              | 613.57    | 34.44  | 612.71 | 35.9   | 612    | 36.61  | 611.65 | 37.91  | 611    |
| 38.86              | 610.51    | 39.88  | 610    | 40.04  | 609.93 | 42.27  | 609    | 47.95  | 608.28 |
| 50.01              | 608       | 51.73  | 607.85 | 54.41  | 607.62 | 55.38  | 607.55 | 57.03  | 607.41 |
| 58.76              | 607.31    | 59.64  | 607.24 | 62.13  | 607.1  | 62.4   | 607.08 | 64.02  | 607    |
| 64.94              | 606.94    | 65.07  | 606.94 | 67     | 606.82 | 67.46  | 606.78 | 69.05  | 606.69 |
| 69.87              | 606.62    | 71.06  | 606.55 | 72.23  | 606.45 | 73.01  | 606.4  | 74.48  | 606.28 |
| 74.88              | 606.25    | 76.55  | 606.11 | 77.7   | 606    | 77.82  | 606    | 78.52  | 605.86 |
| 81.74              | 605       | 84.17  | 604.22 | 84.85  | 604    | 87.98  | 603    | 90.45  | 602.19 |
| 92.1               | 601.67    | 94.25  | 601    | 96.47  | 600.38 | 97.41  | 600.14 | 98.02  | 600    |
| 98.25              | 600       | 99.38  | 599.81 | 99.47  | 599.79 | 100.51 | 599.69 | 102.02 | 599.56 |
| 103.27             | 599.47    | 104.08 | 599.42 | 104.97 | 599.36 | 106.83 | 599.23 | 108.65 | 599.09 |
| 110.3              | 598.95    | 110.37 | 598.95 | 113.11 | 598.71 | 113.4  | 598.69 | 114.57 | 598.56 |
| 115.49             | 598.42    | 116.72 | 598.21 | 117.56 | 598    | 117.74 | 598    | 119.47 | 597.27 |
| 120.13             | 597       | 121.4  | 596.35 | 122.12 | 596    | 123.99 | 595.04 | 124.3  | 594.89 |
| 126.01             | 594       | 127.92 | 593    | 129.8  | 592    | 130.8  | 591.45 | 131.6  | 591    |
| 132.91             | 590.28    | 133.41 | 590    | 134.97 | 589.17 | 137.13 | 588.06 | 137.43 | 587.9  |
| 139.2              | 587       | 140    | 586.59 | 143.07 | 585    | 144.94 | 584    | 150    | 577.5  |
| 155                | 584       | 155.33 | 584.19 | 156.51 | 585    | 157.21 | 585.36 | 158.27 | 585.9  |
| 158.65             | 586.1     | 160.43 | 587    | 162.31 | 587.94 | 162.58 | 588.08 | 165.71 | 589.67 |
| 166.69             | 590.16    | 168.32 | 591    | 169.76 | 591.74 | 170.26 | 592    | 171.93 | 592.89 |
| 172.13             | 593       | 173.89 | 593.99 | 174.65 | 594.35 | 175.4  | 594.69 | 175.58 | 594.76 |
| 176.08             | 595       | 182.07 | 598.09 | 185.82 | 600    | 189.1  | 601.65 | 190.54 | 602.39 |
| 191.67             | 603       | 300    | 603    |        |        |        |        |        |        |

| Manning's n Values |       |       |       |       |       |        |       |        |       |
|--------------------|-------|-------|-------|-------|-------|--------|-------|--------|-------|
| Sta                | n Val | Sta   | n Val | Sta   | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .035  | 42.27 | .024  | 77.82 | .035  | 116.72 | .07   | 173.89 | .035  |
| 191.67             | .024  |       |       |       |       |        |       |        |       |

| Bank Sta: | Left   | Right  | Lengths: | Left Channel | Right | Coeff | Contr. | Expan. |
|-----------|--------|--------|----------|--------------|-------|-------|--------|--------|
|           | 116.72 | 173.89 |          | 32.36        | 25    |       | .1     | .3     |

# CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 593.11   | Element           | Left OB | Channel |
|--------------------|----------|-------------------|---------|---------|
| Right OB           |          |                   |         |         |
| Vel Head (ft)      | 1.19     | wt. n-Val.        |         | 0.070   |
| W.S. Elev (ft)     | 591.92   | Reach Len. (ft)   | 32.36   | 25.00   |
| 27.33              |          |                   |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft) |         | 230.78  |
| E.G. Slope (ft/ft) | 0.022428 | Area (sq ft)      |         | 230.78  |
| Q Total (cfs)      | 2021.00  | Flow (cfs)        |         | 2021.00 |

| LemonCreekPR.rep  |         |                        |         |
|-------------------|---------|------------------------|---------|
| Top width (ft)    | 40.17   | Top width (ft)         | 40.17   |
| Vel Total (ft/s)  | 8.76    | Avg. Vel. (ft/s)       | 8.76    |
| Max Chl Dpth (ft) | 14.42   | Hydr. Depth (ft)       | 5.75    |
| Conv. Total (cfs) | 13495.0 | Conv. (cfs)            | 13495.0 |
| Length wtd. (ft)  | 25.00   | wetted Per. (ft)       | 50.47   |
| Min Ch El (ft)    | 577.50  | Shear (lb/sq ft)       | 6.40    |
| Alpha             | 1.00    | Stream Power (lb/ft s) | 300.00  |
| 0.00              |         |                        |         |
| Frctn Loss (ft)   | 0.28    | Cum Volume (acre-ft)   | 1.91    |
| 2.67              |         |                        |         |
| C & E Loss (ft)   | 0.04    | Cum SA (acres)         | 0.84    |
| 0.91              |         |                        |         |

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: LemonCreek  
REACH: Reach1 RS: 2660.91

| INPUT Description: |           |        |        |        |        |        |        |        |        |
|--------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Station            | Elevation | Data   | num=   | 149    |        |        |        |        |        |
| Sta                | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0                  | 630.3     | .5     | 630    | 1.23   | 629.55 | 2.14   | 629    | 3.24   | 628.32 |
| 3.77               | 628       | 5.39   | 627    | 6.54   | 626.3  | 7.02   | 626    | 8.69   | 625    |
| 10.42              | 624       | 11.74  | 623.31 | 12.26  | 623    | 13.94  | 622.18 | 14.28  | 622    |
| 15.99              | 621.18    | 16.35  | 621    | 18.44  | 620    | 19.2   | 619.64 | 20.53  | 619    |
| 22.56              | 618       | 24.21  | 617.16 | 24.54  | 617    | 25.29  | 616.67 | 27.75  | 615.64 |
| 29.24              | 615       | 30.65  | 614.38 | 32.5   | 613.54 | 33.71  | 613    | 35.84  | 612.04 |
| 38.13              | 611       | 40.35  | 610    | 40.67  | 609.85 | 42.56  | 609    | 46.2   | 608    |
| 46.65              | 608       | 56.87  | 607.62 | 64.61  | 607.35 | 74.14  | 607.01 | 74.56  | 607    |
| 76.89              | 606.01    | 76.97  | 605.97 | 79.32  | 605    | 79.79  | 604.8  | 81.72  | 604    |
| 82.16              | 603.82    | 83.21  | 603.38 | 83.86  | 603.1  | 86.07  | 602.2  | 86.55  | 602    |
| 88.85              | 601.13    | 89.18  | 601    | 90.26  | 600.68 | 92.5   | 600    | 94.22  | 599.4  |
| 95.41              | 599       | 96.87  | 598.4  | 97.87  | 598    | 100.42 | 596.99 | 103.13 | 596    |
| 105.91             | 595       | 106.01 | 595    | 108.21 | 594.49 | 108.84 | 594.38 | 109.88 | 594.21 |
| 110.11             | 594.16    | 111.07 | 594    | 113.04 | 593.63 | 113.35 | 593.58 | 114.34 | 593.39 |
| 115.67             | 593.14    | 116.47 | 593.01 | 116.49 | 593    | 117.08 | 593    | 117.92 | 592.87 |
| 117.98             | 592.85    | 118.71 | 592.76 | 120.5  | 592.46 | 122.85 | 592.06 | 123.22 | 592    |
| 125.25             | 591.61    | 127.02 | 591.28 | 128.3  | 591.05 | 128.38 | 591.03 | 129.6  | 590.82 |
| 130.73             | 590.61    | 132.33 | 590.12 | 132.72 | 590    | 132.95 | 590    | 134.81 | 589    |
| 135.4              | 588.54    | 136.04 | 588    | 136.86 | 587.27 | 137.46 | 586.76 | 138.33 | 586    |
| 139                | 585.43    | 143    | 577    | 143.04 | 577    | 144    | 577    | 144.21 | 577    |
| 144.87             | 577       | 145.42 | 577    | 146.65 | 577    | 147.46 | 577    | 149.07 | 577    |
| 149.12             | 577       | 150.2  | 577    | 150.62 | 577    | 151.35 | 577    | 151.45 | 577    |
| 152.58             | 577       | 153.57 | 577    | 154.33 | 577    | 154.63 | 577    | 155.38 | 577    |
| 155.63             | 577       | 156    | 577    | 156.22 | 577    | 156.95 | 577    | 157    | 577    |
| 157.92             | 585.34    | 158.51 | 586    | 159.05 | 586.35 | 159.67 | 586.73 | 159.86 | 586.82 |
| 161.07             | 587.26    | 162.59 | 587.79 | 163.22 | 588    | 164.36 | 588.39 | 166.41 | 589.1  |
| 167.73             | 589.56    | 169.55 | 590.21 | 171.7  | 591    | 172.22 | 591.21 | 174.13 | 592.01 |
| 176.11             | 592.7     | 176.42 | 592.82 | 178.02 | 593.48 | 179.41 | 594.08 | 181.5  | 595    |
| 184.82             | 596.56    | 187.35 | 597.76 | 191.29 | 599.66 | 192.49 | 600.26 | 198.01 | 603    |
| 291.83             | 603       | 298.05 | 600.01 | 298.09 | 600.02 | 300    | 601.61 |        |        |

LemonCreekPR.rep

Manning's n Values  
Sta n Val  
0 .035  
198.01 .024

num= 6  
Sta n Val  
46.2 .024  
74.56 .035  
132.33

Bank Sta: Left Right Lengths: Left Channel Right  
132.33 174.13 168.68 158.51 172.97

Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 143 603 F  
157 300 603 F

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 592.79   | Element                | Left OB | Channel |
|--------------------|----------|------------------------|---------|---------|
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 1.61     | Wt. n-Val.             |         | 0.070   |
| W.S. Elev (ft)     | 591.18   | Reach Len. (ft)        | 168.68  | 158.51  |
| 172.97             |          |                        |         |         |
| Crit W.S. (ft)     | 585.66   | Flow Area (sq ft)      |         | 198.52  |
| E.G. Slope (ft/ft) | 0.006701 | Area (sq ft)           | 2.20    | 304.73  |
| Q Total (cfs)      | 2021.00  | Flow (cfs)             |         | 2021.00 |
| Top Width (ft)     | 44.57    | Top Width (ft)         | 4.75    | 39.82   |
| Vel Total (ft/s)   | 10.18    | Avg. Vel. (ft/s)       |         | 10.18   |
| Max Chl Dpth (ft)  | 14.18    | Hydr. Depth (ft)       |         | 14.18   |
| Conv. Total (cfs)  | 24688.5  | conv. (cfs)            |         | 24688.5 |
| Length wtd. (ft)   | 158.51   | Wetted Per. (ft)       |         | 14.00   |
| Min Ch El (ft)     | 577.00   | Shear (lb/sq ft)       |         | 5.93    |
| Alpha              | 1.00     | Stream Power (lb/ft s) | 300.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    |          | Cum Volume (acre-ft)   | 1.91    | 11.21   |
| 2.67               |          |                        |         |         |
| C & E Loss (ft)    |          | Cum SA (acres)         | 0.84    | 1.32    |
| 0.91               |          |                        |         |         |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CULVERT

RIVER: LemonCreek  
REACH: Reach1 RS: 2577.93

INPUT  
Description: Culvert #4  
Distance from Upstream XS = 21.18  
Deck/Roadway Width = 123.36  
Weir Coefficient = 2.6  
Upstream Deck/Roadway Coordinates  
num= 2  
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
74.56 607 198.01 603

LemonCreekPR.rep

Upstream Bridge Cross Section Data  
Station Elevation Data num= 149

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 630.3  | 5      | 630    | 1.23   | 629.55 | 2.14   | 629    | 3.24   | 628.32 |
| 3.77   | 628    | 5.39   | 627    | 6.54   | 626.3  | 7.02   | 626    | 8.69   | 625    |
| 10.42  | 624    | 11.74  | 623.31 | 12.26  | 623    | 13.94  | 622.18 | 14.28  | 622    |
| 15.99  | 621.18 | 16.35  | 621    | 18.44  | 620    | 19.2   | 619.64 | 20.53  | 619    |
| 22.56  | 618    | 24.21  | 617.16 | 24.54  | 617    | 25.29  | 616.67 | 27.75  | 615.64 |
| 29.24  | 615    | 30.65  | 614.38 | 32.5   | 613.54 | 33.71  | 613    | 35.84  | 612.04 |
| 38.13  | 611    | 40.35  | 610    | 40.67  | 609.85 | 42.56  | 609    | 46.2   | 608    |
| 46.65  | 608    | 56.87  | 607.62 | 64.61  | 607.35 | 74.14  | 607.01 | 74.56  | 607    |
| 76.89  | 606.01 | 76.97  | 605.97 | 79.32  | 605    | 79.79  | 604.8  | 81.72  | 604    |
| 82.16  | 603.82 | 83.21  | 603.38 | 83.86  | 603.1  | 86.07  | 602.2  | 86.55  | 602    |
| 88.85  | 601.13 | 89.18  | 601    | 90.26  | 600.68 | 92.5   | 600    | 94.22  | 599.4  |
| 95.41  | 599    | 96.87  | 598.4  | 97.87  | 598    | 100.42 | 596.99 | 103.13 | 596    |
| 105.91 | 595    | 106.01 | 595    | 108.21 | 594.49 | 108.84 | 594.38 | 109.88 | 594.21 |
| 110.11 | 594.16 | 111.07 | 594    | 113.04 | 593.63 | 113.35 | 593.58 | 114.34 | 593.39 |
| 115.67 | 593.14 | 116.47 | 593.01 | 116.49 | 593    | 117.08 | 593    | 117.92 | 592.87 |
| 117.98 | 592.85 | 118.71 | 592.76 | 120.5  | 592.46 | 122.85 | 592.06 | 123.22 | 592    |
| 125.25 | 591.61 | 127.02 | 591.28 | 128.3  | 591.05 | 128.38 | 591.03 | 129.6  | 590.82 |
| 130.73 | 590.61 | 132.33 | 590.12 | 132.72 | 590    | 132.95 | 590    | 134.81 | 589    |
| 135.4  | 588.54 | 136.04 | 588    | 136.86 | 587.27 | 137.46 | 586.76 | 138.33 | 586    |
| 139    | 585.43 | 143    | 577    | 143.04 | 577    | 144    | 577    | 144.21 | 577    |
| 144.87 | 577    | 145.42 | 577    | 146.65 | 577    | 147.46 | 577    | 149.07 | 577    |
| 149.12 | 577    | 150.2  | 577    | 150.62 | 577    | 151.35 | 577    | 151.45 | 577    |
| 152.58 | 577    | 153.57 | 577    | 154.33 | 577    | 154.63 | 577    | 155.38 | 577    |
| 155.63 | 577    | 156    | 577    | 156.22 | 577    | 156.95 | 577    | 157    | 577    |
| 157.92 | 585.34 | 158.51 | 586    | 159.05 | 586.35 | 159.67 | 586.73 | 159.86 | 586.82 |
| 161.07 | 587.26 | 162.59 | 587.79 | 163.22 | 588    | 164.36 | 588.39 | 166.41 | 589.1  |
| 167.73 | 589.56 | 169.55 | 590.21 | 171.7  | 591    | 172.22 | 591.21 | 174.13 | 592.01 |
| 176.11 | 592.7  | 176.42 | 592.82 | 178.02 | 593.48 | 179.41 | 594.08 | 181.5  | 595    |
| 184.82 | 596.56 | 187.35 | 597.76 | 191.29 | 599.66 | 192.49 | 600.26 | 198.01 | 603    |
| 291.83 | 603    | 298.05 | 600.01 | 298.09 | 600.02 | 300    | 601.61 |        |        |

Manning's n Values  
Sta n Val  
0 .035  
198.01 .024

num= 6  
Sta n Val  
46.2 .035  
74.56 .035  
132.33

Bank Sta: Left Right  
132.33 174.13

Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 143 603 F  
157 300 603 F

Downstream Deck/Roadway Coordinates  
num= 2  
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
98.04 605 223.58 598

Downstream Bridge Cross Section Data  
Station Elevation Data num= 147

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 615    | 55.11  | 615    | 55.21  | 615.15 | 55.54  | 615.03 | 55.61  | 615    |
| 56.63  | 614.48 | 57.59  | 614    | 58.28  | 613.65 | 59.57  | 613    | 60.06  | 612.76 |
| 61.57  | 612    | 62     | 611.79 | 63.57  | 611    | 65.27  | 610.15 | 65.57  | 610    |
| 65.81  | 609.88 | 67.55  | 609    | 69.49  | 608.09 | 69.68  | 608    | 70.11  | 607.83 |
| 72.17  | 607    | 73.64  | 606.41 | 74.66  | 606    | 80.04  | 605.57 | 80.12  | 605.57 |
| 80.2   | 605.56 | 80.24  | 605.56 | 85.3   | 605.37 | 95.13  | 605.05 | 97.62  | 605.01 |
| 98.04  | 605    | 98.3   | 604.82 | 99.45  | 604    | 100.09 | 603.55 | 100.87 | 603    |
| 101.76 | 602.37 | 102.27 | 602    | 103.42 | 601.17 | 103.66 | 601    | 104.28 | 600.54 |
| 105.01 | 600    | 105.22 | 599.84 | 106.34 | 599    | 107.4  | 598.19 | 107.66 | 598    |
| 108    | 597.74 | 108.98 | 597    | 109.66 | 596.48 | 110.3  | 596    | 110.83 | 595.6  |
| 111.62 | 595    | 112.5  | 594.33 | 112.94 | 594    | 113.48 | 593.59 | 114.26 | 593    |

| LemonCreekPR.rep |        |        |        |        |        |        |        |        |        |  |  |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|--|
| 115.44           | 592.1  | 115.58 | 592    | 115.77 | 591.86 | 116.9  | 591    | 117.54 | 590.52 |  |  |
| 118.23           | 590    | 119.37 | 589.14 | 119.55 | 589    | 119.64 | 588.93 | 120.87 | 588    |  |  |
| 121.3            | 587.68 | 122.2  | 587    | 123.13 | 586.3  | 123.52 | 586    | 124.24 | 585.46 |  |  |
| 124.85           | 585    | 125.15 | 584.77 | 126.17 | 584    | 126.43 | 583.7  | 127.06 | 583.03 |  |  |
| 127.09           | 583    | 134.26 | 582.35 | 138.38 | 582.03 | 138.85 | 582    | 142.07 | 582    |  |  |
| 142.62           | 581.58 | 143.14 | 581.18 | 143.38 | 581    | 143.64 | 580.84 | 145.31 | 576    |  |  |
| 146.11           | 576    | 146.31 | 576    | 146.33 | 576    | 146.8  | 576    | 147.3  | 576    |  |  |
| 147.43           | 576    | 147.91 | 576    | 148.02 | 576    | 155.77 | 576    | 155.88 | 576    |  |  |
| 157.06           | 576    | 157.31 | 576    | 158.31 | 576    | 159.18 | 576    | 159.31 | 576    |  |  |
| 162.03           | 581    | 162.8  | 581.62 | 163.26 | 582    | 164.36 | 582.9  | 164.48 | 583    |  |  |
| 164.63           | 583.13 | 165.67 | 584    | 166.81 | 584.99 | 166.82 | 585    | 166.85 | 585.02 |  |  |
| 168.01           | 586    | 168.54 | 586    | 168.67 | 586.09 | 170.01 | 587    | 170.84 | 587.56 |  |  |
| 171.5            | 588    | 172.81 | 588.86 | 173.03 | 589    | 173.36 | 589.2  | 173.65 | 589.37 |  |  |
| 174.51           | 589.89 | 174.91 | 590.08 | 176.04 | 590.63 | 177.93 | 591.55 | 178.65 | 591.89 |  |  |
| 178.78           | 591.95 | 179.47 | 592.28 | 179.95 | 592.5  | 181.03 | 593    | 195.69 | 593    |  |  |
| 203.37           | 594.13 | 204.05 | 594.26 | 205.55 | 594.51 | 208.99 | 595.14 | 215.45 | 596.33 |  |  |
| 221.53           | 597.56 | 222.27 | 597.71 | 223.58 | 598    | 238.68 | 598    | 241.07 | 598    |  |  |
| 251.07           | 598    | 268.78 | 598    | 270.31 | 598    | 274.51 | 598.35 | 281.72 | 598.71 |  |  |
| 287.7            | 599.2  | 300    | 600.13 |        |        |        |        |        |        |  |  |

| Manning's n Values |       |        |       |        |       |        |       |        |       |     |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|-----|-------|
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta | n Val |
| 0                  | .024  | 55.21  | .035  | 74.66  | .024  | 97.62  | .035  | 127.06 | .024  |     |       |
| 142.07             | .07   | 174.91 | .035  | 181.03 | .024  | 195.69 | .035  | 223.58 | .024  |     |       |
| 270.31             | .035  |        |       |        |       |        |       |        |       |     |       |

Bank Sta: Left 127.06 Right 174.91 Coeff Contr. .1 Expan. .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 0 145.31 593 F  
 159.31 300 593 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .98  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Culverts = 1

| Culvert Name                                   | Shape  | Rise   | Span     |
|------------------------------------------------|--------|--------|----------|
| Culvert #1                                     | Box    | 10     | 14       |
| FHWA Chart # 8 - Flared wingwalls              |        |        |          |
| FHWA Scale # 1 - Wingwall flared 30 to 75 deg. |        |        |          |
| Solution Criteria = Highest U.S. EG            |        |        |          |
| Culvert Upstrm Dist                            | Length | Top n  | Bottom n |
| Exit Loss Coef                                 |        |        |          |
| 1                                              | 21.18  | 123.36 | .024     |
|                                                |        | .024   | 0        |
|                                                |        |        | .5       |

Upstream Elevation = 577  
 Centerline Station = 150  
 Downstream Elevation = 576  
 Centerline Station = 152.31

CROSS SECTION

RIVER: LemonCreek  
 REACH: Reach1 RS: 2502.40

INPUT  
 Description:  
 Station Elevation Data num= 147

| LemonCreekPR.rep |        |        |        |        |        |        |        |        |        |     |      |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| Sta              | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
| 0                | 615    | 55.11  | 615    | 55.21  | 615.15 | 55.54  | 615.03 | 55.61  | 615    |     |      |
| 56.63            | 614.48 | 57.59  | 614    | 58.28  | 613.65 | 59.57  | 613    | 60.06  | 612.76 |     |      |
| 61.57            | 612    | 62     | 611.79 | 63.57  | 611    | 65.27  | 610.15 | 65.57  | 610    |     |      |
| 65.81            | 609.88 | 67.55  | 609    | 69.49  | 608.09 | 69.68  | 608    | 70.11  | 607.83 |     |      |
| 72.17            | 607    | 73.64  | 606.41 | 74.66  | 606    | 80.04  | 605.57 | 80.12  | 605.57 |     |      |
| 80.2             | 605.56 | 80.24  | 605.56 | 85.3   | 605.37 | 95.13  | 605.05 | 97.62  | 605.01 |     |      |
| 98.04            | 605    | 98.3   | 604.82 | 99.45  | 604    | 100.09 | 603.55 | 100.87 | 603    |     |      |
| 101.76           | 602.37 | 102.27 | 602    | 103.42 | 601.17 | 103.66 | 601    | 104.28 | 600.54 |     |      |
| 105.01           | 600    | 105.22 | 599.84 | 106.34 | 599    | 107.4  | 598.19 | 107.66 | 598    |     |      |
| 108              | 597.74 | 108.98 | 597    | 109.66 | 596.48 | 110.3  | 596    | 110.83 | 595.6  |     |      |
| 111.62           | 595    | 112.5  | 594.33 | 112.94 | 594    | 113.48 | 593.59 | 114.26 | 593    |     |      |
| 115.44           | 592.1  | 115.58 | 592    | 115.77 | 591.86 | 116.9  | 591    | 117.54 | 590.52 |     |      |
| 118.23           | 590    | 119.37 | 589.14 | 119.55 | 589    | 119.64 | 588.93 | 120.87 | 588    |     |      |
| 121.3            | 587.68 | 122.2  | 587    | 123.13 | 586.3  | 123.52 | 586    | 124.24 | 585.46 |     |      |
| 124.85           | 585    | 125.15 | 584.77 | 126.17 | 584    | 126.43 | 583.7  | 127.06 | 583.03 |     |      |
| 127.09           | 583    | 134.26 | 582.35 | 138.38 | 582.03 | 138.85 | 582    | 142.07 | 582    |     |      |
| 142.62           | 581.58 | 143.14 | 581.18 | 143.38 | 581    | 143.64 | 580.84 | 145.31 | 576    |     |      |
| 146.11           | 576    | 146.31 | 576    | 146.33 | 576    | 146.8  | 576    | 147.3  | 576    |     |      |
| 147.43           | 576    | 147.91 | 576    | 148.02 | 576    | 155.77 | 576    | 155.88 | 576    |     |      |
| 157.06           | 576    | 157.31 | 576    | 158.31 | 576    | 159.18 | 576    | 159.31 | 576    |     |      |
| 162.03           | 581    | 162.8  | 581.62 | 163.26 | 582    | 164.36 | 582.9  | 164.48 | 583    |     |      |
| 164.63           | 583.13 | 165.67 | 584    | 166.81 | 584.99 | 166.82 | 585    | 166.85 | 585.02 |     |      |
| 168.01           | 586    | 168.54 | 586    | 168.67 | 586.09 | 170.01 | 587    | 170.84 | 587.56 |     |      |
| 171.5            | 588    | 172.81 | 588.86 | 173.03 | 589    | 173.36 | 589.2  | 173.65 | 589.37 |     |      |
| 174.51           | 589.89 | 174.91 | 590.08 | 176.04 | 590.63 | 177.93 | 591.55 | 178.65 | 591.89 |     |      |
| 178.78           | 591.95 | 179.47 | 592.28 | 179.95 | 592.5  | 181.03 | 593    | 195.69 | 593    |     |      |
| 203.37           | 594.13 | 204.05 | 594.26 | 205.55 | 594.51 | 208.99 | 595.14 | 215.45 | 596.33 |     |      |
| 221.53           | 597.56 | 222.27 | 597.71 | 223.58 | 598    | 238.68 | 598    | 241.07 | 598    |     |      |
| 251.07           | 598    | 268.78 | 598    | 270.31 | 598    | 274.51 | 598.35 | 281.72 | 598.71 |     |      |
| 287.7            | 599.2  | 300    | 600.13 |        |        |        |        |        |        |     |      |

| Manning's n Values |       |        |       |        |       |        |       |        |       |     |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|-----|-------|
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta | n Val |
| 0                  | .024  | 55.21  | .035  | 74.66  | .024  | 97.62  | .035  | 127.06 | .024  |     |       |
| 142.07             | .07   | 174.91 | .035  | 181.03 | .024  | 195.69 | .035  | 223.58 | .024  |     |       |
| 270.31             | .035  |        |       |        |       |        |       |        |       |     |       |

| Bank Sta: Left   | Right  | Lengths: Left | Channel   | Right | Coeff Contr. | Expan. |
|------------------|--------|---------------|-----------|-------|--------------|--------|
| 127.06           | 174.91 | 35            | 30.97     | 31.13 | .1           | .3     |
| Ineffective Flow |        |               |           |       |              |        |
| Sta L            | Sta R  | Elev          | Permanent |       |              |        |
| 0                | 145.31 | 593           | F         |       |              |        |
| 159.31           | 300    | 593           | F         |       |              |        |

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft)     | 588.97   | Element           | Left OB | Channel |
|--------------------|----------|-------------------|---------|---------|
| Right OB           |          |                   |         |         |
| Vel Head (ft)      | 4.32     | wt. n-Val.        |         | 0.070   |
| W.S. Elev (ft)     | 584.65   | Reach Len. (ft)   | 35.00   | 30.97   |
| 31.13              |          |                   |         |         |
| Crit W.S. (ft)     | 584.65   | Flow Area (sq ft) |         | 121.10  |
| E.G. slope (ft/ft) | 0.034809 | Area (sq ft)      | 1.30    | 195.56  |
| Q Total (cfs)      | 2021.00  | Flow (cfs)        |         | 2021.00 |
| Top Width (ft)     | 41.11    | Top Width (ft)    | 1.75    | 39.36   |
| Vel Total (ft/s)   | 16.69    | Avg. Vel. (ft/s)  |         | 16.69   |
| Max Chl Dpth (ft)  | 8.65     | Hydr. Depth (ft)  |         | 8.65    |

|                   |         |                                 |             |
|-------------------|---------|---------------------------------|-------------|
| Conv. Total (cfs) | 10832.3 | LemonCreekPR.rep<br>Conv. (cfs) | 10832.3     |
| Length wtd. (ft)  | 31.50   | Wetted Per. (ft)                | 14.00       |
| Min Ch El (ft)    | 576.00  | Shear (lb/sq ft)                | 18.80       |
| Alpha<br>0.00     | 1.00    | Stream Power (lb/ft s)          | 300.00 0.00 |
| Frctn Loss (ft)   | 0.42    | Cum Volume (acre-ft)            | 1.91 10.62  |
| C & E Loss (ft)   | 1.05    | Cum SA (acres)                  | 0.82 1.18   |

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.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION

RIVER: LemonCreek  
 REACH: Reach1 RS: 2471.43

## INPUT Description:

| Station | Elevation | Data   | num=   | 150    |        |        |        |        |        |  |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| Sta     | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |  |
| 0       | 615       | 51.68  | 615    | 52.06  | 614.78 | 52.23  | 614.7  | 53.82  | 613.86 |  |
| 55.35   | 613.06    | 56.84  | 612.35 | 57.57  | 612    | 59.27  | 611.17 | 59.65  | 611    |  |
| 61.38   | 610.25    | 61.72  | 610.1  | 61.97  | 610    | 63.17  | 609.49 | 64.3   | 609    |  |
| 65.12   | 608.65    | 66.62  | 608    | 67.76  | 607.5  | 68.88  | 607    | 70.06  | 606.48 |  |
| 71.14   | 606       | 72.75  | 605.29 | 73.4   | 605    | 74.17  | 604.96 | 78.31  | 604.74 |  |
| 82.14   | 604.7     | 83.31  | 604.68 | 86.06  | 604.54 | 86.62  | 604.5  | 87.39  | 604.46 |  |
| 89.15   | 604.35    | 95.02  | 604    | 96.73  | 603    | 98.22  | 602.12 | 98.43  | 602    |  |
| 100.14  | 601       | 101.13 | 600.42 | 101.85 | 600    | 102.37 | 599.7  | 103.55 | 599    |  |
| 104.73  | 598.31    | 105.25 | 598    | 106.57 | 597.23 | 106.95 | 597    | 108.61 | 596.02 |  |
| 108.67  | 595.99    | 110.56 | 594.87 | 111.48 | 594.32 | 112.34 | 593.81 | 113.68 | 593    |  |
| 114.66  | 592.4     | 115.31 | 592    | 115.69 | 591.76 | 116.92 | 591    | 118.54 | 590    |  |
| 119.93  | 589.14    | 120.37 | 588.86 | 121.76 | 588    | 122.52 | 587.31 | 122.85 | 587    |  |
| 123.33  | 586.49    | 123.78 | 586    | 124.21 | 585.55 | 124.71 | 585    | 125.59 | 584.19 |  |
| 125.8   | 584       | 125.94 | 583.89 | 126.84 | 583.42 | 126.93 | 583.39 | 127.17 | 583.36 |  |
| 127.38  | 583.32    | 128.1  | 583.24 | 128.96 | 583.15 | 129.12 | 583.14 | 130.3  | 583.01 |  |
| 130.42  | 583       | 131.55 | 582.87 | 131.76 | 582.85 | 132.8  | 582.71 | 133.31 | 582.63 |  |
| 134.04  | 582.51    | 134.36 | 582.43 | 135.24 | 582.3  | 135.38 | 582.26 | 136.59 | 582.05 |  |
| 136.83  | 582       | 137.85 | 581.87 | 138.59 | 581.64 | 139.33 | 581.47 | 139.64 | 581.34 |  |
| 139.86  | 581.28    | 140.12 | 581.17 | 140.46 | 581.04 | 140.58 | 581    | 140.9  | 581    |  |
| 140.93  | 580.96    | 141.55 | 580.1  | 141.7  | 579.9  | 142.29 | 579    | 142.83 | 578.2  |  |
| 143.46  | 577.24    | 143.61 | 577    | 144.1  | 576.27 | 144.27 | 576    | 144.91 | 575.01 |  |

|        |        |        |        |                  |        |        |        |        |        |        |
|--------|--------|--------|--------|------------------|--------|--------|--------|--------|--------|--------|
| 144.92 | 575    | 146    | 575    | LemonCreekPR.rep | 148.86 | 575.32 | 154.82 | 576    | 155.78 | 576.78 |
| 156.06 | 577    | 156.66 | 577.49 | 158.42           | 578.96 | 158.49 | 579.02 | 159.6  | 580    |        |
| 160.15 | 580.49 | 160.71 | 581    | 161.2            | 581.45 | 161.81 | 582    | 162.91 | 583    |        |
| 163.06 | 583.14 | 163.99 | 584    | 165.06           | 585    | 165.72 | 585.62 | 166.12 | 586    |        |
| 166.38 | 586.24 | 167.17 | 587    | 167.94           | 587.8  | 168.13 | 588    | 168.68 | 588.16 |        |
| 169.73 | 588.6  | 169.76 | 588.61 | 169.8            | 588.63 | 170.34 | 588.82 | 171.04 | 589.23 |        |
| 171.39 | 589.36 | 171.64 | 589.52 | 172.5            | 590    | 173.25 | 590.37 | 178.5  | 593    |        |
| 246.39 | 593    | 247.25 | 593.22 | 254.82           | 596.4  | 260.38 | 596.49 | 265.68 | 596.59 |        |
| 275.25 | 598.25 | 291.51 | 600    | 293.81           | 600.83 | 294.58 | 603    | 300    | 603    |        |

|             |        |        |       |
|-------------|--------|--------|-------|
| Manning's n | Values | num=   | 10    |
| Sta         | n Val  | Sta    | n Val |
| 0           | .024   | 51.68  | .035  |
| 144.27      | .04    | 154.82 | .07   |
|             |        | 169.76 | .035  |
|             |        | 178.5  | .024  |
|             |        | 246.39 | .035  |

|                |        |               |         |        |       |        |        |
|----------------|--------|---------------|---------|--------|-------|--------|--------|
| Bank Sta: Left | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
| 140.93         | 169.76 | 139.55        | 144.24  | 152.45 | .1    | .3     |        |

## CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 587.47   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.84     | wt. n-Val,             | 0.035   | 0.061   |
| W.S. Elev (ft)     | 586.64   | Reach Len. (ft)        | 139.55  | 144.24  |
| 152.45             |          |                        |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft)      | 66.06   | 210.68  |
| E.G. Slope (ft/ft) | 0.007062 | Area (sq ft)           | 66.06   | 210.68  |
| Q Total (cfs)      | 2021.00  | Flow (cfs)             | 535.78  | 1485.22 |
| Top width (ft)     | 43.60    | Top width (ft)         | 17.74   | 25.86   |
| Vel Total (ft/s)   | 7.30     | Avg. Vel. (ft/s)       | 8.11    | 7.05    |
| Max Chl Dpth (ft)  | 11.64    | Hydr. Depth (ft)       | 3.72    | 8.15    |
| Conv. Total (cfs)  | 24050.1  | Conv. (cfs)            | 6375.9  | 17674.3 |
| Length wtd. (ft)   | 143.62   | Wetted Per. (ft)       | 19.27   | 33.15   |
| Min Ch El (ft)     | 575.00   | Shear (lb/sq ft)       | 1.51    | 2.80    |
| Alpha              | 1.01     | Stream Power (lb/ft s) | 300.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 2.10     | Cum Volume (acre-ft)   | 1.89    | 10.47   |
| 2.67               |          |                        |         |         |
| C & E Loss (ft)    | 0.17     | Cum SA (acres)         | 0.81    | 1.16    |
| 0.91               |          |                        |         |         |

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.

Note: Manning's n values were composited to a single value in the main channel.

## CROSS SECTION

RS: 2327.19

INPUT  
Description:

| Station | Elevation | Data   | num=   | 150    |        |        |        |        |        |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Sta     | Elev      | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0       | 622       | 27.36  | 622    | 31.77  | 620.49 | 33.19  | 620    | 34.67  | 619.26 |
| 40.4    | 616.13    | 42.32  | 615    | 42.51  | 615    | 53.24  | 610    | 60.27  | 605.86 |
| 62.4    | 604.67    | 62.8   | 604.52 | 64.23  | 604.07 | 65.49  | 604    | 68.26  | 603.65 |
| 68.98   | 603.57    | 69.26  | 603.49 | 70.35  | 603.41 | 70.57  | 603.38 | 71.41  | 603.31 |
| 74.68   | 603       | 75.24  | 602.62 | 76.13  | 602    | 77.6   | 601    | 79.05  | 600    |
| 80.74   | 598.84    | 81.97  | 598    | 83.42  | 597    | 86.28  | 595    | 86.75  | 594.66 |
| 87.69   | 594       | 89.1   | 593    | 90.55  | 592    | 92.06  | 591    | 92.82  | 590.56 |
| 93.92   | 590       | 94.72  | 589.64 | 96.17  | 589    | 98.04  | 588.19 | 100.37 | 587.16 |
| 102.29  | 586.32    | 103.01 | 586    | 104.89 | 585    | 107.67 | 584.38 | 108.99 | 584.07 |
| 109.58  | 584       | 110.98 | 583.35 | 111.84 | 583    | 112.08 | 582.86 | 113.65 | 582    |
| 115.54  | 580.95    | 118.4  | 579.38 | 120.52 | 578.21 | 120.91 | 578    | 123.98 | 576.3  |
| 126.32  | 575       | 127.18 | 574.51 | 128.04 | 574    | 129.44 | 573    | 132.3  | 573    |
| 133.21  | 573.99    | 134.25 | 575    | 135.3  | 576    | 136.39 | 577    | 138.79 | 579    |
| 139.89  | 580       | 140.92 | 581    | 141.03 | 581.06 | 142.55 | 582    | 143.25 | 582.3  |
| 144.8   | 583       | 145.76 | 583.29 | 146.41 | 583.36 | 147.66 | 583.55 | 148.68 | 583.75 |
| 149.62  | 583.87    | 150.07 | 583.93 | 150.69 | 583.98 | 151.39 | 583.97 | 151.78 | 583.94 |
| 152.97  | 583.86    | 153.92 | 583.82 | 154.71 | 583.8  | 155.19 | 583.77 | 158.07 | 583.71 |
| 159.54  | 583.64    | 161.13 | 583.54 | 162    | 583.48 | 162.95 | 583.49 | 163.28 | 583.52 |
| 163.51  | 583.51    | 164.03 | 583.54 | 165.03 | 583.58 | 165.74 | 583.6  | 166.43 | 583.67 |
| 166.97  | 583.77    | 167.16 | 583.78 | 168.15 | 584    | 169.22 | 584.21 | 170.64 | 584.5  |
| 172.83  | 585       | 174.09 | 585.21 | 174.97 | 585.35 | 175.58 | 585.46 | 176.85 | 585.67 |
| 177.08  | 585.7     | 178.21 | 585.93 | 179.84 | 586.32 | 182.57 | 587    | 185.06 | 587.3  |
| 185.81  | 587.42    | 186.59 | 587.52 | 187.62 | 587.75 | 187.99 | 587.79 | 188.82 | 588.01 |
| 188.94  | 588.02    | 189.61 | 588.21 | 191.25 | 588.37 | 194.12 | 588.64 | 198.75 | 590.6  |
| 199.69  | 591       | 204.87 | 591    | 208.97 | 589.41 | 210.04 | 589    | 240.77 | 589    |
| 241.54  | 589.33    | 246.22 | 590.85 | 246.7  | 591    | 248.11 | 591.22 | 248.82 | 591.32 |
| 250.63  | 591.56    | 252.37 | 591.71 | 253.52 | 591.86 | 254.24 | 591.99 | 254.93 | 592.08 |
| 256.55  | 592.36    | 258.83 | 592.95 | 259.03 | 593.01 | 260.22 | 593.41 | 264.8  | 593.59 |
| 266.48  | 593.64    | 268.88 | 593.72 | 273.9  | 593.88 | 276.33 | 593.95 | 278.21 | 594    |
| 289.28  | 594.42    | 297.1  | 594.73 | 298.7  | 594.8  | 299.79 | 595    | 300    | 595.1  |

|           |          |        |          |        |         |        |       |        |       |
|-----------|----------|--------|----------|--------|---------|--------|-------|--------|-------|
| Manning's | n Values |        | num=9    |        |         |        |       |        |       |
| Sta       | n Val    | Sta    | n Val    | Sta    | n Val   | Sta    | n Val | Sta    | n Val |
| 0         | .024     | 27.36  | .035     | 64.23  | .024    | 74.68  | .035  | 108.99 | .07   |
| 128.04    | .04      | 133.21 | .07      | 149.62 | .035    | 199.69 | .024  |        |       |
| Bank Sta: | Left     | Right  | Lengths: | Left   | Channel | Right  | Coeff | Contr. | Expan |
|           | 108.99   | 149.62 |          | 55.09  | 56.19   | 66.43  |       | .1     | .3    |

## CROSS SECTION OUTPUT Profile #50-YR

|                           |          |                   |         |         |
|---------------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)            | 585.20   | Element           | Left OB | Channel |
| Right OB<br>Vel Head (ft) | 2.50     | Wt. n-Val.        |         | 0.066   |
| W.S. Elev (ft)            | 582.70   | Reach Len. (ft)   | 55.09   | 56.19   |
| 66.43<br>Crit W.S. (ft)   | 582.70   | Flow Area (sq ft) |         | 159.21  |
| E.G. Slope (ft/ft)        | 0.046655 | Area (sq ft)      |         | 159.21  |
| Q Total (cfs)             | 2021.00  | Flow (cfs)        |         | 2021.00 |
| Top width (ft)            | 31.77    | Top width (ft)    |         | 31.77   |
| Vel Total (ft/s)          | 12.69    | Avg. Vel. (ft/s)  |         | 12.69   |

|                   |        |                        |        |        |
|-------------------|--------|------------------------|--------|--------|
| Max ch1 Dpth (ft) | 9.70   | Hydr. Depth (ft)       |        | 5.01   |
| Conv. Total (cfs) | 9356.6 | Conv. (cfs)            |        | 9356.6 |
| Length wtd. (ft)  | 58.89  | wetted Per. (ft)       |        | 37.93  |
| Min ch El (ft)    | 573.00 | Shear (lb/sq ft)       |        | 12.23  |
| Alpha<br>0.00     | 1.00   | Stream Power (lb/ft s) | 300.00 | 0.00   |
| Frctn Loss (ft)   | 0.11   | Cum volume (acre-ft)   | 1.78   | 9.86   |
| C & E Loss (ft)   | 0.64   | Cum SA (acres)         | 0.79   | 1.06   |
| 0.91              |        |                        |        |        |

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: 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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1

RS: 2271.00

INPUT  
Description:

| Station Elevation Data |        |        |        |        |        | num= 149 |        |        |        |     |      |
|------------------------|--------|--------|--------|--------|--------|----------|--------|--------|--------|-----|------|
| Sta                    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta      | Elev   | Sta    | Elev   | Sta | Elev |
| 0                      | 622    | 31.58  | 622    | 35.3   | 620.78 | 37.67    | 620    | 43.09  | 617.38 |     |      |
| 53.34                  | 612.44 | 58.39  | 610    | 62.6   | 608.04 | 72.52    | 603.5  | 73.52  | 601.9  |     |      |
| 73.88                  | 601.47 | 74.36  | 600.93 | 74.45  | 600.77 | 79.89    | 599.99 | 83.66  | 599.63 |     |      |
| 85.46                  | 599.3  | 86.36  | 599    | 86.68  | 598.58 | 87.22    | 597.84 | 87.87  | 597    |     |      |
| 88.7                   | 596    | 89.58  | 595    | 89.84  | 595    | 91.2     | 594.58 | 92.54  | 594.64 |     |      |
| 93.72                  | 594.39 | 94.8   | 594    | 95.48  | 593.74 | 97.34    | 593    | 98.52  | 592.52 |     |      |
| 99.78                  | 592    | 102.17 | 591    | 103.01 | 590.64 | 104.53   | 590    | 106.86 | 589    |     |      |
| 109.15                 | 588    | 109.62 | 587.8  | 111.44 | 587    | 112.7    | 586.41 | 114.44 | 585.64 |     |      |
| 115.94                 | 585    | 116.85 | 584.6  | 121    | 582.8  | 121.69   | 582.51 | 122.83 | 582    |     |      |
| 123.86                 | 581.48 | 124.95 | 581    | 126.04 | 580.69 | 127.2    | 580.37 | 129.06 | 579.99 |     |      |
| 132.6                  | 579    | 132.67 | 579    | 136.81 | 578    | 140.02   | 577.23 | 140.39 | 576.94 |     |      |
| 141.32                 | 576    | 141.6  | 575.74 | 142.34 | 575    | 143.37   | 574    | 143.85 | 573.56 |     |      |
| 144.42                 | 573    | 144.96 | 572    | 146.64 | 572    | 148.3    | 571.99 | 148.62 | 572    |     |      |
| 164.14                 | 572.56 | 168.15 | 572.76 | 170.64 | 572.87 | 172.25   | 573    | 173.19 | 575.61 |     |      |
| 173.34                 | 576    | 173.69 | 577    | 174    | 577.01 | 174.17   | 577    | 175.01 | 576.01 |     |      |
| 175.46                 | 575.91 | 175.58 | 575.92 | 175.96 | 575.74 | 179.86   | 576    | 187.02 | 576.46 |     |      |
| 187.9                  | 576.45 | 188.27 | 576.48 | 194.67 | 576.97 | 194.81   | 576.99 | 195.59 | 577    |     |      |
| 199.46                 | 577.1  | 199.96 | 577.34 | 201.02 | 577.47 | 201.1    | 577.44 | 201.43 | 577.98 |     |      |
| 202.76                 | 578.22 | 203.23 | 579    | 203.29 | 579    | 204.65   | 579.75 | 209.52 | 582.36 |     |      |
| 213.48                 | 584.4  | 216.32 | 585.81 | 219.55 | 587.38 | 221.09   | 588.12 | 224.64 | 589.79 |     |      |
| 225.08                 | 590    | 226.08 | 590.74 | 226.41 | 591    | 227.11   | 592    | 227.91 | 592.24 |     |      |
| 228.32                 | 592.29 | 229.58 | 592.61 | 231.97 | 593    | 234.55   | 593.21 | 235.12 | 593.22 |     |      |
| 236.22                 | 593.29 | 237.28 | 593.41 | 239.21 | 593.57 | 239.6    | 593.58 | 240.14 | 593.62 |     |      |
| 240.37                 | 593.61 | 241.54 | 593.75 | 242.88 | 593.76 | 244.86   | 593.84 | 245.25 | 593.82 |     |      |

|                                                                      |          |                        |         |         |        |        |        |        |        |
|----------------------------------------------------------------------|----------|------------------------|---------|---------|--------|--------|--------|--------|--------|
| LemonCreekPR.rep                                                     |          |                        |         |         |        |        |        |        |        |
| 245.51                                                               | 593.87   | 246.07                 | 594.02  | 246.78  | 594.29 | 247.79 | 594.75 | 249.04 | 595    |
| 258.96                                                               | 595      | 260.44                 | 594.88  | 276.74  | 594.96 | 277.1  | 594.96 | 278.03 | 595    |
| 280.04                                                               | 596      | 281.39                 | 596.77  | 281.75  | 597    | 282.86 | 598    | 283.15 | 598.25 |
| 284.08                                                               | 599      | 285.33                 | 599.66  | 286.05  | 600    | 288.2  | 600.83 | 290.98 | 601.88 |
| 293.2                                                                | 602.78   | 293.73                 | 603     | 296.06  | 604    | 296.36 | 604.14 | 298.11 | 605    |
| 299.89                                                               | 605.92   | 301.93                 | 607     | 304.43  | 608.33 | 307.59 | 610    |        |        |
| Manning's n Values                                                   |          |                        |         |         |        |        |        |        |        |
| Sta                                                                  | n Val    | Sta                    | n Val   | Sta     | n Val  | Sta    | n Val  | Sta    | n Val  |
| 0                                                                    | .024     | 31.58                  | .035    | 74.36   | .024   | 85.46  | .035   | 140.02 | .07    |
| 144.42                                                               | .04      | 172.25                 | .07     | 174     | .024   | 199.46 | .07    | 249.04 | .024   |
| 278.03                                                               | .07      |                        |         |         |        |        |        |        |        |
| Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. |          |                        |         |         |        |        |        |        |        |
| 140.02                                                               | 174      |                        | 21.66   | 25      | 41.57  |        | .1     | .3     |        |
| CROSS SECTION OUTPUT Profile #50-YR                                  |          |                        |         |         |        |        |        |        |        |
| E.G. Elev (ft)                                                       | 584.41   | Element                | Left OB | Channel |        |        |        |        |        |
| Right OB                                                             |          |                        |         |         |        |        |        |        |        |
| Vel Head (ft)                                                        | 0.36     | Wt. n-Val.             | 0.035   | 0.049   |        |        |        |        |        |
| 0.026                                                                |          |                        |         |         |        |        |        |        |        |
| W.S. Elev (ft)                                                       | 584.05   | Reach Len. (ft)        | 21.66   | 25.00   |        |        |        |        |        |
| 41.57                                                                |          |                        |         |         |        |        |        |        |        |
| Crit W.S. (ft)                                                       |          | Flow Area (sq ft)      | 85.18   | 379.10  |        |        |        |        |        |
| 240.76                                                               |          |                        |         |         |        |        |        |        |        |
| E.G. Slope (ft/ft)                                                   | 0.000860 | Area (sq ft)           | 85.18   | 379.10  |        |        |        |        |        |
| 240.76                                                               |          |                        |         |         |        |        |        |        |        |
| Q Total (cfs)                                                        | 3182.00  | Flow (cfs)             | 253.68  | 1530.53 |        |        |        |        |        |
| 1397.80                                                              |          |                        |         |         |        |        |        |        |        |
| Top width (ft)                                                       | 94.69    | Top width (ft)         | 21.91   | 33.98   |        |        |        |        |        |
| 38.80                                                                |          |                        |         |         |        |        |        |        |        |
| Vel Total (ft/s)                                                     | 4.51     | Avg. Vel. (ft/s)       | 2.98    | 4.04    |        |        |        |        |        |
| 5.81                                                                 |          |                        |         |         |        |        |        |        |        |
| Max Chl Dpth (ft)                                                    | 12.06    | Hydr. Depth (ft)       | 3.89    | 11.16   |        |        |        |        |        |
| 6.20                                                                 |          |                        |         |         |        |        |        |        |        |
| Conv. Total (cfs)                                                    | 108490.4 | Conv. (cfs)            | 8649.1  | 52183.4 |        |        |        |        |        |
| 47657.9                                                              |          |                        |         |         |        |        |        |        |        |
| Length wtd. (ft)                                                     | 33.83    | Wetted Per. (ft)       | 23.03   | 39.12   |        |        |        |        |        |
| 41.45                                                                |          |                        |         |         |        |        |        |        |        |
| Min Ch El (ft)                                                       | 571.99   | Shear (lb/sq ft)       | 0.20    | 0.52    |        |        |        |        |        |
| 0.31                                                                 |          |                        |         |         |        |        |        |        |        |
| Alpha                                                                | 1.15     | Stream Power (lb/ft s) | 307.59  | 0.00    |        |        |        |        |        |
| 0.00                                                                 |          |                        |         |         |        |        |        |        |        |
| Frctn Loss (ft)                                                      | 0.04     | Cum Volume (acre-ft)   | 1.73    | 9.51    |        |        |        |        |        |
| 2.48                                                                 |          |                        |         |         |        |        |        |        |        |
| C & E Loss (ft)                                                      | 0.03     | Cum SA (acres)         | 0.77    | 1.02    |        |        |        |        |        |
| 0.88                                                                 |          |                        |         |         |        |        |        |        |        |

Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2246.00

#### INPUT Description:

|       |        |       |      |       |        |       |        |       |        |
|-------|--------|-------|------|-------|--------|-------|--------|-------|--------|
| Sta   | Elev   | Sta   | Elev | Sta   | Elev   | Sta   | Elev   | Sta   | Elev   |
| 0     | 622    | 33.13 | 622  | 36.85 | 620.78 | 39.24 | 620    | 41.25 | 619.04 |
| 44.96 | 617.25 | 60.03 | 610  | 73.07 | 603.96 | 74.97 | 603.09 | 75.31 | 602.61 |

|                                                                      |          |                   |           |         |        |        |        |        |        |
|----------------------------------------------------------------------|----------|-------------------|-----------|---------|--------|--------|--------|--------|--------|
| LemonCreekPR.rep                                                     |          |                   |           |         |        |        |        |        |        |
| 76.07                                                                | 601.26   | 76.96             | 599.85    | 79.62   | 599.52 | 82.75  | 599.22 | 83.33  | 599.15 |
| 84.93                                                                | 599      | 86.46             | 598.72    | 88.38   | 598.17 | 88.81  | 598.12 | 88.94  | 598    |
| 89.79                                                                | 597      | 90.53             | 597       | 90.91   | 596.83 | 91.41  | 596.75 | 92.33  | 596.4  |
| 93.34                                                                | 596      | 94.37             | 595.58    | 97.71   | 594.16 | 100.35 | 593    | 103.27 | 591.71 |
| 107.07                                                               | 590      | 109.23            | 589       | 109.57  | 588.83 | 110.5  | 588.41 | 111.37 | 588    |
| 112.32                                                               | 587.53   | 113.47            | 587       | 115.12  | 586.19 | 115.55 | 586    | 116.62 | 585.46 |
| 117.51                                                               | 585      | 118.56            | 584.4     | 119.22  | 584    | 120.94 | 583    | 122.32 | 582.43 |
| 125.81                                                               | 581      | 128.29            | 580.73    | 130.44  | 580.5  | 135.82 | 580    | 139.89 | 579.29 |
| 141.23                                                               | 579.15   | 141.43            | 579.12    | 142.81  | 579    | 142.88 | 578.83 | 143.25 | 578.49 |
| 143.77                                                               | 578      | 143.95            | 577.51    | 144.53  | 576    | 144.77 | 575.33 | 145.21 | 574.17 |
| 145.52                                                               | 573.32   | 146.94            | 572       | 149.07  | 571.03 | 149.99 | 571.02 | 151.59 | 571.03 |
| 152.52                                                               | 571.05   | 154.42            | 571.07    | 155.14  | 571.09 | 155.45 | 571.13 | 155.6  | 572    |
| 156.12                                                               | 572.79   | 156.18            | 573       | 156.7   | 573.78 | 156.77 | 574    | 157.29 | 574.78 |
| 157.36                                                               | 575      | 157.87            | 575.77    | 157.95  | 576    | 158.45 | 576.77 | 158.53 | 577    |
| 159.03                                                               | 577.76   | 159.11            | 578       | 159.92  | 578.47 | 160.39 | 578.74 | 160.56 | 579    |
| 179.99                                                               | 579      | 181.51            | 578.99    | 183.48  | 579    | 184.54 | 578.03 | 185.51 | 577.82 |
| 186.29                                                               | 577.71   | 191.48            | 577       | 192.9   | 576.82 | 194.55 | 576.95 | 197.6  | 576.88 |
| 200.61                                                               | 576.95   | 201.85            | 577       | 202.74  | 577.19 | 206.46 | 578    | 208.58 | 579    |
| 208.6                                                                | 579      | 210.97            | 580.11    | 212.88  | 581    | 214.99 | 582    | 215.6  | 582.3  |
| 216.95                                                               | 583      | 218.71            | 584       | 219.64  | 584.55 | 222.53 | 586.24 | 225.56 | 588    |
| 227.33                                                               | 589      | 227.61            | 589       | 230.78  | 589.36 | 231.6  | 589.37 | 233.72 | 589.54 |
| 234.42                                                               | 589.54   | 235.9             | 589.82    | 237.21  | 590    | 238.68 | 590.47 | 238.96 | 590.58 |
| 239.62                                                               | 591      | 241.2             | 591.83    | 241.55  | 592    | 244.4  | 593    | 246.33 | 593    |
| 251.51                                                               | 593.28   | 253.1             | 593.39    | 255.35  | 593.56 | 258.19 | 593.82 | 259.89 | 594    |
| 264.44                                                               | 594.5    | 268.49            | 594.95    | 268.98  | 595    | 269.09 | 595.04 | 272.08 | 596    |
| 273.63                                                               | 596.96   | 273.89            | 597.11    | 275.62  | 598    | 279.57 | 600    | 280.72 | 600.59 |
| 281.49                                                               | 601      | 283.58            | 602.13    | 285.17  | 603    | 285.55 | 603.2  | 288.81 | 605    |
| 290.07                                                               | 605.7    | 292.43            | 607       | 293.66  | 607.67 | 296.06 | 609    | 297.88 | 609.98 |
| Manning's n Values                                                   |          |                   |           |         |        |        |        |        |        |
| Sta                                                                  | n Val    | Sta               | n Val     | Sta     | n Val  | Sta    | n Val  | Sta    | n Val  |
| 0                                                                    | .024     | 33.13             | .035      | 76.96   | .024   | 86.46  | .035   | 125.81 | .024   |
| 143.25                                                               | .07      | 146.94            | .04       | 155.6   | .07    | 160.56 | .024   | 208.58 | .07    |
| 227.33                                                               | .024     | 268.49            | .07       |         |        |        |        |        |        |
| Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. |          |                   |           |         |        |        |        |        |        |
| 143.25                                                               | 159.92   |                   | 33.12     | 29.64   | 31.84  |        | .1     | .3     |        |
| Ineffective Flow num= 2                                              |          |                   |           |         |        |        |        |        |        |
| Sta L                                                                | Sta R    | Elev              | Permanent |         |        |        |        |        |        |
| 0                                                                    | 148.54   | 579.69            | F         |         |        |        |        |        |        |
| 154.54                                                               | 297.88   | 579.69            | F         |         |        |        |        |        |        |
| CROSS SECTION OUTPUT Profile #50-YR                                  |          |                   |           |         |        |        |        |        |        |
| E.G. Elev (ft)                                                       | 584.35   | Element           | Left OB   | Channel |        |        |        |        |        |
| Right OB                                                             |          |                   |           |         |        |        |        |        |        |
| Vel Head (ft)                                                        | 0.65     | Wt. n-Val.        | 0.024     | 0.059   |        |        |        |        |        |
| 0.025                                                                |          |                   |           |         |        |        |        |        |        |
| W.S. Elev (ft)                                                       | 583.70   | Reach Len. (ft)   | 33.12     | 29.64   |        |        |        |        |        |
| 31.84                                                                |          |                   |           |         |        |        |        |        |        |
| Crit W.S. (ft)                                                       | 581.27   | Flow Area (sq ft) | 72.86     | 176.15  |        |        |        |        |        |
| 292.70                                                               |          |                   |           |         |        |        |        |        |        |
| E.G. Slope (ft/ft)                                                   | 0.001668 | Area (sq ft)      | 72.86     | 176.15  |        |        |        |        |        |
| 292.70                                                               |          |                   |           |         |        |        |        |        |        |
| Q Total (cfs)                                                        | 3182.00  | Flow (cfs)        | 399.39    | 657.23  |        |        |        |        |        |
| 2125.38                                                              |          |                   |           |         |        |        |        |        |        |
| Top width (ft)                                                       | 98.43    | Top width (ft)    | 23.51     | 16.67   |        |        |        |        |        |
| 58.26                                                                |          |                   |           |         |        |        |        |        |        |
| Vel Total (ft/s)                                                     | 5.87     | Avg. Vel. (ft/s)  | 5.48      | 3.73    |        |        |        |        |        |
| 7.26                                                                 |          |                   |           |         |        |        |        |        |        |
| Max Chl Dpth (ft)                                                    | 12.68    | Hydr. Depth (ft)  | 3.10      | 10.57   |        |        |        |        |        |
| 5.02                                                                 |          |                   |           |         |        |        |        |        |        |
| Conv. Total (cfs)                                                    | 77912.7  | Conv. (cfs)       | 9779.1    | 16092.6 |        |        |        |        |        |
| 52041.0                                                              |          |                   |           |         |        |        |        |        |        |
| Length wtd. (ft)                                                     | 29.64    | Wetted Per. (ft)  | 24.46     | 25.19   |        |        |        |        |        |

LemonCreekPR.rep

|                 |        |                        |        |      |
|-----------------|--------|------------------------|--------|------|
| 60.37           |        |                        |        |      |
| Min Ch El (ft)  | 571.02 | Shear (lb/sq ft)       | 0.31   | 0.73 |
| 0.50            |        |                        |        |      |
| Alpha           | 1.21   | Stream Power (lb/ft s) | 297.88 | 0.00 |
| 0.00            |        |                        |        |      |
| Frctn Loss (ft) |        | Cum Volume (acre-ft)   | 1.69   | 9.35 |
| 2.23            |        |                        |        |      |
| C & E Loss (ft) |        | Cum SA (acres)         | 0.76   | 1.00 |
| 0.83            |        |                        |        |      |

# CULVERT

RIVER: LemonCreek  
REACH: Reach1 RS: 2230.01

INPUT  
Description: Culvert #3  
Distance from Upstream XS = 5  
Deck/Roadway Width = 22  
Weir Coefficient = 2.6  
Upstream Deck/Roadway Coordinates  
num= 5

|        |         |         |        |         |         |        |         |         |
|--------|---------|---------|--------|---------|---------|--------|---------|---------|
| Sta    | Hi Cord | Lo Cord | Sta    | Hi Cord | Lo Cord | Sta    | Hi Cord | Lo Cord |
| 143.25 | 578.49  |         | 148.54 | 579.69  |         | 151.54 | 579.69  |         |
| 154.54 | 579.69  |         | 159.92 | 578.47  |         |        |         |         |

Upstream Bridge Cross Section Data  
Station Elevation Data num= 150

|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0      | 622    | 33.13  | 622    | 36.85  | 620.78 | 39.24  | 620    | 41.25  | 619.04 |
| 44.96  | 617.25 | 60.03  | 610    | 73.07  | 603.96 | 74.97  | 603.09 | 75.31  | 602.61 |
| 76.07  | 601.26 | 76.96  | 599.85 | 79.62  | 599.52 | 82.75  | 599.22 | 83.33  | 599.15 |
| 84.93  | 599    | 86.46  | 598.72 | 88.38  | 598.17 | 88.81  | 598.12 | 88.94  | 598    |
| 89.79  | 597    | 90.53  | 597    | 90.91  | 596.83 | 91.41  | 596.75 | 92.33  | 596.4  |
| 93.34  | 596    | 94.37  | 595.58 | 97.71  | 594.16 | 100.35 | 593    | 103.27 | 591.71 |
| 107.07 | 590    | 109.23 | 589    | 109.57 | 588.83 | 110.5  | 588.41 | 111.37 | 588    |
| 112.32 | 587.53 | 113.47 | 587    | 115.12 | 586.19 | 115.55 | 586    | 116.62 | 585.46 |
| 117.51 | 585    | 118.56 | 584.4  | 119.22 | 584    | 120.94 | 583    | 122.32 | 582.43 |
| 125.81 | 581    | 128.29 | 580.73 | 130.44 | 580.5  | 135.82 | 580    | 139.89 | 579.29 |
| 141.23 | 579.15 | 141.43 | 579.12 | 142.81 | 579    | 142.88 | 578.83 | 143.25 | 578.49 |
| 143.77 | 578    | 143.95 | 577.51 | 144.53 | 576    | 144.77 | 575.33 | 145.21 | 574.17 |
| 145.52 | 573.32 | 146.94 | 572    | 149.07 | 571.03 | 149.99 | 571.02 | 151.59 | 571.03 |
| 152.52 | 571.05 | 154.42 | 571.07 | 155.14 | 571.09 | 155.45 | 571.13 | 155.6  | 572    |
| 156.12 | 572.79 | 156.18 | 573    | 156.7  | 573.78 | 156.77 | 574    | 157.29 | 574.78 |
| 157.36 | 575    | 157.87 | 575.77 | 157.95 | 576    | 158.45 | 576.77 | 158.53 | 577    |
| 159.03 | 577.76 | 159.11 | 578    | 159.92 | 578.47 | 160.39 | 578.74 | 160.56 | 579    |
| 179.99 | 579    | 181.51 | 578.99 | 183.48 | 579    | 184.54 | 578.03 | 185.51 | 577.82 |
| 186.29 | 577.71 | 191.48 | 577    | 192.9  | 576.82 | 194.55 | 576.95 | 197.6  | 576.88 |
| 200.61 | 576.95 | 201.85 | 577    | 202.74 | 577.19 | 206.46 | 578    | 208.58 | 579    |
| 208.6  | 579    | 210.97 | 580.11 | 212.88 | 581    | 214.99 | 582    | 215.6  | 582.3  |
| 216.95 | 583    | 218.71 | 584    | 219.64 | 584.55 | 222.53 | 586.24 | 225.56 | 588    |
| 227.33 | 589    | 227.61 | 589    | 230.78 | 589.36 | 231.6  | 589.37 | 233.72 | 589.54 |
| 234.42 | 589.54 | 235.9  | 589.82 | 237.21 | 590    | 238.68 | 590.47 | 238.96 | 590.58 |
| 239.62 | 591    | 241.2  | 591.83 | 241.55 | 592    | 244.4  | 593    | 246.33 | 593    |
| 251.51 | 593.28 | 253.1  | 593.39 | 255.35 | 593.56 | 258.19 | 593.82 | 259.89 | 594    |
| 264.44 | 594.5  | 268.49 | 594.95 | 268.98 | 595    | 269.09 | 595.04 | 272.08 | 596    |
| 273.63 | 596.96 | 273.89 | 597.11 | 275.62 | 598    | 279.57 | 600    | 280.72 | 600.59 |
| 281.49 | 601    | 283.58 | 602.13 | 285.17 | 603    | 285.55 | 603.2  | 288.81 | 605    |
| 290.07 | 605.7  | 292.43 | 607    | 293.66 | 607.67 | 296.06 | 609    | 297.88 | 609.98 |

Manning's n Values num= 12

|     |       |       |       |       |       |       |       |        |       |
|-----|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| Sta | n Val | Sta   | n Val | Sta   | n Val | Sta   | n Val | Sta    | n Val |
| 0   | .024  | 33.13 | .035  | 76.96 | .024  | 86.46 | .035  | 125.81 | .024  |

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|        |      |        |     |       |     |        |      |        |     |
|--------|------|--------|-----|-------|-----|--------|------|--------|-----|
| 143.25 | .07  | 146.94 | .04 | 155.6 | .07 | 160.56 | .024 | 208.58 | .07 |
| 227.33 | .024 | 268.49 | .07 |       |     |        |      |        |     |

Bank Sta: Left Right Coeff Contr. Expan.  
143.25 159.92 .1 .3  
Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 148.54 579.69 F  
154.54 297.88 579.69 F

Downstream Deck/Roadway Coordinates  
num= 5  
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
140.58 581 151.07 579.69 154.07 579.69  
157.07 579.69 162.25 580

Downstream Bridge Cross Section Data  
Station Elevation Data num= 150

|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0      | 622    | 46.96  | 622    | 48.98  | 621.35 | 53.15  | 620    | 58.6   | 617.39 |
| 73.98  | 610    | 76.74  | 608.73 | 93.74  | 600.62 | 94.34  | 600.6  | 95.19  | 598.05 |
| 95.21  | 597.87 | 95.53  | 596.47 | 95.81  | 595.29 | 95.84  | 595.2  | 96.16  | 595.17 |
| 97.8   | 595    | 103.43 | 594.26 | 104.03 | 594.21 | 104.5  | 594.16 | 105.25 | 594    |
| 107.04 | 594    | 108.44 | 593.15 | 108.94 | 592.85 | 111.92 | 591    | 113.76 | 590    |
| 118.64 | 588    | 120.28 | 587.33 | 121.37 | 586.88 | 123.52 | 586    | 125.99 | 585    |
| 131.05 | 583    | 132.83 | 582.3  | 133.4  | 582.07 | 133.6  | 582    | 139.09 | 581.21 |
| 140.58 | 581    | 141.81 | 580    | 145.39 | 577.82 | 146.73 | 577    | 148.3  | 576.02 |
| 148.5  | 575.89 | 149.74 | 575.14 | 149.94 | 575.07 | 150.19 | 575.05 | 150.56 | 575.07 |
| 151.53 | 571    | 151.95 | 571    | 152.36 | 571    | 152.76 | 571    | 153.29 | 571    |
| 153.67 | 571    | 154.34 | 571    | 154.98 | 571    | 155.75 | 571    | 156.68 | 571    |
| 157.27 | 571    | 157.96 | 577.48 | 158.78 | 577.95 | 160.18 | 578.79 | 161.56 | 579.6  |
| 162.25 | 580    | 168.35 | 580    | 169.16 | 579.77 | 170.7  | 579.35 | 179.32 | 579    |
| 184.49 | 579    | 184.82 | 578.98 | 185.32 | 578.99 | 185.79 | 578.99 | 186.17 | 579    |
| 187.9  | 579    | 188.9  | 578.96 | 189.02 | 578.95 | 190.83 | 578.84 | 192.59 | 578.74 |
| 194.11 | 578.66 | 194.47 | 578.62 | 195.49 | 578.56 | 196.7  | 578.5  | 197.1  | 578.5  |
| 198.48 | 578.41 | 199.37 | 578.36 | 201.54 | 578.22 | 202.57 | 578.32 | 203.2  | 578.33 |
| 203.97 | 578.37 | 205.08 | 578.47 | 205.55 | 578.52 | 207.29 | 578.99 | 207.93 | 579.26 |
| 209.64 | 580    | 211.57 | 580.82 | 212.01 | 581    | 216.07 | 582.61 | 217.06 | 583    |
| 218.88 | 583.7  | 219.71 | 584    | 219.96 | 584.07 | 222.55 | 584.39 | 222.77 | 584.4  |
| 223.33 | 584.4  | 225.65 | 584.45 | 226.42 | 584.47 | 226.69 | 584.49 | 228.2  | 584.62 |
| 228.81 | 584.71 | 229.64 | 584.85 | 229.77 | 584.86 | 230.57 | 585    | 231.6  | 585.39 |
| 232.94 | 586    | 234.72 | 586.85 | 235.34 | 587.13 | 237.25 | 588    | 239.44 | 589    |
| 240.05 | 589.3  | 241.54 | 590    | 242.48 | 590.55 | 243.02 | 590.86 | 243.28 | 591    |
| 244.9  | 592    | 246.62 | 593    | 246.78 | 593.09 | 248.3  | 594    | 248.73 | 594.03 |
| 257.35 | 594.59 | 263.53 | 595    | 268.24 | 595.36 | 270.43 | 595.53 | 272.59 | 595.7  |
| 276.35 | 595.98 | 276.56 | 596    | 277.1  | 596.2  | 278.87 | 596.87 | 279.28 | 597    |
| 281.09 | 598    | 284.75 | 600    | 285.29 | 600.29 | 288.02 | 601.79 | 289.76 | 602.73 |
| 290.41 | 603.09 | 292.08 | 604    | 293.48 | 604.77 | 293.91 | 605    | 294.52 | 605.34 |
| 295.73 | 606    | 296.82 | 606.59 | 297.56 | 607    | 298.48 | 607.5  | 302.6  | 609.76 |

Manning's n Values num= 11

|        |       |        |       |        |       |        |       |        |       |
|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
| 0      | .024  | 46.96  | .035  | 95.81  | .024  | 107.04 | .035  | 140.58 | .04   |
| 162.25 | .024  | 209.64 | .07   | 222.55 | .024  | 226.42 | .07   | 248.3  | .024  |
| 276.56 | .07   |        |       |        |       |        |       |        |       |

Bank Sta: Left Right Coeff Contr. Expan.  
140.58 162.25 .1 .3  
Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 151.07 579.69 F  
157.07 302.6 579.69 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .98

Elevation at which weir flow begins =  
Energy head used in spillway design =  
Spillway height used in design =  
weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span  
Culvert #1 Circular 6  
FHWA Chart # 2 - Corrugated Metal Pipe Culvert  
FHWA Scale # 1 - Headwall  
Solution Criteria = Highest U.S. EG  
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef  
Exit Loss Coef  
1  
Upstream Elevation = 571.02  
Centerline Station = 151.54  
Downstream Elevation = 571  
Centerline Station = 154.07

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 2216.36

INPUT  
Description:  
Station Elevation Data num= 150  
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
0 622 46.96 622 48.98 621.35 53.15 620 58.6 617.39  
73.98 610 76.74 608.73 93.74 600.62 94.34 600.6 95.19 598.05  
95.21 597.67 95.53 596.47 95.81 595.29 95.84 595.2 96.16 595.17  
97.8 595 103.43 594.26 104.03 594.21 104.5 594.16 105.25 594  
107.04 594 108.44 593.15 108.94 592.85 111.92 591 113.76 590  
118.64 588 120.28 587.33 121.37 586.88 123.52 586 125.99 585  
131.05 583 132.83 582.3 133.4 582.07 133.6 582 139.09 581.21  
140.58 581 141.81 580 145.39 577.82 146.73 577 148.3 576.02  
148.5 575.89 149.74 575.14 149.94 575.07 150.19 575.05 150.56 575.07  
151.53 571 151.95 571 152.36 571 152.76 571 153.29 571  
153.67 571 154.34 571 154.98 571 155.75 571 156.68 571  
157.27 571 157.96 577.48 158.78 577.95 160.18 578.79 161.56 579.6  
162.25 580 168.35 580 169.16 579.77 170.7 579.35 179.32 579  
184.49 579 184.82 578.98 185.32 578.99 185.79 578.99 186.17 579  
187.9 579 188.9 578.96 189.02 578.95 190.83 578.84 192.59 578.74  
194.11 578.66 194.47 578.62 195.49 578.56 196.7 578.5 197.1 578.5  
198.48 578.41 199.37 578.36 201.54 578.22 202.57 578.32 203.2 578.33  
203.97 578.37 205.08 578.47 205.55 578.52 207.29 578.99 207.93 579.26  
209.64 580 211.57 580.82 212.01 581 216.07 582.61 217.06 583  
218.88 583.7 219.71 584 219.96 584.07 222.55 584.39 222.77 584.4  
223.33 584.4 225.65 584.45 226.42 584.47 226.69 584.49 228.2 584.62  
228.81 584.71 229.64 584.85 229.77 584.86 230.57 585 231.6 585.39  
232.94 586 234.72 586.85 235.34 587.13 237.25 588 239.44 589  
240.05 589.3 241.54 590 242.48 590.55 243.02 590.86 243.28 591  
244.9 592 246.62 593 246.78 593.09 248.3 594 248.73 594.03  
257.35 594.59 263.53 595 268.24 595.36 270.43 595.53 272.59 595.7  
276.35 595.98 276.56 596 277.1 596.2 278.87 596.87 279.28 597  
281.09 598 284.75 600 285.29 600.29 288.02 601.79 289.76 602.73  
290.41 603.09 292.08 604 293.48 604.77 293.91 605 294.52 605.34  
295.73 606 296.82 606.59 297.56 607 298.48 607.5 302.6 609.76

Manning's n values num= 11  
Sta n Val Sta n Val Sta n Val Sta n Val  
0 .024 46.96 .035 95.81 .024 107.04 .035 140.58 .04  
162.25 .024 209.64 .07 222.55 .024 226.42 .07 248.3 .024

276.56 .07  
LemonCreekPR.rep  
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
140.58 162.25 29.71 17.36 12.78  
Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 151.07 579.69 F  
157.07 302.6 579.69 F

#### CROSS SECTION OUTPUT Profile #50-YR

E.G. Elev (ft) 584.11 Element Left OB Channel  
Right OB  
Vel Head (ft) 1.97 Wt. n-Val. 0.035 0.040  
0.024  
W.S. Elev (ft) 582.14 Reach Len. (ft) 29.71 17.36  
12.78  
Crit W.S. (ft) 582.14 Flow Area (sq ft) 4.48 136.75  
152.01  
E.G. Slope (ft/ft) 0.009609 Area (sq ft) 4.48 136.75  
152.01  
Q Total (cfs) 3182.00 Flow (cfs) 13.31 1281.17  
1887.53  
Top Width (ft) 81.64 Top Width (ft) 7.35 21.67  
52.63  
Vel Total (ft/s) 10.85 Avg. Vel. (ft/s) 2.97 9.37  
12.42  
Max Chl Dpth (ft) 11.14 Hydr. Depth (ft) 0.61 6.31  
2.89  
Conv. Total (cfs) 32461.7 conv. (cfs) 135.7 13070.0  
19255.9  
Length wtd. (ft) 14.99 wetted Per. (ft) 7.44 33.14  
53.45  
Min Ch El (ft) 571.00 Shear (lb/sq ft) 0.36 2.48  
1.71  
Alpha 1.08 Stream Power (lb/ft s) 302.60 0.00  
0.00  
Frctn Loss (ft) 0.12 Cum Volume (acre-ft) 1.69 8.96  
2.23  
C & E Loss (ft) 0.20 Cum SA (acres) 0.75 0.99  
0.79

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: 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: LemonCreek  
REACH: Reach1 RS: 2199.00

INPUT  
Description:  
Station Elevation Data num= 150  
Sta Elev Sta Elev Sta Elev

[illegible]CROSS SECTION OUTPUT Profile #50-YRPage 24

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RS: 2084.10

### INPUT

**Description:**

|                    |       |        |       |        |       |        |       |        |       |     |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|-----|-------|
| Manning's n Values |       | num=   |       | 10     |       |        |       |        |       |     |       |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta | n Val |
| 0                  | .024  | 27.82  | .035  | 105.57 | .024  | 121.55 | .07   | 132.07 | .04   |     |       |
| 155.15             | .07   | 163.09 | .024  | 184.09 | .07   | 212.69 | .024  | 225.08 | .07   |     |       |

CROSS SECTION OUTPUT Profile #50-YRPage 25

LemonCreekPR.rep

|                    |          |                        |         |
|--------------------|----------|------------------------|---------|
| Vel Head (ft)      | 1.27     | wt. n-Val.             | 0.054   |
| 0.025              |          |                        |         |
| W.S. Elev (ft)     | 581.45   | Reach Len. (ft)        | 202.44  |
| 211.80             |          |                        |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft)      | 307.79  |
| 44.13              |          |                        |         |
| E.G. Slope (ft/ft) | 0.008415 | Area (sq ft)           | 307.79  |
| 44.13              |          |                        |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 2813.39 |
| 368.61             |          |                        |         |
| Top Width (ft)     | 61.76    | Top Width (ft)         | 37.51   |
| 24.25              |          |                        |         |
| Vel Total (ft/s)   | 9.04     | Avg. Vel. (ft/s)       | 9.14    |
| 8.35               |          |                        |         |
| Max Chl Dpth (ft)  | 11.45    | Hydr. Depth (ft)       | 8.21    |
| 1.82               |          |                        |         |
| Conv. Total (cfs)  | 34687.8  | Conv. (cfs)            | 30669.5 |
| 4018.3             |          |                        |         |
| Length Wtd. (ft)   | 208.64   | Wetted Per. (ft)       | 45.05   |
| 24.72              |          |                        |         |
| Min Ch El (ft)     | 570.00   | Shear (lb/sq ft)       | 3.59    |
| 0.94               |          |                        |         |
| Alpha              | 1.00     | Stream Power (lb/ft s) | 250.00  |
| 0.00               |          |                        |         |
| Frctn Loss (ft)    | 1.91     | Cum Volume (acre-ft)   | 1.69    |
| 1.92               |          |                        |         |
| C & E Loss (ft)    | 0.06     | Cum SA (acres)         | 0.75    |
| 0.68               |          |                        |         |

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.  
Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1875.66

INPUT  
Description:  
Station Elevation Data num= 99

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 605    | 12.27  | 605    | 24.25  | 605    | 36.23  | 605    | 48.21  | 605    |
| 37.13  | 605    | 62.63  | 601.76 | 94.61  | 601.34 | 126.59 | 598.03 | 158.57 | 597.74 |
| 77.81  | 597.1  | 109.57 | 596.39 | 141.55 | 592.15 | 173.53 | 590    | 205.51 | 585.89 |
| 104.46 | 585    | 141.55 | 584.68 | 173.53 | 584.61 | 205.51 | 584.51 | 237.49 | 584.24 |
| 107.01 | 583.88 | 173.53 | 583.82 | 205.51 | 583.68 | 237.49 | 583.68 | 269.47 | 583.3  |
| 118.84 | 583.28 | 205.51 | 583.01 | 237.49 | 584.99 | 269.47 | 584.98 | 301.45 | 584.92 |
| 147.27 | 564.87 | 237.49 | 564.83 | 269.47 | 564.78 | 301.45 | 564.75 | 333.43 | 564.73 |
| 147.54 | 564.69 | 269.47 | 564.64 | 301.45 | 564.6  | 333.43 | 564.56 | 365.41 | 564.52 |
| 147.77 | 564.48 | 301.45 | 564.44 | 333.43 | 564.41 | 365.41 | 564.37 | 397.39 | 564.33 |
| 147.98 | 564.3  | 333.43 | 564.27 | 365.41 | 564.25 | 397.39 | 564.21 | 429.37 | 564.21 |
| 156.2  | 564.21 | 365.41 | 564.21 | 397.39 | 564.66 | 429.37 | 564.84 | 461.35 | 579    |
| 166.29 | 579.23 | 397.39 | 579.29 | 429.37 | 579.48 | 461.35 | 579.87 | 493.33 | 579.91 |
| 180.45 | 582.82 | 429.37 | 587.18 | 461.35 | 588    | 493.33 | 588.02 | 525.31 | 588.18 |
| 199.74 | 588.72 | 461.35 | 588.87 | 493.33 | 589    | 525.31 | 589    | 557.29 | 589    |
| 201.51 | 589    | 493.33 | 589    | 525.31 | 589    | 557.29 | 590    | 589.27 | 590    |
| 219.81 | 590    | 525.31 | 590.67 | 557.29 | 591    | 589.27 | 591.51 | 621.25 | 592    |
| 227.2  | 592.89 | 557.29 | 593    | 589.27 | 593.06 | 621.25 | 594    | 653.23 | 594.76 |
| 232.73 | 593    | 589.27 | 595.42 | 621.25 | 596    | 653.23 | 596.59 | 685.21 | 597    |
| 239.67 | 597.59 | 621.25 | 598    | 653.23 | 598.75 | 685.21 | 599    | 717.19 | 599.28 |
| 246.26 | 600    | 653.23 | 600.35 | 685.21 | 601    | 717.19 | 601.35 |        |        |

LemonCreekPR.rep

|                                                     |                                                          |                       |           |              |           |
|-----------------------------------------------------|----------------------------------------------------------|-----------------------|-----------|--------------|-----------|
| Manning's n Values                                  | num= 10                                                  |                       |           |              |           |
| Sta n Val                                           | Sta n Val                                                | Sta n Val             | Sta n Val | Sta n Val    | Sta n Val |
| 0 .024 37.13 .035 107.86 .024 119.26 .07 147.09 .04 | 156.54 .07 165.85 .024 171.21 .07 201.91 .024 219.79 .07 |                       |           |              |           |
| Bank Sta: Left                                      | Right                                                    | Lengths: Left Channel | Right     | Coeff Contr. | Expan.    |
| 119.26                                              | 165.85                                                   | 107.36                | 105.37    | 108.86       | .1 .3     |

CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 580.75   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 1.09     | wt. n-Val.             |         | 0.065   |
| 0.024              |          |                        |         |         |
| W.S. Elev (ft)     | 579.66   | Reach Len. (ft)        | 107.36  | 105.37  |
| 108.86             |          |                        |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft)      |         | 379.75  |
| 0.55               |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.010025 | Area (sq ft)           |         | 379.75  |
| 0.55               |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             |         | 3180.55 |
| 1.45               |          |                        |         |         |
| Top Width (ft)     | 43.24    | Top Width (ft)         |         | 41.42   |
| 1.82               |          |                        |         |         |
| Vel Total (ft/s)   | 8.37     | Avg. Vel. (ft/s)       |         | 8.38    |
| 2.65               |          |                        |         |         |
| Max Chl Dpth (ft)  | 15.45    | Hydr. Depth (ft)       |         | 9.17    |
| 0.30               |          |                        |         |         |
| Conv. Total (cfs)  | 31780.8  | Conv. (cfs)            |         | 31766.3 |
| 14.5               |          |                        |         |         |
| Length Wtd. (ft)   | 105.64   | Wetted Per. (ft)       |         | 54.19   |
| 1.95               |          |                        |         |         |
| Min Ch El (ft)     | 564.21   | Shear (lb/sq ft)       |         | 4.39    |
| 0.18               |          |                        |         |         |
| Alpha              | 1.00     | Stream Power (lb/ft s) | 250.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.66     | Cum Volume (acre-ft)   | 1.69    | 6.56    |
| 1.81               |          |                        |         |         |
| C & E Loss (ft)    | 0.05     | Cum SA (acres)         | 0.75    | 0.71    |
| 0.61               |          |                        |         |         |

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.  
Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1770.29

INPUT  
Description:  
Station Elevation Data num= 108

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 589    | 25.87  | 589    | 51.04  | 589    | 76.21  | 589    | 101.38 | 589    |
| 73.75  | 589    | 81.34  | 589    | 85.71  | 587.25 | 91.33  | 585    | 93.06  | 584.49 |
| 94.34  | 584.09 | 95.21  | 583.95 | 95.22  | 583.94 | 95.99  | 583.28 | 108.67 | 572.52 |
| 108.88 | 572.35 | 116.93 | 565.92 | 117.88 | 565.16 | 118.6  | 565.18 | 125.31 | 565.62 |
| 125.38 | 565.69 | 125.41 | 565.71 | 125.66 | 565.91 | 125.78 | 566    | 125.94 | 566.24 |
| 138.43 | 574.09 | 138.45 | 574.1  | 141.94 | 574.37 | 145.34 | 574.51 | 147.29 | 574.98 |

|                  |        |        |        |        |        |        |        |        |        |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| LemonCreekPR.rep |        |        |        |        |        |        |        |        |        |
| 160.68           | 578.23 | 161.47 | 578.51 | 161.51 | 578.51 | 161.63 | 578.55 | 161.89 | 578.63 |
| 163.04           | 578.99 | 163.06 | 579    | 163.17 | 579.04 | 165.94 | 580    | 166.26 | 580.11 |
| 168.78           | 581    | 169.35 | 581.2  | 171.61 | 582    | 173.83 | 582.87 | 174.16 | 583    |
| 174.79           | 583    | 175.98 | 583    | 177.52 | 583    | 179.09 | 583    | 179.76 | 583    |
| 180.78           | 583    | 181.98 | 583.11 | 183.49 | 583.26 | 185.35 | 583.57 | 186.2  | 583.67 |
| 186.6            | 583.72 | 186.75 | 583.74 | 187.97 | 584    | 191.87 | 584.8  | 192.29 | 584.88 |
| 192.9            | 585    | 193.21 | 585    | 193.23 | 585    | 193.5  | 585    | 193.54 | 585    |
| 206.96           | 585.41 | 207.3  | 585.41 | 207.69 | 585.41 | 208.9  | 585.53 | 209.2  | 585.53 |
| 209.45           | 585.53 | 209.69 | 585.53 | 211.5  | 585.75 | 211.71 | 585.75 | 211.97 | 585.76 |
| 212.25           | 585.76 | 213.55 | 586    | 214.45 | 586.39 | 215.89 | 587    | 217.74 | 587.76 |
| 218.32           | 588    | 219.58 | 588.52 | 220.75 | 589    | 221.94 | 589.49 | 223.19 | 590    |
| 224.33           | 590.47 | 225.62 | 591    | 227.57 | 591.8  | 228.05 | 592    | 228.37 | 592.13 |
| 230.48           | 593    | 231.7  | 593.51 | 232.9  | 594    | 233.84 | 594.39 | 235.3  | 595    |
| 236.32           | 595.43 | 237.68 | 596    | 239.71 | 596.85 | 240.06 | 597    | 240.56 | 597.21 |
| 242.43           | 598    | 243.81 | 598.58 | 244.81 | 599    | 245.93 | 599.47 | 247.18 | 600    |
| 248.32           | 600.48 | 249.55 | 601    | 250    | 601.19 |        |        |        |        |

|                    |       |        |       |        |       |        |       |        |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| Manning's n Values |       |        |       |        |       |        |       |        |       |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .024  | 81.34  | .035  | 95.99  | .07   | 108.67 | .04   | 138.43 | .024  |
| 145.34             | .07   | 174.16 | .024  | 180.78 | .07   | 192.9  | .024  | 213.55 | .07   |

|                |        |                       |        |       |        |        |
|----------------|--------|-----------------------|--------|-------|--------|--------|
| Bank Sta: Left | Right  | Lengths: Left Channel | Right  | Coeff | Contr. | Expan. |
| 95.99          | 138.43 | 181.22                | 176.46 | 170.8 | .1     | .3     |

#### CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 580.04   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.91     | wt. n-val.             |         | 0.048   |
| 0.034              |          |                        |         |         |
| W.S. Elev (ft)     | 579.13   | Reach Len. (ft)        | 181.22  | 176.46  |
| 170.80             |          |                        |         |         |
| Crit W.S. (ft)     |          | Flow Area (sq ft)      |         | 343.05  |
| 76.75              |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.004238 | Area (sq ft)           |         | 343.05  |
| 76.75              |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             |         | 2696.70 |
| 485.30             |          |                        |         |         |
| Top width (ft)     | 62.55    | Top width (ft)         |         | 37.55   |
| 25.00              |          |                        |         |         |
| Vel Total (ft/s)   | 7.58     | Avg. vel. (ft/s)       |         | 7.86    |
| 6.32               |          |                        |         |         |
| Max Chl Dpth (ft)  | 13.97    | Hydr. Depth (ft)       |         | 9.14    |
| 3.07               |          |                        |         |         |
| Conv. Total (cfs)  | 48879.9  | Conv. (cfs)            |         | 41425.1 |
| 7454.8             |          |                        |         |         |
| Length wtd. (ft)   | 175.08   | wetted Per. (ft)       |         | 45.10   |
| 25.61              |          |                        |         |         |
| Min Ch El (ft)     | 565.16   | Shear (lb/sq ft)       |         | 2.01    |
| 0.79               |          |                        |         |         |
| Alpha              | 1.02     | Stream Power (lb/ft s) | 250.00  | 0.00    |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.56     | Cum Volume (acre-ft)   | 1.69    | 5.69    |
| 1.72               |          |                        |         |         |
| C & E Loss (ft)    | 0.05     | Cum SA (acres)         | 0.75    | 0.61    |
| 0.58               |          |                        |         |         |

Note: Manning's n values were composited to a single value in the main channel.

#### CROSS SECTION

|                   |             |        |        |        |        |        |        |        |        |
|-------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|
| LemonCreekPR.rep  |             |        |        |        |        |        |        |        |        |
| RIVER: LemonCreek |             |        |        |        |        |        |        |        |        |
| REACH: Reach1     | RS: 1593.83 |        |        |        |        |        |        |        |        |
| INPUT             |             |        |        |        |        |        |        |        |        |
| Description:      |             |        |        |        |        |        |        |        |        |
| Station           | Elevation   | Data   | num=   | 87     |        |        |        |        |        |
| Sta               | Elev        | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
| 0                 | 582         | 3.99   | 582    | 70.62  | 582    | 99.25  | 582    | 100.27 | 581.35 |
| 100.29            | 581.34      | 100.39 | 581.27 | 100.41 | 581.26 | 100.49 | 581.2  | 100.5  | 581.19 |
| 100.55            | 581.16      | 100.66 | 581.08 | 100.68 | 581.07 | 100.84 | 580.95 | 100.85 | 580.95 |
| 101.55            | 580.45      | 102.09 | 580.06 | 102.17 | 579.99 | 102.2  | 579.99 | 102.22 | 579.99 |
| 102.61            | 579.92      | 102.88 | 579.87 | 102.97 | 579.85 | 114.77 | 569.5  | 120.75 | 564.25 |
| 120.8             | 564.26      | 122.33 | 564.26 | 126.98 | 564.28 | 127.2  | 564.29 | 127.64 | 564.66 |
| 133.94            | 570.51      | 134.85 | 570.91 | 135.83 | 570.93 | 143.73 | 571.03 | 160.54 | 576.19 |
| 172.63            | 579.54      | 181.51 | 580.45 | 181.85 | 580.48 | 181.97 | 580.49 | 182.02 | 580.5  |
| 182.12            | 580.51      | 182.42 | 580.54 | 186.94 | 581    | 187.92 | 581.1  | 191.92 | 581.53 |
| 196.39            | 582         | 198.1  | 582    | 198.49 | 582    | 200.96 | 582    | 211.94 | 582    |
| 212.28            | 582         | 212.35 | 582.03 | 214.45 | 583    | 215.94 | 583.69 | 216.62 | 584    |
| 216.83            | 584.09      | 218.8  | 585    | 218.83 | 585.01 | 220.98 | 586    | 222.27 | 586.59 |
| 223.18            | 587         | 223.91 | 587.34 | 225.37 | 588    | 226.54 | 588.54 | 227.56 | 589    |
| 228.86            | 589.59      | 229.75 | 590    | 230.55 | 590.38 | 231.85 | 591    | 233.45 | 591.84 |
| 233.75            | 592         | 234.07 | 592.17 | 235.69 | 593    | 236    | 593.16 | 237.68 | 594    |
| 239.46            | 594.89      | 239.68 | 595    | 239.78 | 595.05 | 241.67 | 596    | 243.11 | 596.7  |
| 243.73            | 597         | 245.74 | 597.96 | 245.82 | 598    | 245.85 | 598.01 | 247.91 | 599    |
| 248.57            | 599.32      | 250    | 600    |        |        |        |        |        |        |

|                    |       |        |       |        |       |        |       |        |       |
|--------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| Manning's n Values |       |        |       |        |       |        |       |        |       |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .024  | 99.25  | .07   | 102.97 | .04   | 134.85 | .024  | 143.73 | .07   |
| 172.63             | .035  | 196.39 | .024  | 211.94 | .07   |        |       |        |       |

#### CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 579.43   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.75     | wt. n-val.             |         | 0.040   |
| 0.034              |          |                        |         |         |
| W.S. Elev (ft)     | 578.69   | Reach Len. (ft)        | 130.89  | 127.96  |
| 126.93             |          |                        |         |         |
| Crit W.S. (ft)     | 574.94   | Flow Area (sq ft)      |         | 295.17  |
| 165.05             |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.002473 | Area (sq ft)           |         | 295.17  |
| 165.05             |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             |         | 2120.06 |
| 1061.95            |          |                        |         |         |
| Top width (ft)     | 65.25    | Top width (ft)         |         | 30.55   |
| 34.70              |          |                        |         |         |
| Vel Total (ft/s)   | 6.91     | Avg. vel. (ft/s)       |         | 7.18    |
| 6.43               |          |                        |         |         |
| Max Chl Dpth (ft)  | 14.44    | Hydr. Depth (ft)       |         | 9.66    |
| 4.76               |          |                        |         |         |
| Conv. Total (cfs)  | 63983.2  | Conv. (cfs)            |         | 42629.8 |
| 21353.4            |          |                        |         |         |
| Length wtd. (ft)   | 127.54   | wetted Per. (ft)       |         | 38.51   |
| 35.81              |          |                        |         |         |
| Min Ch El (ft)     | 564.25   | Shear (lb/sq ft)       |         | 1.18    |
| 0.71               |          |                        |         |         |
| Alpha              | 1.01     | Stream Power (lb/ft s) | 250.00  | 99.25   |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.20     | Cum Volume (acre-ft)   | 1.69    | 4.40    |
| 1.24               |          |                        |         |         |



LemonCreekPR.rep

|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 346.67 | 587.55 | 347.74 | 588    | 349.9  | 588.92 | 350.1  | 589    | 350.22 | 589.05 |
| 350.28 | 589.07 | 350.6  | 589.21 | 352.4  | 590    | 353.8  | 590.74 | 354.3  | 591    |
| 356.19 | 591.99 | 356.21 | 592    | 356.55 | 592.16 | 358.36 | 593    | 358.51 | 593.07 |
| 358.63 | 593.12 | 359.44 | 593.48 | 360.32 | 593.84 | 360.48 | 593.91 | 360.53 | 593.93 |
| 360.7  | 594    | 361.11 | 594.15 | 361.51 | 594.29 | 361.87 | 594.4  | 362.1  | 594.47 |
| 362.37 | 594.56 | 362.77 | 594.68 | 362.91 | 594.73 | 363.53 | 594.92 | 363.79 | 595    |
| 364.18 | 595.12 | 364.28 | 595.16 | 364.7  | 595.3  | 364.97 | 595.38 | 365    | 595.39 |

Manning's n Values num= 8

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .024  | 2.22   | .035  | 9.35   | .024  | 217.76 | .07   | 223.31 | .04   |
| 248.36 | .024  | 253.19 | .035  | 330.48 | .07   |        |       |        |       |

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

|                      |           |            |      |      |      |    |    |  |  |
|----------------------|-----------|------------|------|------|------|----|----|--|--|
| 219.19               | 262.76    |            | 28.9 | 26.5 | 28.7 | .1 | .3 |  |  |
| Ineffective Flow     | num= 3    |            |      |      |      |    |    |  |  |
| Sta L Sta R Elev     | Permanent |            |      |      |      |    |    |  |  |
| 0 183.26 577.17      | F         |            |      |      |      |    |    |  |  |
| 183.26 224.89 577.34 | F         |            |      |      |      |    |    |  |  |
| 244.89 365 577.34    | F         |            |      |      |      |    |    |  |  |
| Left Levee Station=  | 183.26    | Elevation= | 579  |      |      |    |    |  |  |

CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 579.04   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.89     | wt. n-val.             | 0.025   | 0.041   |
| 0.035              |          |                        |         |         |
| W.S. Elev (ft)     | 578.15   | Reach Len. (ft)        | 28.90   | 26.50   |
| 28.70              |          |                        |         |         |
| Crit W.S. (ft)     | 572.74   | Flow Area (sq ft)      | 41.09   | 389.40  |
| 4.54               |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.003886 | Area (sq ft)           | 41.09   | 389.40  |
| 4.54               |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 163.14  | 3014.37 |
| 4.49               |          |                        |         |         |
| Top width (ft)     | 99.37    | Top width (ft)         | 35.93   | 43.57   |
| 19.87              |          |                        |         |         |
| Vel Total (ft/s)   | 7.31     | Avg. Vel. (ft/s)       | 3.97    | 7.74    |
| 0.99               |          |                        |         |         |
| Max Chl Dpth (ft)  | 14.64    | Hydr. Depth (ft)       | 1.14    | 8.94    |
| 0.23               |          |                        |         |         |
| Conv. Total (cfs)  | 51047.1  | Conv. (cfs)            | 2617.2  | 48357.9 |
| 72.0               |          |                        |         |         |
| Length wtd. (ft)   | 26.50    | wetted Per. (ft)       | 37.11   | 62.30   |
| 19.87              |          |                        |         |         |
| Min Ch El (ft)     | 563.51   | Shear (lb/sq ft)       | 0.27    | 1.52    |
| 0.06               |          |                        |         |         |
| Alpha              | 1.08     | Stream Power (lb/ft s) | 365.00  | 183.26  |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    |          | Cum Volume (acre-ft)   | 1.64    | 3.12    |
| 0.52               |          |                        |         |         |
| C & E Loss (ft)    |          | Cum SA (acres)         | 0.70    | 0.34    |
| 0.30               |          |                        |         |         |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CULVERT

RIVER: LemonCreek  
REACH: Reach1 RS: 1412.68

LemonCreekPR.rep

INPUT  
Description: Culvert #2  
Distance from Upstream XS = 5  
Deck/Roadway Width = 16.5  
Weir Coefficient = 2.6  
Upstream Deck/Roadway Coordinates

| Sta    | Hi     | Cord | Lo | Cord | Sta    | Hi     | Cord | Lo | Cord | Sta    | Hi     | Cord | Lo | Cord |
|--------|--------|------|----|------|--------|--------|------|----|------|--------|--------|------|----|------|
| 217.76 | 577    |      |    |      | 224.89 | 577.34 |      |    |      | 234.89 | 577.34 |      |    |      |
| 244.89 | 577.34 |      |    |      | 262.76 | 577.82 |      |    |      |        |        |      |    |      |

Upstream Bridge Cross Section Data

| Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0      | 583    | 2.22   | 583    | 3.42   | 582.51 | 9.35   | 580    | 24.98  | 580    |
| 35     | 580    | 53.74  | 580    | 60.06  | 580    | 66.66  | 580    | 77.33  | 580    |
| 84.84  | 580    | 85.06  | 579.81 | 85.96  | 579    | 87.06  | 579    | 88.34  | 579    |
| 90.08  | 579    | 102.9  | 579    | 104.54 | 579    | 115    | 579    | 129.29 | 579    |
| 129.56 | 578.35 | 130.11 | 576.57 | 132.74 | 576.56 | 135.29 | 576.54 | 135.59 | 576.25 |
| 135.8  | 576.04 | 135.93 | 575.16 | 136.01 | 574.54 | 153.8  | 574.94 | 154.62 | 574.96 |
| 154.94 | 574.97 | 155.96 | 574.93 | 173.7  | 574.38 | 173.85 | 575.47 | 173.91 | 575.88 |
| 174.28 | 576.24 | 174.42 | 576.37 | 178.45 | 576.36 | 179.57 | 576.35 | 181.38 | 576.59 |
| 182.33 | 576.89 | 183.26 | 577.17 | 185.45 | 577.16 | 193.13 | 577.13 | 206.94 | 576.86 |
| 217.76 | 577    | 219.19 | 576.22 | 221.48 | 574.97 | 223.31 | 574.56 | 223.33 | 574.57 |
| 224.21 | 573.34 | 224.89 | 563.51 | 228.69 | 563.51 | 230.99 | 563.51 | 242.37 | 563.51 |
| 244.65 | 563.51 | 244.83 | 563.51 | 247.69 | 573.13 | 248.26 | 573.38 | 248.36 | 573.95 |
| 248.54 | 573.83 | 253.19 | 573.81 | 261.95 | 577.35 | 262.76 | 577.82 | 266.54 | 577.85 |
| 273.43 | 577.88 | 274.65 | 577.86 | 275.02 | 577.89 | 277.09 | 577.96 | 280.42 | 578.07 |
| 280.88 | 578.08 | 281.42 | 578.1  | 281.55 | 578.1  | 289.48 | 578.44 | 289.87 | 578.46 |
| 290.5  | 578.48 | 291.08 | 578.51 | 292.63 | 578.57 | 295.74 | 578.7  | 302.21 | 578.98 |
| 302.26 | 578.98 | 302.76 | 579    | 306.18 | 579.22 | 318.43 | 580    | 320.22 | 580.16 |
| 321.72 | 580.29 | 321.96 | 580.31 | 324.19 | 580.48 | 324.44 | 580.5  | 324.89 | 580.52 |
| 330.48 | 581    | 330.71 | 581    | 330.75 | 581    | 330.97 | 581    | 331.68 | 581.25 |
| 332.96 | 581.71 | 333.86 | 582    | 335.27 | 582.6  | 336.27 | 583    | 336.32 | 583.02 |
| 336.38 | 583.05 | 337.53 | 583.57 | 338.45 | 584    | 339.22 | 584.34 | 340.7  | 585    |
| 341.39 | 585.3  | 342.46 | 585.75 | 343.03 | 586    | 344.57 | 586.65 | 345.38 | 587    |
| 346.67 | 587.55 | 347.74 | 588    | 349.9  | 588.92 | 350.1  | 589    | 350.22 | 589.05 |
| 350.28 | 589.07 | 350.6  | 589.21 | 352.4  | 590    | 353.8  | 590.74 | 354.3  | 591    |
| 356.19 | 591.99 | 356.21 | 592    | 356.55 | 592.16 | 358.36 | 593    | 358.51 | 593.07 |
| 358.63 | 593.12 | 359.44 | 593.48 | 360.32 | 593.84 | 360.48 | 593.91 | 360.53 | 593.93 |
| 360.7  | 594    | 361.11 | 594.15 | 361.51 | 594.29 | 361.87 | 594.4  | 362.1  | 594.47 |
| 362.37 | 594.56 | 362.77 | 594.68 | 362.91 | 594.73 | 363.53 | 594.92 | 363.79 | 595    |
| 364.18 | 595.12 | 364.28 | 595.16 | 364.7  | 595.3  | 364.97 | 595.38 | 365    | 595.39 |

Manning's n Values num= 8

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .024  | 2.22   | .035  | 9.35   | .024  | 217.76 | .07   | 223.31 | .04   |
| 248.36 | .024  | 253.19 | .035  | 330.48 | .07   |        |       |        |       |

Bank Sta: Left Right Coeff Contr. Expan.

|                      |           |            |     |    |  |  |  |  |  |
|----------------------|-----------|------------|-----|----|--|--|--|--|--|
| 219.19               | 262.76    |            | .1  | .3 |  |  |  |  |  |
| Ineffective Flow     | num= 3    |            |     |    |  |  |  |  |  |
| Sta L Sta R Elev     | Permanent |            |     |    |  |  |  |  |  |
| 0 183.26 577.17      | F         |            |     |    |  |  |  |  |  |
| 183.26 224.89 577.34 | F         |            |     |    |  |  |  |  |  |
| 244.89 365 577.34    | F         |            |     |    |  |  |  |  |  |
| Left Levee Station=  | 183.26    | Elevation= | 579 |    |  |  |  |  |  |

Downstream Deck/Roadway Coordinates

| Sta    | Hi     | Cord | Lo | Cord | Sta    | Hi     | Cord | Lo | Cord |
|--------|--------|------|----|------|--------|--------|------|----|------|
| 179.99 | 573.89 |      |    |      | 185.12 | 577.34 |      |    |      |
| 205.12 | 577.34 |      |    |      | 212.17 | 576.66 |      |    |      |

Downstream Bridge Cross Section Data

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| Station | Elevation | Data   | num=   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| 0       | 580       | 22.76  | 580    | 23.1   | 579.71 | 23.89  | 579    | 94.84  | 579    |     |      |
| 96.33   | 576.44    | 96.62  | 575.98 | 96.89  | 575.98 | 101.69 | 575.96 | 101.74 | 575.91 |     |      |
| 102.2   | 575.46    | 102.22 | 575.3  | 102.4  | 573.96 | 117.29 | 574.33 | 120.97 | 574.42 |     |      |
| 127.82  | 574.22    | 139.54 | 573.86 | 139.65 | 574.65 | 139.74 | 575.36 | 140.01 | 575.63 |     |      |
| 140.25  | 575.86    | 143.1  | 575.85 | 145.32 | 575.84 | 147.08 | 575.82 | 147.94 | 575.68 |     |      |
| 151.82  | 575.64    | 153.01 | 575.63 | 157.4  | 575.68 | 163.01 | 575.37 | 168.11 | 573.62 |     |      |
| 173.95  | 574.5     | 174.43 | 574.45 | 179.54 | 573.92 | 179.99 | 573.89 | 180.08 | 573.34 |     |      |
| 185.12  | 563.39    | 186.91 | 563.39 | 187.62 | 563.39 | 189.25 | 563.39 | 195.87 | 563.39 |     |      |
| 199.62  | 563.39    | 200.25 | 563.39 | 205.12 | 563.39 | 208.93 | 574.42 | 212.17 | 576.66 |     |      |
| 219.47  | 577.14    | 219.56 | 577.14 | 219.84 | 577.15 | 220.08 | 577.16 | 220.38 | 577.17 |     |      |
| 220.7   | 577.19    | 221.19 | 577.2  | 221.41 | 577.22 | 223.44 | 577.22 | 235.21 | 578    |     |      |
| 243.98  | 578       | 244.07 | 578.01 | 244.09 | 578.01 | 244.1  | 578.01 | 244.79 | 578.09 |     |      |
| 244.99  | 578.11    | 245.28 | 578.15 | 246.82 | 578.33 | 248.15 | 578.49 | 249.44 | 578.65 |     |      |
| 252.33  | 579       | 252.59 | 579.03 | 252.64 | 579.04 | 252.72 | 579.04 | 255.07 | 579.32 |     |      |
| 255.51  | 579.36    | 256.1  | 579.42 | 257.16 | 579.54 | 259.32 | 579.78 | 260.14 | 579.87 |     |      |
| 261.28  | 580       | 262.79 | 580.18 | 262.88 | 580.18 | 264.62 | 580.39 | 265.05 | 580.43 |     |      |
| 267.03  | 580.64    | 267.33 | 580.67 | 268.32 | 580.78 | 268.5  | 580.8  | 268.64 | 580.81 |     |      |
| 270.2   | 581       | 270.39 | 581    | 271.03 | 581.12 | 271.17 | 581.14 | 271.62 | 581.21 |     |      |
| 274.31  | 581.59    | 276.6  | 581.93 | 276.81 | 581.96 | 277.06 | 582    | 279.43 | 582.32 |     |      |
| 280.07  | 582.4     | 281.52 | 582.59 | 282.59 | 582.73 | 284.12 | 582.93 | 284.29 | 582.95 |     |      |
| 284.66  | 583       | 285.03 | 583.05 | 286.23 | 583.18 | 286.66 | 583.21 | 286.67 | 583.21 |     |      |
| 287.22  | 583.25    | 287.8  | 583.29 | 291.61 | 583.33 | 291.69 | 583.33 | 292.88 | 583.29 |     |      |
| 293.54  | 583.25    | 293.77 | 583.25 | 294.03 | 583.24 | 295.35 | 583.19 | 295.57 | 583.19 |     |      |
| 297.04  | 583.14    | 297.2  | 583.13 | 297.33 | 583.13 | 298.82 | 583.08 | 298.86 | 583.08 |     |      |
| 300.33  | 583.03    | 301.56 | 583    | 301.64 | 583    | 301.66 | 583    | 302.47 | 583    |     |      |
| 302.66  | 583       | 302.86 | 583    | 302.93 | 583    | 302.97 | 583    | 302.99 | 583.01 |     |      |
| 305.98  | 584       | 306.6  | 584.32 | 307.92 | 585    | 309.62 | 585.8  | 310.06 | 586    |     |      |
| 311.35  | 586.59    | 312.23 | 587    | 312.92 | 587.27 | 314.04 | 587.69 | 314.85 | 588    |     |      |
| 315.7   | 588.32    | 317.52 | 589    | 318.85 | 589.5  | 321.92 | 590.65 | 322.84 | 591    |     |      |
| 324.33  | 591.56    | 325.51 | 592    | 326.67 | 592.44 | 328.18 | 593    | 328.8  | 593.23 |     |      |
| 329.64  | 593.55    | 330    | 593.68 |        |        |        |        |        |        |     |      |

Manning's n Values

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .024  | 157.4  | .035  | 163.01 | .07   | 173.95 | .04   |
| 212.17 | .035  | 302.97 | .07   |        |       | 208.93 | .07   |

Bank Sta: Left 174.43 Right 212.17 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev   | Permanent |
|--------|--------|--------|-----------|
| 0      | 185.12 | 577.34 | F         |
| 205.12 | 330    | 577.34 | F         |

Left Levee Station= 140.25 Elevation= 578.5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

Downstream Embankment side slope = 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .98

Elevation at which weir flow begins =

Energy head used in spillway design =

Spillway height used in design =

Weir crest shape = Broad Crested

Number of Culverts = 1

| Culvert Name | Shape | Rise  | Span |
|--------------|-------|-------|------|
| Culvert #1   | Arch  | 10.25 | 13.5 |

FWHA Chart # 41- Arch; Corrugated metal

FWHA Scale # 1 - 90 Degree headwall

Solution Criteria = Highest U.S. EG

| Culvert Upstrm Dist | Length | Top n | Bottom n | Depth Blocked | Entrance Loss Coef |
|---------------------|--------|-------|----------|---------------|--------------------|
| Exit Loss Coef      | 5      | 16.5  | .024     | .024          | 0                  |
|                     |        |       |          |               | .5                 |

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LemonCreekPR.rep

Upstream Elevation = 563.51  
Centerline Station = 234.89

Downstream Elevation = 563.39  
Centerline Station = 195.12

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1399.42

INPUT  
Description:

| Station | Elevation | Data   | num=   | Sta    | Elev   | Sta    | Elev   | Sta    | Elev   | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|-----|------|
| 0       | 580       | 22.76  | 580    | 23.1   | 579.71 | 23.89  | 579    | 94.84  | 579    |     |      |
| 96.33   | 576.44    | 96.62  | 575.98 | 96.89  | 575.98 | 101.69 | 575.96 | 101.74 | 575.91 |     |      |
| 102.2   | 575.46    | 102.22 | 575.3  | 102.4  | 573.96 | 117.29 | 574.33 | 120.97 | 574.42 |     |      |
| 127.82  | 574.22    | 139.54 | 573.86 | 139.65 | 574.65 | 139.74 | 575.36 | 140.01 | 575.63 |     |      |
| 140.25  | 575.86    | 143.1  | 575.85 | 145.32 | 575.84 | 147.08 | 575.82 | 147.94 | 575.68 |     |      |
| 151.82  | 575.64    | 153.01 | 575.63 | 157.4  | 575.68 | 163.01 | 575.37 | 168.11 | 573.62 |     |      |
| 173.95  | 574.5     | 174.43 | 574.45 | 179.54 | 573.92 | 179.99 | 573.89 | 180.08 | 573.34 |     |      |
| 185.12  | 563.39    | 186.91 | 563.39 | 187.62 | 563.39 | 189.25 | 563.39 | 195.87 | 563.39 |     |      |
| 199.62  | 563.39    | 200.25 | 563.39 | 205.12 | 563.39 | 208.93 | 574.42 | 212.17 | 576.66 |     |      |
| 219.47  | 577.14    | 219.56 | 577.14 | 219.84 | 577.15 | 220.08 | 577.16 | 220.38 | 577.17 |     |      |
| 220.7   | 577.19    | 221.19 | 577.2  | 221.41 | 577.22 | 223.44 | 577.22 | 235.21 | 578    |     |      |
| 243.98  | 578       | 244.07 | 578.01 | 244.09 | 578.01 | 244.1  | 578.01 | 244.79 | 578.09 |     |      |
| 244.99  | 578.11    | 245.28 | 578.15 | 246.82 | 578.33 | 248.15 | 578.49 | 249.44 | 578.65 |     |      |
| 252.33  | 579       | 252.59 | 579.03 | 252.64 | 579.04 | 252.72 | 579.04 | 255.07 | 579.32 |     |      |
| 255.51  | 579.36    | 256.1  | 579.42 | 257.16 | 579.54 | 259.32 | 579.78 | 260.14 | 579.87 |     |      |
| 261.28  | 580       | 262.79 | 580.18 | 262.88 | 580.18 | 264.62 | 580.39 | 265.05 | 580.43 |     |      |
| 267.03  | 580.64    | 267.33 | 580.67 | 268.32 | 580.78 | 268.5  | 580.8  | 268.64 | 580.81 |     |      |
| 270.2   | 581       | 270.39 | 581    | 271.03 | 581.12 | 271.17 | 581.14 | 271.62 | 581.21 |     |      |
| 274.31  | 581.59    | 276.6  | 581.93 | 276.81 | 581.96 | 277.06 | 582    | 279.43 | 582.32 |     |      |
| 280.07  | 582.4     | 281.52 | 582.59 | 282.59 | 582.73 | 284.12 | 582.93 | 284.29 | 582.95 |     |      |
| 284.66  | 583       | 285.03 | 583.05 | 286.23 | 583.18 | 286.66 | 583.21 | 286.67 | 583.21 |     |      |
| 287.22  | 583.25    | 287.8  | 583.29 | 291.61 | 583.33 | 291.69 | 583.33 | 292.88 | 583.29 |     |      |
| 293.54  | 583.25    | 293.77 | 583.25 | 294.03 | 583.24 | 295.35 | 583.19 | 295.57 | 583.19 |     |      |
| 297.04  | 583.14    | 297.2  | 583.13 | 297.33 | 583.13 | 298.82 | 583.08 | 298.86 | 583.08 |     |      |
| 300.33  | 583.03    | 301.56 | 583    | 301.64 | 583    | 301.66 | 583    | 302.47 | 583    |     |      |
| 302.66  | 583       | 302.86 | 583    | 302.93 | 583    | 302.97 | 583    | 302.99 | 583.01 |     |      |
| 305.98  | 584       | 306.6  | 584.32 | 307.92 | 585    | 309.62 | 585.8  | 310.06 | 586    |     |      |
| 311.35  | 586.59    | 312.23 | 587    | 312.92 | 587.27 | 314.04 | 587.69 | 314.85 | 588    |     |      |
| 315.7   | 588.32    | 317.52 | 589    | 318.85 | 589.5  | 321.92 | 590.65 | 322.84 | 591    |     |      |
| 324.33  | 591.56    | 325.51 | 592    | 326.67 | 592.44 | 328.18 | 593    | 328.8  | 593.23 |     |      |
| 329.64  | 593.55    | 330    | 593.68 |        |        |        |        |        |        |     |      |

Manning's n Values

| Sta    | n Val | Sta    | n Val | Sta    | n Val | Sta    | n Val |
|--------|-------|--------|-------|--------|-------|--------|-------|
| 0      | .024  | 157.4  | .035  | 163.01 | .07   | 173.95 | .04   |
| 212.17 | .035  | 302.97 | .07   |        |       | 208.93 | .07   |

Bank Sta: Left 174.43 Right 212.17 Lengths: Left Channel 31.63 Right 31.45 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev   | Permanent |
|--------|--------|--------|-----------|
| 0      | 185.12 | 577.34 | F         |
| 205.12 | 330    | 577.34 | F         |

Left Levee Station= 140.25 Elevation= 578.5

CROSS SECTION OUTPUT Profile #50-YR

| E.G. Elev (ft) | Element | Left OB    | Channel |
|----------------|---------|------------|---------|
| Right OB       |         |            |         |
| Vel Head (ft)  | 4.60    | wt. n-Val. | 0.040   |

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| LemonCreekPR.rep   |          |                        |        |         |
|--------------------|----------|------------------------|--------|---------|
| W.S. Elev (ft)     | 572.63   | Reach Len. (ft)        | 31.63  | 31.45   |
| 35.82              |          |                        |        |         |
| Crit W.S. (ft)     | 572.63   | Flow Area (sq ft)      |        | 184.89  |
| E.G. Slope (ft/ft) | 0.011063 | Area (sq ft)           |        | 221.29  |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             |        | 3182.00 |
| Top width (ft)     | 27.88    | Top Width (ft)         |        | 27.88   |
| Vel Total (ft/s)   | 17.21    | Avg. Vel. (ft/s)       |        | 17.21   |
| Max Chl Dpth (ft)  | 9.24     | Hydr. Depth (ft)       |        | 9.24    |
| Conv. Total (cfs)  | 30252.5  | Conv. (cfs)            |        | 30252.5 |
| Length wtd. (ft)   | 31.45    | Wetted Per. (ft)       |        | 20.00   |
| Min Ch El (ft)     | 563.39   | Shear (lb/sq ft)       |        | 6.38    |
| Alpha              | 1.00     | Stream Power (lb/ft s) | 330.00 | 140.25  |
| 0.00               |          |                        |        |         |
| Frctn Loss (ft)    | 0.29     | Cum Volume (acre-ft)   | 1.64   | 2.83    |
| 0.52               |          |                        |        |         |
| C & E Loss (ft)    | 0.87     | Cum SA (acres)         | 0.69   | 0.32    |
| 0.29               |          |                        |        |         |

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.

warning: when the Manning's n value for the channel was composited, the computed n value was larger [smaller] than the largest [smallest] user entered n value. The n value has been set to the largest [smallest] entered value. The user may wish to examine this cross section and enter a single n value for the entire channel.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### CROSS SECTION

RIVER: LemonCreek  
 REACH: Reach1 RS: 1367.97

| INPUT        |           |       |      |       |        |       |        |       |        |
|--------------|-----------|-------|------|-------|--------|-------|--------|-------|--------|
| Description: |           |       |      |       |        |       |        |       |        |
| Station      | Elevation | Data  | num= | 109   |        |       |        |       |        |
| Sta          | Elev      | Sta   | Elev | Sta   | Elev   | Sta   | Elev   | Sta   | Elev   |
| 0            | 579       | .4    | 579  | 8.23  | 579    | 12.97 | 579    | 23.32 | 579    |
| 32.63        | 579       | 36.92 | 579  | 46.74 | 579    | 50.21 | 579    | 65    | 579    |
| 84.89        | 579       | 90.42 | 579  | 92.63 | 577.04 | 95.28 | 575.44 | 98.13 | 575.43 |

|                                     |        |        |          |        |        |                        |        |        |                   |     |       |
|-------------------------------------|--------|--------|----------|--------|--------|------------------------|--------|--------|-------------------|-----|-------|
| LemonCreekPR.rep                    |        |        |          |        |        |                        |        |        |                   |     |       |
| 100.36                              | 575.42 | 100.66 | 575.13   | 100.87 | 574.92 | 100.99                 | 574.03 | 101.07 | 573.42            |     |       |
| 115.87                              | 573.79 | 119.69 | 573.88   | 123.62 | 573.76 | 138.25                 | 573.32 | 138.29 | 573.63            |     |       |
| 138.45                              | 574.82 | 138.56 | 574.92   | 138.96 | 575.32 | 139.92                 | 575.32 | 144.03 | 575.3             |     |       |
| 146.7                               | 574.4  | 153.19 | 572.07   | 155.29 | 571.84 | 157.62                 | 571.66 | 158.29 | 571.41            |     |       |
| 158.64                              | 571.35 | 171.55 | 569.51   | 172.34 | 569.01 | 173.83                 | 568.75 | 183.44 | 563.33            |     |       |
| 184.24                              | 562.82 | 185.4  | 562.66   | 194.1  | 562.66 | 194.61                 | 562.65 | 196.69 | 564.51            |     |       |
| 208.63                              | 576.44 | 208.86 | 576.43   | 213.77 | 576.23 | 214                    | 576.25 | 214.74 | 576.32            |     |       |
| 216.87                              | 576.45 | 217.37 | 576.48   | 225.91 | 576.96 | 226.76                 | 577    | 228.62 | 577.34            |     |       |
| 230.26                              | 577.64 | 232.28 | 578      | 234.13 | 578.33 | 234.74                 | 578.43 | 237.28 | 578.87            |     |       |
| 237.74                              | 578.95 | 238.07 | 579      | 240.16 | 579.33 | 243.13                 | 579.8  | 243.77 | 579.9             |     |       |
| 244.38                              | 580    | 247.88 | 580.6    | 250.26 | 581    | 251.39                 | 581.18 | 252.34 | 581.32            |     |       |
| 254.47                              | 581.65 | 256.76 | 582      | 257.14 | 582.06 | 257.33                 | 582.08 | 259.62 | 582.42            |     |       |
| 260.73                              | 582.59 | 261.58 | 582.71   | 262.97 | 582.92 | 263.5                  | 583    | 264.49 | 583.15            |     |       |
| 265.05                              | 583.23 | 266.79 | 583.49   | 269.5  | 583.9  | 269.81                 | 583.94 | 269.94 | 583.96            |     |       |
| 270.19                              | 584    | 270.95 | 584      | 271.01 | 584    | 271.77                 | 584    | 271.9  | 584               |     |       |
| 276.63                              | 584    | 277.1  | 584      | 277.53 | 584    | 277.89                 | 584    | 278.14 | 584               |     |       |
| 294.17                              | 584.48 | 295.42 | 584.51   | 297    | 584.56 | 298.89                 | 584.61 | 300.98 | 584.67            |     |       |
| 303.04                              | 584.73 | 303.4  | 584.74   | 304.98 | 584.78 | 305.65                 | 584.8  | 305.96 | 584.81            |     |       |
| 310.7                               | 584.95 | 312.39 | 585      | 314.38 | 585.61 | 315                    | 585.8  |        |                   |     |       |
| Manning's n values                  |        |        | num= 8   |        |        |                        |        |        |                   |     |       |
| Sta                                 | n Val  | Sta    | n Val    | Sta    | n Val  | Sta                    | n Val  | Sta    | n Val             | Sta | n Val |
| 0                                   | .024   | 144.03 | .035     | 158.64 | .07    | 171.55                 | .04    | 208.63 | .035              |     |       |
| 270.19                              | .024   | 278.14 | .035     | 312.39 | .07    |                        |        |        |                   |     |       |
| Bank Sta: Left                      |        |        | Right    |        |        | Lengths: Left Channel  |        |        | Right             |     |       |
| 158.64                              |        |        | 208.63   |        |        | 111.43                 |        |        | 110.1             |     |       |
| Ineffective Flow                    |        |        | num= 1   |        |        | 108.69                 |        |        | Coeff Contr. .1   |     |       |
| Sta L                               |        |        | Sta R    |        |        | Elev                   |        |        | Permanent         |     |       |
| 0                                   |        |        | 138.96   |        |        | 575.32                 |        |        | F                 |     |       |
| Left Levee                          |        |        | Station= |        |        | 138.96                 |        |        | Elevation= 575.32 |     |       |
| CROSS SECTION OUTPUT Profile #50-YR |        |        |          |        |        |                        |        |        |                   |     |       |
| E.G. Elev (ft)                      |        |        | 575.08   |        |        | Element                |        |        | Left OB Channel   |     |       |
| Right OB                            |        |        |          |        |        |                        |        |        |                   |     |       |
| Vel Head (ft)                       |        |        | 1.70     |        |        | wt. n-Val.             |        |        | 0.035 0.041       |     |       |
| W.S. Elev (ft)                      |        |        | 573.38   |        |        | Reach Len. (ft)        |        |        | 111.43 110.10     |     |       |
| 108.69                              |        |        |          |        |        |                        |        |        |                   |     |       |
| Crit W.S. (ft)                      |        |        | 572.29   |        |        | Flow Area (sq ft)      |        |        | 11.11 297.62      |     |       |
| E.G. Slope (ft/ft)                  |        |        | 0.007973 |        |        | Area (sq ft)           |        |        | 11.11 297.62      |     |       |
| Q Total (cfs)                       |        |        | 3182.00  |        |        | Flow (cfs)             |        |        | 47.09 3134.91     |     |       |
| Top width (ft)                      |        |        | 56.02    |        |        | Top width (ft)         |        |        | 9.10 46.93        |     |       |
| Vel Total (ft/s)                    |        |        | 10.31    |        |        | Avg. Vel. (ft/s)       |        |        | 4.24 10.53        |     |       |
| Max Chl Dpth (ft)                   |        |        | 10.73    |        |        | Hydr. Depth (ft)       |        |        | 1.22 6.34         |     |       |
| Conv. Total (cfs)                   |        |        | 35636.8  |        |        | Conv. (cfs)            |        |        | 527.4 35109.4     |     |       |
| Length wtd. (ft)                    |        |        | 110.13   |        |        | wetted Per. (ft)       |        |        | 9.39 53.19        |     |       |
| Min Ch El (ft)                      |        |        | 562.65   |        |        | Shear (lb/sq ft)       |        |        | 0.59 2.79         |     |       |
| Alpha                               |        |        | 1.03     |        |        | Stream Power (lb/ft s) |        |        | 315.00 138.96     |     |       |
| 0.00                                |        |        |          |        |        |                        |        |        |                   |     |       |
| Frctn Loss (ft)                     |        |        | 0.86     |        |        | Cum Volume (acre-ft)   |        |        | 1.64 2.64         |     |       |
| 0.52                                |        |        |          |        |        |                        |        |        |                   |     |       |
| C & E Loss (ft)                     |        |        | 0.00     |        |        | Cum SA (acres)         |        |        | 0.68 0.29         |     |       |
| 0.29                                |        |        |          |        |        |                        |        |        |                   |     |       |

|                    |          |                        |        |         |
|--------------------|----------|------------------------|--------|---------|
| Right OB           |          |                        |        |         |
| Vel Head (ft)      | 1.71     | wt. n-Val.             | 0.040  | 0.042   |
| 0.035              |          |                        |        |         |
| W.S. Elev (ft)     | 572.52   | Reach Len. (ft)        | 107.54 | 106.66  |
| 108.30             |          |                        |        |         |
| Crit W.S. (ft)     | 572.19   | Flow Area (sq ft)      | 58.16  | 231.46  |
| 41.65              |          |                        |        |         |
| E.G. Slope (ft/ft) | 0.007602 | Area (sq ft)           | 58.16  | 231.46  |
| 41.65              |          |                        |        |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 352.77 | 2607.85 |
| 221.38             |          |                        |        |         |
| Top width (ft)     | 76.45    | Top width (ft)         | 24.02  | 28.44   |
| 24.00              |          |                        |        |         |
| Vel Total (ft/s)   | 9.61     | Avg. vel. (ft/s)       | 6.07   | 11.27   |
| 5.31               |          |                        |        |         |
| Max Chl Dpth (ft)  | 10.73    | Hydr. Depth (ft)       | 2.42   | 8.14    |
| 1.74               |          |                        |        |         |
| Conv. Total (cfs)  | 36495.2  | Conv. (cfs)            | 4046.0 | 29910.1 |
| 2539.1             |          |                        |        |         |
| Length wtd. (ft)   | 106.96   | Wetted Per. (ft)       | 24.76  | 33.17   |
| 24.21              |          |                        |        |         |
| Min Ch El (ft)     | 561.79   | Shear (lb/sq ft)       | 1.11   | 3.31    |
| 0.82               |          |                        |        |         |
| Alpha              | 1.19     | Stream Power (lb/ft s) | 305.00 | 111.15  |
| 0.00               |          |                        |        |         |
| Frctn Loss (ft)    | 0.27     | Cum Volume (acre-ft)   | 1.55   | 1.97    |
| 0.47               |          |                        |        |         |
| C & E Loss (ft)    | 0.40     | Cum SA (acres)         | 0.64   | 0.19    |
| 0.26               |          |                        |        |         |

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.  
Note: Manning's n values were composited to a single value in the main channel.  
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1 RS: 1151.21

| INPUT        |        |        |        |        |        |        |        |        |        |      |  |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------|--|
| Station: 116 |        |        |        |        |        |        |        |        |        |      |  |
| Sta          |        | Elev   |        | Data   |        | num=   |        | Sta    |        | Elev |  |
| 0            | 576    | 3.19   | 576    | 5.53   | 575.11 | 5.78   | 575    | 22.52  | 575    |      |  |
| 23.1         | 574.28 | 24.52  | 572.69 | 25.81  | 572.68 | 30.16  | 572.65 | 31.03  | 572.65 |      |  |
| 31.07        | 572.62 | 31.71  | 572.14 | 31.73  | 572.01 | 31.97  | 570.64 | 45.74  | 570.83 |      |  |
| 56.93        | 570.98 | 62.36  | 570.84 | 65     | 570.79 | 81.13  | 570.46 | 81.17  | 570.76 |      |  |
| 81.33        | 571.96 | 81.43  | 572.06 | 81.83  | 572.46 | 82.85  | 572.46 | 86.83  | 572.46 |      |  |
| 91.29        | 570.24 | 91.77  | 570    | 98.76  | 570    | 130.66 | 570    | 135.19 | 571.81 |      |  |
| 135.68       | 572    | 139.58 | 572    | 140.74 | 572    | 144.7  | 570.87 | 151.9  | 568.77 |      |  |
| 152.9        | 568.02 | 154.25 | 567.49 | 155.43 | 567.03 | 160.05 | 563.27 | 161.98 | 561.53 |      |  |
| 168.49       | 561.02 | 169.83 | 560.85 | 174.25 | 560.85 | 187.87 | 567.66 | 190.05 | 568.04 |      |  |
| 191.72       | 568.33 | 195.25 | 568.94 | 195.59 | 568.99 | 195.62 | 569    | 196.81 | 569.21 |      |  |
| 201.39       | 570    | 203.38 | 570.39 | 206.63 | 571    | 207.67 | 571.19 | 210.6  | 571.73 |      |  |
| 211.57       | 571.91 | 211.73 | 571.94 | 212.05 | 572    | 215.13 | 572.47 | 215.71 | 572.55 |      |  |
| 216.74       | 572.71 | 217.53 | 572.83 | 218.68 | 573    | 218.7  | 573    | 221.45 | 573.89 |      |  |
| 221.59       | 573.94 | 221.65 | 573.96 | 221.78 | 574    | 223.22 | 574.1  | 223.33 | 574.1  |      |  |
| 232.51       | 574.45 | 233.68 | 574.47 | 234.3  | 574.47 | 235.48 | 574.48 | 236.16 | 574.48 |      |  |

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E.G. Elev (ft) 574.22 Element Left OB Channel  
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CROSS SECTION

|                             |          |                   |         |         |
|-----------------------------|----------|-------------------|---------|---------|
| E.G. Elev (ft)              | 573.50   | Element           | Left OB | Channel |
| Right OB<br>Vel Head (ft)   | 0.30     | wt. n-Val.        | 0.025   | 0.040   |
| 0.035<br>W.S. Elev (ft)     | 573.20   | Reach Len. (ft)   | 30.43   | 29.50   |
| 29.97<br>Crit W.S. (ft)     | 569.90   | Flow Area (sq ft) | 362.94  | 341.89  |
| 67.44<br>E.G. Slope (ft/ft) | 0.001061 | Area (sq ft)      | 362.94  | 341.89  |
| 67.44<br>Q Total (cfs)      | 3182.00  | Flow (cfs)        | 1288.04 | 1730.80 |
| 163.15<br>Top width (ft)    | 204.62   | Top width (ft)    | 140.96  | 33.61   |
| 30.05<br>Vel Total (ft/s)   | 4.12     | Avg. Vel. (ft/s)  | 3.55    | 5.06    |

LemonCreekPR.rep

|                   |         |                        |         |         |
|-------------------|---------|------------------------|---------|---------|
| 2.42              |         |                        |         |         |
| Max Chl Dpth (ft) | 12.77   | Hydr. Depth (ft)       | 2.57    | 10.17   |
| 2.24              |         |                        |         |         |
| Conv. Total (cfs) | 97689.2 | Conv. (cfs)            | 39543.6 | 53136.7 |
| 5008.9            |         |                        |         |         |
| Length wtd. (ft)  | 29.91   | wetted Per. (ft)       | 145.61  | 39.95   |
| 30.41             |         |                        |         |         |
| Min Ch El (ft)    | 560.43  | Shear (lb/sq ft)       | 0.17    | 0.57    |
| 0.15              |         |                        |         |         |
| Alpha             | 1.14    | Stream Power (lb/ft s) | 307.64  | 164.13  |
| 0.00              |         |                        |         |         |
| Frctn Loss (ft)   | 0.03    | Cum Volume (acre-ft)   | 0.92    | 1.13    |
| 0.27              |         |                        |         |         |
| C & E Loss (ft)   | 0.00    | Cum SA (acres)         | 0.39    | 0.10    |
| 0.18              |         |                        |         |         |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1

RS: 1101.71

INPUT  
Description:

| Station | Elevation | Data   | num=   | 156    | Sta    | Elev   | Sta    | Elev   | Sta    | Elev | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|------|-----|------|
| 0       | 576       | 1.27   | 576    | 2.8    | 575.42 | 3.77   | 575    | 20.07  | 575    |      |     |      |
| 35.06   | 575       | 59.83  | 575    | 66.45  | 575    | 73.94  | 575    | 75.33  | 573.27 |      |     |      |
| 76.07   | 572.32    | 81.28  | 572.29 | 83.47  | 572.27 | 83.55  | 572.22 | 84.23  | 571.77 |      |     |      |
| 84.28   | 571.54    | 84.54  | 570.27 | 94.51  | 570.37 | 102.25 | 570.45 | 106.87 | 570.5  |      |     |      |
| 113.19  | 570.55    | 118.23 | 570.46 | 119.62 | 570.45 | 130    | 570.5  | 138    | 570.39 |      |     |      |
| 150.93  | 570.07    | 156.26 | 569.97 | 160.72 | 569.83 | 160.88 | 570.83 | 160.95 | 571.33 |      |     |      |
| 161.33  | 571.64    | 161.54 | 571.82 | 164.12 | 571.8  | 167.36 | 571.77 | 168.98 | 571.26 |      |     |      |
| 173.03  | 570       | 178.46 | 570    | 197.04 | 570    | 199.14 | 570.82 | 202.18 | 572    |      |     |      |
| 204.69  | 572       | 207.32 | 572    | 208.3  | 571.57 | 214.99 | 568.59 | 217.1  | 567.51 |      |     |      |
| 217.44  | 567.36    | 217.63 | 567.33 | 217.82 | 567.31 | 219.32 | 567.07 | 220.35 | 566.9  |      |     |      |
| 225.47  | 566.09    | 226.2  | 563.93 | 228.43 | 559.8  | 231.96 | 559.8  | 233.64 | 559.8  |      |     |      |
| 233.66  | 559.8     | 234.91 | 559.8  | 234.94 | 559.8  | 235.13 | 559.8  | 235.44 | 559.8  |      |     |      |
| 251.8   | 567.98    | 258.54 | 568.57 | 258.9  | 568.62 | 259.35 | 568.67 | 260.02 | 568.73 |      |     |      |
| 260.94  | 568.81    | 262.13 | 568.91 | 263.25 | 569    | 263.64 | 569.03 | 263.68 | 569.03 |      |     |      |
| 263.72  | 569.04    | 264.01 | 569.07 | 266.29 | 569.28 | 267.08 | 569.39 | 268.35 | 569.53 |      |     |      |
| 270.1   | 569.82    | 270.42 | 569.86 | 271.21 | 570    | 274.33 | 570.64 | 276.11 | 571    |      |     |      |
| 277.49  | 571.27    | 280.85 | 571.93 | 281.14 | 571.99 | 281.21 | 572    | 282.22 | 572.48 |      |     |      |
| 283.33  | 573       | 283.89 | 573    | 283.95 | 573    | 284.58 | 573    | 285.29 | 573    |      |     |      |
| 285.46  | 573       | 286.23 | 573    | 286.95 | 573    | 287.58 | 573    | 288.08 | 573    |      |     |      |
| 288.37  | 573       | 288.81 | 573    | 289.29 | 573    | 289.79 | 573    | 311.6  | 573.43 |      |     |      |
| 312.05  | 573.43    | 312.78 | 573.45 | 313.45 | 573.47 | 313.93 | 573.47 | 314.44 | 573.48 |      |     |      |
| 315.01  | 573.48    | 315.53 | 573.5  | 316.15 | 573.5  | 316.86 | 573.51 | 317.51 | 573.52 |      |     |      |
| 318.38  | 573.54    | 319.03 | 573.54 | 319.55 | 573.55 | 320.56 | 573.57 | 321.69 | 573.59 |      |     |      |
| 322.93  | 573.61    | 324.22 | 573.63 | 325.51 | 573.65 | 329.11 | 573.72 | 330.21 | 573.73 |      |     |      |
| 331.17  | 573.75    | 331.89 | 573.76 | 332.78 | 573.78 | 333.37 | 573.79 | 334    | 573.8  |      |     |      |
| 334.66  | 573.81    | 335.29 | 573.82 | 335.86 | 573.83 | 336.42 | 573.84 | 337.3  | 573.86 |      |     |      |
| 337.51  | 573.87    | 337.52 | 573.87 | 342.99 | 574    | 352.9  | 574.37 | 353.1  | 574.38 |      |     |      |
| 357.82  | 574.54    | 358.48 | 574.57 | 358.88 | 574.58 | 359.73 | 574.62 | 360.04 | 574.63 |      |     |      |
| 361.07  | 574.67    | 362.28 | 574.72 | 362.49 | 574.73 | 363.78 | 574.79 | 364.03 | 574.8  |      |     |      |
| 365.28  | 574.85    | 366.37 | 574.9  | 366.53 | 574.9  | 367.22 | 574.93 | 367.33 | 574.94 |      |     |      |
| 368.06  | 574.97    | 368.12 | 574.97 | 368.95 | 575    | 368.96 | 575    | 368.97 | 575    |      |     |      |
| 369.09  | 575       |        |        |        |        |        |        |        |        |      |     |      |

Manning's n Values

| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
|-----|-------|-----|-------|-----|-------|-----|-------|
| 5   |       |     |       |     |       |     |       |

LemonCreekPR.rep

|                  |          |               |            |        |       |        |        |        |      |
|------------------|----------|---------------|------------|--------|-------|--------|--------|--------|------|
| 0                | .024     | 207.32        | .035       | 220.35 | .04   | 251.8  | .07    | 283.33 | .035 |
| Bank Sta: Left   | Right    | Lengths: Left | Channel    | Right  | Coeff | Contr. | Expan. |        |      |
| 217.63           | 251.8    | 22.38         | 20.19      | 20.28  | .1    | .3     |        |        |      |
| Ineffective Flow | num=     | 1             |            |        |       |        |        |        |      |
| Sta L            | Sta R    | Elev          | Permanent  |        |       |        |        |        |      |
| 0                | 207.32   | 572           | F          |        |       |        |        |        |      |
| Left Levee       | Station= | 207.32        | Elevation= | 572    |       |        |        |        |      |

CROSS SECTION OUTPUT Profile #50-YR

|                    |          |                        |         |         |
|--------------------|----------|------------------------|---------|---------|
| E.G. Elev (ft)     | 573.47   | Element                | Left OB | Channel |
| Right OB           |          |                        |         |         |
| Vel Head (ft)      | 0.29     | Wt. n-Val.             | 0.025   | 0.040   |
| 0.070              |          |                        |         |         |
| W.S. Elev (ft)     | 573.18   | Reach Len. (ft)        | 22.38   | 20.19   |
| 20.28              |          |                        |         |         |
| Crit W.S. (ft)     | 570.35   | Flow Area (sq ft)      | 376.18  | 327.56  |
| 108.45             |          |                        |         |         |
| E.G. Slope (ft/ft) | 0.001078 | Area (sq ft)           | 376.18  | 327.56  |
| 108.45             |          |                        |         |         |
| Q Total (cfs)      | 3182.00  | Flow (cfs)             | 1384.06 | 1631.96 |
| 165.98             |          |                        |         |         |
| Top Width (ft)     | 223.34   | Top Width (ft)         | 142.23  | 34.17   |
| 46.94              |          |                        |         |         |
| Vel Total (ft/s)   | 3.92     | Avg. Vel. (ft/s)       | 3.68    | 4.98    |
| 1.53               |          |                        |         |         |
| Max Chl Dpth (ft)  | 13.38    | Hydr. Depth (ft)       | 2.64    | 9.59    |
| 2.31               |          |                        |         |         |
| Conv. Total (cfs)  | 96899.6  | Conv. (cfs)            | 42147.9 | 49697.2 |
| 5054.4             |          |                        |         |         |
| Length wtd. (ft)   | 21.06    | wetted Per. (ft)       | 147.16  | 40.21   |
| 47.48              |          |                        |         |         |
| Min Ch El (ft)     | 559.80   | Shear (lb/sq ft)       | 0.17    | 0.55    |
| 0.15               |          |                        |         |         |
| Alpha              | 1.22     | Stream Power (lb/ft s) | 369.09  | 207.32  |
| 0.00               |          |                        |         |         |
| Frctn Loss (ft)    | 0.02     | Cum Volume (acre-ft)   | 0.66    | 0.90    |
| 0.21               |          |                        |         |         |
| C & E Loss (ft)    | 0.01     | Cum SA (acres)         | 0.29    | 0.08    |
| 0.15               |          |                        |         |         |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RIVER: LemonCreek  
REACH: Reach1

RS: 1081.52

INPUT  
Description:

| Station | Elevation | Data   | num=   | 211    | Sta    | Elev   | Sta    | Elev   | Sta    | Elev | Sta | Elev |
|---------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|------|-----|------|
| 0       | 575       | 11.13  | 575    | 30.64  | 575    | 53.57  | 575    | 66.13  | 575    |      |     |      |
| 81.18   | 575       | 82.41  | 572.5  | 82.7   | 572.16 | 84.9   | 572.15 | 90.68  | 572.1  |      |     |      |
| 90.92   | 571.95    | 91.49  | 571.6  | 91.59  | 571.1  | 91.81  | 570.1  | 100.03 | 570.17 |      |     |      |
| 104.51  | 570.21    | 111.37 | 570.22 | 122.66 | 570.75 | 123.68 | 570.75 | 123.78 | 570.75 |      |     |      |
| 136.01  | 570.8     | 137.27 | 570.77 | 138.33 | 570.75 | 139.45 | 570.71 | 140    | 570.69 |      |     |      |
| 152.03  | 570.27    | 176.8  | 569.38 | 176.97 | 570.66 | 177    | 570.88 | 177.43 | 571.31 |      |     |      |
| 177.5   | 571.38    | 181.84 | 571.39 | 182.53 | 571.39 | 182.66 | 571.57 | 182.92 | 572    |      |     |      |
| 183.26  | 572       | 188.39 | 572    | 189.06 | 572    | 192.76 | 572    | 193.06 | 572    |      |     |      |

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| LemonCreekPR.rep                    |          |                        |              |         |              |        |        |        |        |
|-------------------------------------|----------|------------------------|--------------|---------|--------------|--------|--------|--------|--------|
| 303.05                              | 573      | 303.36                 | 573          | 303.85  | 573          | 304.16 | 573    | 304.47 | 573    |
| 304.72                              | 573      | 305.36                 | 573          | 305.55  | 573          | 305.81 | 573    | 306.6  | 573    |
| 306.73                              | 573      | 306.84                 | 573          | 307.26  | 573          | 307.53 | 573    | 308.25 | 573    |
| 308.32                              | 573      | 308.43                 | 573          | 308.57  | 573          | 308.7  | 573    | 308.8  | 573    |
| 309.06                              | 573      | 309.22                 | 573          | 309.44  | 573          | 309.63 | 573    | 310.09 | 573    |
| 310.19                              | 573      | 310.71                 | 573          | 314.81  | 572.72       | 315.02 | 572.73 | 315.2  | 572.73 |
| 315.47                              | 572.74   | 315.69                 | 572.74       | 316.98  | 572.73       | 317.29 | 572.74 | 318.57 | 572.73 |
| 318.94                              | 572.73   | 320.14                 | 572.73       | 320.56  | 572.73       | 321.63 | 572.73 | 322.07 | 572.73 |
| 322.95                              | 572.73   | 324.23                 | 572.74       | 324.98  | 572.75       | 325.38 | 572.76 | 326.21 | 572.77 |
| 327.12                              | 572.79   | 327.45                 | 572.79       | 328.38  | 572.81       | 328.65 | 572.82 | 329.59 | 572.84 |
| 329.79                              | 572.84   | 330.71                 | 572.86       | 330.83  | 572.86       | 331.71 | 572.87 | 331.82 | 572.88 |
| 332.6                               | 572.89   | 332.71                 | 572.89       | 332.84  | 572.89       | 333.58 | 572.89 | 333.71 | 572.9  |
| 334.73                              | 572.9    | 334.85                 | 572.9        | 335     | 572.9        |        |        |        |        |
| Manning's n Values                  |          |                        |              |         |              |        |        |        |        |
| Sta                                 | n Val    | Sta                    | n Val        | Sta     | n Val        | Sta    | n Val  | Sta    | n Val  |
| 0                                   | .024     | 210.91                 |              | 245.22  | .024         |        |        |        |        |
| Bank Sta: Left                      | Right    | Lengths:               | Left Channel | Right   | Coeff Contr. | Expan. |        |        |        |
| 210.91                              | 245.22   |                        | 9.02         | 0       | .1           | .3     |        |        |        |
| CROSS SECTION OUTPUT Profile #50-YR |          |                        |              |         |              |        |        |        |        |
| E.G. Elev (ft)                      | 573.31   | Element                | Left OB      | Channel |              |        |        |        |        |
| Right OB                            |          |                        |              |         |              |        |        |        |        |
| Vel Head (ft)                       | 0.56     | Wt. n-val.             | 0.024        | 0.040   |              |        |        |        |        |
| 0.024                               |          |                        |              |         |              |        |        |        |        |
| W.S. Elev (ft)                      | 572.75   | Reach Len. (ft)        |              |         |              |        |        |        |        |
| Crit W.S. (ft)                      | 567.17   | Flow Area (sq ft)      | 157.81       | 393.08  |              |        |        |        |        |
| 33.68                               |          |                        |              |         |              |        |        |        |        |
| E.G. Slope (ft/ft)                  | 0.002020 | Area (sq ft)           | 157.81       | 393.08  |              |        |        |        |        |
| 33.68                               |          |                        |              |         |              |        |        |        |        |
| Q Total (cfs)                       | 3255.00  | Flow (cfs)             | 624.52       | 2547.43 |              |        |        |        |        |
| 83.05                               |          |                        |              |         |              |        |        |        |        |
| Top width (ft)                      | 176.45   | Top width (ft)         | 92.20        | 34.31   |              |        |        |        |        |
| 49.94                               |          |                        |              |         |              |        |        |        |        |
| Vel Total (ft/s)                    | 5.57     | Avg. Vel. (ft/s)       | 3.96         | 6.48    |              |        |        |        |        |
| 2.47                                |          |                        |              |         |              |        |        |        |        |
| Max Chl Dpth (ft)                   | 14.15    | Hydr. Depth (ft)       | 1.71         | 11.46   |              |        |        |        |        |
| 0.67                                |          |                        |              |         |              |        |        |        |        |
| Conv. Total (cfs)                   | 72423.2  | Conv. (cfs)            | 13895.5      | 56679.8 |              |        |        |        |        |
| 1847.9                              |          |                        |              |         |              |        |        |        |        |
| Length wtd. (ft)                    |          | Wetted Per. (ft)       | 93.04        | 51.40   |              |        |        |        |        |
| 50.47                               |          |                        |              |         |              |        |        |        |        |
| Min Ch El (ft)                      | 558.60   | Shear (lb/sq ft)       | 0.21         | 0.96    |              |        |        |        |        |
| 0.08                                |          |                        |              |         |              |        |        |        |        |
| Alpha                               | 1.16     | Stream Power (lb/ft s) | 335.00       | 0.00    |              |        |        |        |        |
| 0.00                                |          |                        |              |         |              |        |        |        |        |
| Frctn Loss (ft)                     |          | Cum Volume (acre-ft)   |              |         |              |        |        |        |        |
| C & E Loss (ft)                     |          | Cum SA (acres)         |              |         |              |        |        |        |        |

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:LemonCreek

| LemonCreekPR.rep |            |         |         |      |      |      |      |      |      |
|------------------|------------|---------|---------|------|------|------|------|------|------|
| Reach            | River Sta. | n1      | n2      | n3   | n4   | n5   |      |      |      |
| n6               | n7         | n8      | n9      | n10  | n11  | n12  |      |      |      |
| Reach1           |            | 3105.07 | .035    | .024 | .035 | .024 | .07  |      |      |
| .04              | .07        | .024    |         |      |      |      |      |      |      |
| Reach1           |            | 3034.84 | .035    | .024 | .07  | .04  | .07  |      |      |
| .024             |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 2901.88 | .035    | .024 | .07  | .04  | .07  |      |      |
| .035             | .024       |         |         |      |      |      |      |      |      |
| Reach1           |            | 2778.60 | .035    | .024 | .07  | .035 | .024 |      |      |
|                  |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 2685.91 | .035    | .024 | .035 | .07  | .035 |      |      |
| .024             |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 2660.91 | .035    | .024 | .035 | .07  | .035 |      |      |
| .024             |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 2577.93 | Culvert |      |      |      |      |      |      |
|                  |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 2502.40 | .024    | .035 | .024 | .035 | .024 |      |      |
| .07              | .035       | .024    | .035    | .024 | .035 | .035 | .024 | .035 | .024 |
| Reach1           |            | 2471.43 | .024    | .024 | .035 | .024 | .035 | .07  |      |
| .04              | .07        | .035    | .024    | .035 | .024 | .035 | .024 | .035 | .07  |
| Reach1           |            | 2327.19 | .024    | .024 | .035 | .024 | .035 | .07  |      |
| .04              | .07        | .035    | .024    |      |      |      |      |      |      |
| Reach1           |            | 2271.00 | .024    | .024 | .035 | .024 | .035 | .07  |      |
| .04              | .07        | .024    | .07     | .024 | .035 | .07  | .024 | .035 | .07  |
| Reach1           |            | 2246.00 | .024    | .024 | .035 | .024 | .035 | .07  | .024 |
| .07              | .04        | .07     | .024    | .07  | .024 | .07  | .024 | .07  | .035 |
| Reach1           |            | 2230.01 | Culvert |      |      |      |      |      |      |
|                  |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 2216.36 | .024    | .024 | .035 | .024 | .035 | .04  |      |
| .024             | .07        | .024    | .07     | .024 | .035 | .07  | .024 | .07  | .04  |
| Reach1           |            | 2199.00 | .024    | .024 | .035 | .07  | .024 | .07  | .04  |
| .024             | .07        | .024    | .07     | .024 | .035 | .07  | .024 | .07  | .04  |
| Reach1           |            | 2084.10 | .024    | .024 | .035 | .024 | .035 | .07  | .04  |
| .07              | .024       | .07     | .024    | .07  | .035 | .024 | .035 | .07  | .04  |
| Reach1           |            | 1875.66 | .024    | .024 | .035 | .024 | .035 | .07  | .04  |
| .07              | .024       | .07     | .024    | .07  | .035 | .024 | .035 | .07  | .04  |
| Reach1           |            | 1770.29 | .024    | .024 | .035 | .07  | .024 | .035 | .07  |
| .07              | .024       | .07     | .024    | .07  | .035 | .07  | .024 | .035 | .07  |
| Reach1           |            | 1593.83 | .024    | .024 | .035 | .07  | .024 | .035 | .07  |
| .035             | .024       | .07     | .024    | .07  | .035 | .07  | .024 | .035 | .07  |
| Reach1           |            | 1465.87 | .024    | .024 | .035 | .07  | .024 | .035 | .07  |
| .07              | .024       | .035    | .024    | .07  | .035 | .07  | .024 | .035 | .07  |
| Reach1           |            | 1425.92 | .024    | .024 | .035 | .024 | .035 | .07  | .04  |
| .024             | .035       | .07     | .024    | .035 | .024 | .035 | .024 | .035 | .07  |
| Reach1           |            | 1412.68 | Culvert |      |      |      |      |      |      |
|                  |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 1399.42 | .024    | .035 | .07  | .04  | .07  |      |      |
| .035             | .07        |         |         |      |      |      |      |      |      |
| Reach1           |            | 1367.97 | .024    | .035 | .07  | .04  | .035 |      |      |
| .024             | .035       | .07     |         |      |      |      |      |      |      |
| Reach1           |            | 1257.87 | .024    | .035 | .07  | .04  | .035 |      |      |
| .024             | .07        | .035    |         |      |      |      |      |      |      |
| Reach1           |            | 1151.21 | .024    | .035 | .07  | .04  | .07  |      |      |
| .035             |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 1131.21 | .024    | .035 | .04  | .035 | .035 |      |      |
|                  |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 1101.71 | .024    | .035 | .04  | .07  | .035 |      |      |
|                  |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 1081.52 | .024    | .035 | .04  | .07  | .035 |      |      |
|                  |            |         |         |      |      |      |      |      |      |
| Reach1           |            | 1000.00 | .024    | .04  | .024 |      |      |      |      |

LemonCreekPR.rep

SUMMARY OF REACH LENGTHS

River: LemonCreek

| Reach  | River Sta. | Left    | Channel | Right  |
|--------|------------|---------|---------|--------|
| Reach1 | 3105.07    | 73.02   | 70.23   | 65.15  |
| Reach1 | 3034.84    | 141.38  | 132.96  | 131.7  |
| Reach1 | 2901.88    | 123.39  | 123.28  | 123.92 |
| Reach1 | 2778.60    | 80.84   | 92.69   | 99.08  |
| Reach1 | 2685.91    | 32.36   | 25      | 27.33  |
| Reach1 | 2660.91    | 168.68  | 158.51  | 172.97 |
| Reach1 | 2577.93    | Culvert |         |        |
| Reach1 | 2502.40    | 35      | 30.97   | 31.13  |
| Reach1 | 2471.43    | 139.55  | 144.24  | 152.45 |
| Reach1 | 2327.19    | 55.09   | 56.19   | 66.43  |
| Reach1 | 2271.00    | 21.66   | 25      | 41.57  |
| Reach1 | 2246.00    | 33.12   | 29.64   | 31.84  |
| Reach1 | 2230.01    | Culvert |         |        |
| Reach1 | 2216.36    | 29.71   | 17.36   | 12.78  |
| Reach1 | 2199.00    | 107.55  | 114.9   | 122.27 |
| Reach1 | 2084.10    | 202.44  | 208.44  | 211.8  |
| Reach1 | 1875.66    | 107.36  | 105.37  | 108.86 |
| Reach1 | 1770.29    | 181.22  | 176.46  | 170.8  |
| Reach1 | 1593.83    | 130.89  | 127.96  | 126.93 |
| Reach1 | 1465.87    | 41.14   | 39.95   | 45.44  |
| Reach1 | 1425.92    | 28.9    | 26.5    | 28.7   |
| Reach1 | 1412.68    | Culvert |         |        |
| Reach1 | 1399.42    | 31.63   | 31.45   | 35.82  |
| Reach1 | 1367.97    | 111.43  | 110.1   | 108.69 |
| Reach1 | 1257.87    | 107.54  | 106.66  | 108.3  |
| Reach1 | 1151.21    | 20.39   | 20      | 20.37  |
| Reach1 | 1131.21    | 30.43   | 29.5    | 29.97  |
| Reach1 | 1101.71    | 22.38   | 20.19   | 20.28  |
| Reach1 | 1081.52    | 79.44   | 81.52   | 87.79  |
| Reach1 | 1000.00    | 9.02    | 0       | 4.06   |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: LemonCreek

| Reach  | River Sta. | Contr.  | Expan. |
|--------|------------|---------|--------|
| Reach1 | 3105.07    | .1      | .3     |
| Reach1 | 3034.84    | .1      | .3     |
| Reach1 | 2901.88    | .1      | .3     |
| Reach1 | 2778.60    | .1      | .3     |
| Reach1 | 2685.91    | .1      | .3     |
| Reach1 | 2660.91    | .1      | .3     |
| Reach1 | 2577.93    | Culvert |        |
| Reach1 | 2502.40    | .1      | .3     |
| Reach1 | 2471.43    | .1      | .3     |
| Reach1 | 2327.19    | .1      | .3     |
| Reach1 | 2271.00    | .1      | .3     |
| Reach1 | 2246.00    | .1      | .3     |
| Reach1 | 2230.01    | Culvert |        |
| Reach1 | 2216.36    | .1      | .3     |
| Reach1 | 2199.00    | .1      | .3     |
| Reach1 | 2084.10    | .1      | .3     |
| Reach1 | 1875.66    | .1      | .3     |

|        | LemonCreekPR.rep      |
|--------|-----------------------|
| Reach1 | 1770.29 .1 .3         |
| Reach1 | 1593.83 .1 .3         |
| Reach1 | 1465.87 .1 .3         |
| Reach1 | 1425.92 .1 .3         |
| Reach1 | 1412.68 Culvert .1 .3 |
| Reach1 | 1399.42 .1 .3         |
| Reach1 | 1367.97 .1 .3         |
| Reach1 | 1257.87 .1 .3         |
| Reach1 | 1151.21 .1 .3         |
| Reach1 | 1131.21 .1 .3         |
| Reach1 | 1101.71 .1 .3         |
| Reach1 | 1081.52 .1 .3         |
| Reach1 | 1000.00 .1 .3         |

## Worksheet for La Puente Road Pre-Dev. Broad Crested Weir

### Project Description

Solve For Headwater Elevation

### Input Data

|                     |       |         |                    |
|---------------------|-------|---------|--------------------|
| Discharge           |       | 1255.00 | ft <sup>3</sup> /s |
| Crest Elevation     |       | 571.50  | ft                 |
| Tailwater Elevation |       | 0.00    | ft                 |
| Crest Surface Type  | Paved |         |                    |
| Crest Breadth       |       | 86.00   | ft                 |
| Crest Length        |       | 400.00  | ft                 |

### Results

|                              |         |                 |
|------------------------------|---------|-----------------|
| Headwater Elevation          | 572.52  | ft              |
| Headwater Height Above Crest | 1.02    | ft              |
| Tailwater Height Above Crest | -571.50 | ft              |
| Weir Coefficient             | 3.04    | US              |
| Submergence Factor           | 1.00    |                 |
| Adjusted Weir Coefficient    | 3.04    | US              |
| Flow Area                    | 408.75  | ft <sup>2</sup> |
| Velocity                     | 3.07    | ft/s            |
| Wetted Perimeter             | 402.04  | ft              |
| Top Width                    | 400.00  | ft              |

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## Worksheet for La Puente Road Post-Dev. Broad Crested Weir

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### Project Description

Solve For                      Headwater Elevation

### Input Data

|                     |       |         |                    |
|---------------------|-------|---------|--------------------|
| Discharge           |       | 1230.00 | ft <sup>3</sup> /s |
| Crest Elevation     |       | 571.50  | ft                 |
| Tailwater Elevation |       | 0.00    | ft                 |
| Crest Surface Type  | Paved |         |                    |
| Crest Breadth       |       | 86.00   | ft                 |
| Crest Length        |       | 300.00  | ft                 |

### Results

|                              |         |                 |
|------------------------------|---------|-----------------|
| Headwater Elevation          | 572.72  | ft              |
| Headwater Height Above Crest | 1.22    | ft              |
| Tailwater Height Above Crest | -571.50 | ft              |
| Weir Coefficient             | 3.04    | US              |
| Submergence Factor           | 1.00    |                 |
| Adjusted Weir Coefficient    | 3.04    | US              |
| Flow Area                    | 366.40  | ft <sup>2</sup> |
| Velocity                     | 3.36    | ft/s            |
| Wetted Perimeter             | 302.44  | ft              |
| Top Width                    | 300.00  | ft              |

## Worksheet for Existing and Proposed 18" RCP

### Project Description

|                 |                    |
|-----------------|--------------------|
| Friction Method | Manning Formula    |
| Solve For       | Full Flow Capacity |

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.013   |                    |
| Channel Slope         | 0.02000 | ft/ft              |
| Normal Depth          | 1.50    | ft                 |
| Diameter              | 1.50    | ft                 |
| Discharge             | 14.85   | ft <sup>3</sup> /s |

### Results

|                   |             |                    |
|-------------------|-------------|--------------------|
| Discharge         | 14.85       | ft <sup>3</sup> /s |
| Normal Depth      | 1.50        | ft                 |
| Flow Area         | 1.77        | ft <sup>2</sup>    |
| Wetted Perimeter  | 4.71        | ft                 |
| Hydraulic Radius  | 0.38        | ft                 |
| Top Width         | 0.00        | ft                 |
| Critical Depth    | 1.40        | ft                 |
| Percent Full      | 100.0       | %                  |
| Critical Slope    | 0.01729     | ft/ft              |
| Velocity          | 8.41        | ft/s               |
| Velocity Head     | 1.10        | ft                 |
| Specific Energy   | 2.60        | ft                 |
| Froude Number     | 0.00        |                    |
| Maximum Discharge | 15.98       | ft <sup>3</sup> /s |
| Discharge Full    | 14.85       | ft <sup>3</sup> /s |
| Slope Full        | 0.02000     | ft/ft              |
| Flow Type         | SubCritical |                    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                             |      |    |
|-----------------------------|------|----|
| Upstream Depth              | 0.00 | ft |
| Profile Description         |      |    |
| Profile Headloss            | 0.00 | ft |
| Average End Depth Over Rise | 0.00 | %  |

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## Worksheet for Existing and Proposed 18" RCP

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### GVF Output Data

|                        |          |       |
|------------------------|----------|-------|
| Normal Depth Over Rise | 100.00   | %     |
| Downstream Velocity    | Infinity | ft/s  |
| Upstream Velocity      | Infinity | ft/s  |
| Normal Depth           | 1.50     | ft    |
| Critical Depth         | 1.40     | ft    |
| Channel Slope          | 0.02000  | ft/ft |
| Critical Slope         | 0.01729  | ft/ft |

## Worksheet for Existing and Proposed 33" RCP

### Project Description

|                 |                    |
|-----------------|--------------------|
| Friction Method | Manning Formula    |
| Solve For       | Full Flow Capacity |

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.013   |                    |
| Channel Slope         | 0.02000 | ft/ft              |
| Normal Depth          | 2.75    | ft                 |
| Diameter              | 2.75    | ft                 |
| Discharge             | 74.79   | ft <sup>3</sup> /s |

### Results

|                   |             |                    |
|-------------------|-------------|--------------------|
| Discharge         | 74.79       | ft <sup>3</sup> /s |
| Normal Depth      | 2.75        | ft                 |
| Flow Area         | 5.94        | ft <sup>2</sup>    |
| Wetted Perimeter  | 8.64        | ft                 |
| Hydraulic Radius  | 0.69        | ft                 |
| Top Width         | 0.00        | ft                 |
| Critical Depth    | 2.62        | ft                 |
| Percent Full      | 100.0       | %                  |
| Critical Slope    | 0.01736     | ft/ft              |
| Velocity          | 12.59       | ft/s               |
| Velocity Head     | 2.46        | ft                 |
| Specific Energy   | 5.21        | ft                 |
| Froude Number     | 0.00        |                    |
| Maximum Discharge | 80.45       | ft <sup>3</sup> /s |
| Discharge Full    | 74.79       | ft <sup>3</sup> /s |
| Slope Full        | 0.02000     | ft/ft              |
| Flow Type         | SubCritical |                    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                             |      |    |
|-----------------------------|------|----|
| Upstream Depth              | 0.00 | ft |
| Profile Description         |      |    |
| Profile Headloss            | 0.00 | ft |
| Average End Depth Over Rise | 0.00 | %  |

---

## Worksheet for Existing and Proposed 33" RCP

---

### GVF Output Data

|                        |          |       |
|------------------------|----------|-------|
| Normal Depth Over Rise | 100.00   | %     |
| Downstream Velocity    | Infinity | ft/s  |
| Upstream Velocity      | Infinity | ft/s  |
| Normal Depth           | 2.75     | ft    |
| Critical Depth         | 2.62     | ft    |
| Channel Slope          | 0.02000  | ft/ft |
| Critical Slope         | 0.01736  | ft/ft |

## Worksheet for Proposed 21" RCP

### Project Description

|                 |                    |
|-----------------|--------------------|
| Friction Method | Manning Formula    |
| Solve For       | Full Flow Capacity |

### Input Data

|                       |         |                    |
|-----------------------|---------|--------------------|
| Roughness Coefficient | 0.013   |                    |
| Channel Slope         | 0.02000 | ft/ft              |
| Normal Depth          | 1.75    | ft                 |
| Diameter              | 1.75    | ft                 |
| Discharge             | 22.41   | ft <sup>3</sup> /s |

### Results

|                   |             |                    |
|-------------------|-------------|--------------------|
| Discharge         | 22.41       | ft <sup>3</sup> /s |
| Normal Depth      | 1.75        | ft                 |
| Flow Area         | 2.41        | ft <sup>2</sup>    |
| Wetted Perimeter  | 5.50        | ft                 |
| Hydraulic Radius  | 0.44        | ft                 |
| Top Width         | 0.00        | ft                 |
| Critical Depth    | 1.65        | ft                 |
| Percent Full      | 100.0       | %                  |
| Critical Slope    | 0.01729     | ft/ft              |
| Velocity          | 9.32        | ft/s               |
| Velocity Head     | 1.35        | ft                 |
| Specific Energy   | 3.10        | ft                 |
| Froude Number     | 0.00        |                    |
| Maximum Discharge | 24.10       | ft <sup>3</sup> /s |
| Discharge Full    | 22.41       | ft <sup>3</sup> /s |
| Slope Full        | 0.02000     | ft/ft              |
| Flow Type         | SubCritical |                    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                             |      |    |
|-----------------------------|------|----|
| Upstream Depth              | 0.00 | ft |
| Profile Description         |      |    |
| Profile Headloss            | 0.00 | ft |
| Average End Depth Over Rise | 0.00 | %  |

---

## Worksheet for Proposed 21" RCP

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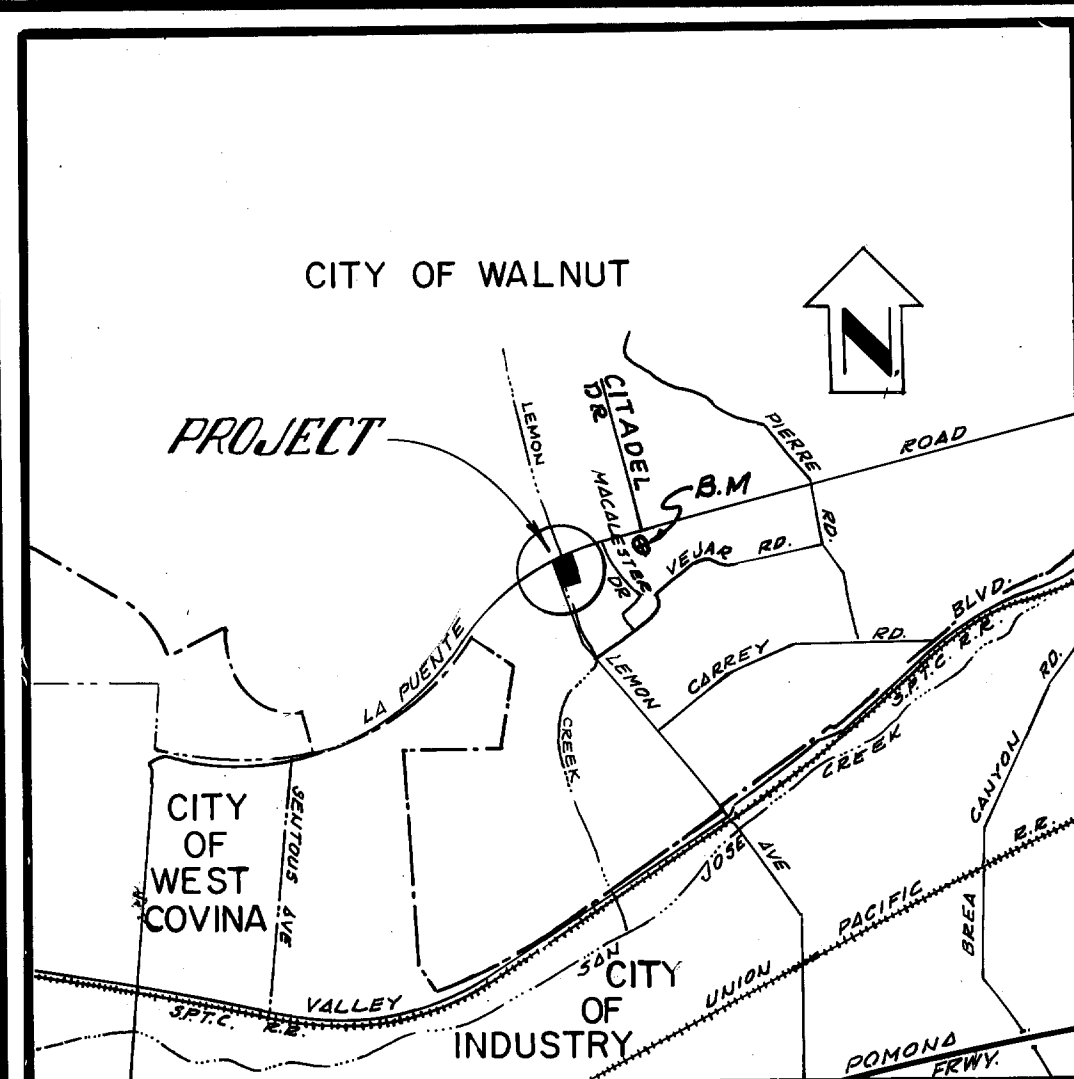
### GVF Output Data

|                        |          |       |
|------------------------|----------|-------|
| Normal Depth Over Rise | 100.00   | %     |
| Downstream Velocity    | Infinity | ft/s  |
| Upstream Velocity      | Infinity | ft/s  |
| Normal Depth           | 1.75     | ft    |
| Critical Depth         | 1.65     | ft    |
| Channel Slope          | 0.02000  | ft/ft |
| Critical Slope         | 0.01729  | ft/ft |

## **Appendix D: Storm Drain Improvement Plans for P.M. No. 14987**

GENERAL.

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER OF BAR AND SHALL BE TWO INCHES UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE AND PARALLEL TO OR AT RIGHT ANGLES (OR RADially) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOK SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE."
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE," SECTION 803.
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
8. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELED.
9. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWINGS. TRANSVERSE SPLICES WILL BE LIMITED TO 20% OF THE TOTAL SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
10. LONGITUDINAL AND TRANSVERSE STEEL SHALL BE LAPPED 30 BAR DIAMETERS AT SPLICES.
11. FIELD BENDING OF REINFORCING STEEL IS NOT PERMITTED.



PROJECT LOCATION

### CONSTRUCTION NOTES AND QUANTITY ESTIMATE.

- |   |                                                                                                 |        |      |
|---|-------------------------------------------------------------------------------------------------|--------|------|
| 1 | CONSTRUCT DOUBLE 6"X8" REINFORCED CONCRETE BOX. SEE DETAILS PER SHT. NO. 4.                     | 771.49 | L.F. |
| 2 | REMOVE EXIST. TRAP CHANNEL 8'-8", 21" H+75" AND CONSTRUCT K.C. TRANS. STRUCTURE PER SHT. NO. 5. | 38.10  | L.F. |
| 3 | CONSTRUCT MAINFLOE NO. 3 PER L.A. CO. F.C.D., NO. 2 D104.                                       | 2      | L.S. |
| 4 | CONSTRUCT FLOW EQUALIZING WINDOW PER L.A. CO. F.C.D., NO. 2 D205.                               | 2      | L.S. |
| 5 | INSTALL PROTECTION BARRIER PER L.A. CO. F.C.D., NO. 3-D261.1 THRU 261.3                         | 1      | L.S. |
| 6 | CONSTRUCT JUNCTION STRUCTURE NO. 5 PER L.A. CO. F.C.D., NO. 2-D191                              | 1      | L.S. |
| 7 | INSTALL 30" R.C.P. (1000-0) STUB & PLUG.                                                        | 8      | L.F. |
| 8 | CONSTRUCT TRANSITION STRUCTURE (SEE DETAIL, SHEET 5 OF 6)                                       | 21.05  | L.F. |

**BENCH MARK:**

**BENCH MARK:**  
C.G. 3419 RDBM TAG 4' W/O BCR 32' S/O -  
57' W/O & INT. LA PUENTE RD. AND  
CITADEL DR.

ELEV. 568.559 (GOVINA 1975)

STORM DRAIN PLANS IN  
P.M.No. 14987 No.

### GENERAL NOTES (Cont'd)

24. A SOLID ENGINEER SHALL CERTIFY THAT ALL FILLS AND BACKFILLS OVER UNDERGROUND STORM DRAINS OUTSIDE OF ST. J. RW HAVE BEEN COMPACTED OR CONSOLIDATED TO A 90% DENSITY. THIS CERTIFICATION SHALL BE SUBMITTED TO THE CITY ENGINEER PRIOR TO ACCEPTANCE OF THE WORK BY THE CITY.
25. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 710.4-1 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION IN REGARD TO SAFETY ORDERS. EVIDENCE OF COMPLIANCE AND A COPY OF PERMIT SHALL BE SUBMITTED TO CITY ENGINEER PRIOR TO ANY BEGINNING OF WORK.
26. THE CONTRACTOR SHALL COMPLY WITH THE MINIMUM PUBLIC SAFETY REQUIREMENTS" AS SHOWN ON LOS ANGELES COUNTY ENGINEER STANDARD S-2.
27. ALL PIPE SHALL BE PLACED IN A TRENCH IN NATURAL GROUND AND/OR COMPACTED FILL. THE GROUND LEVEL BEFORE THE TRENCHING SHALL BE AT LEAST 3 FEET ABOVE TOP OF PIPE ELEVATION, OR AT FINISH SURFACE ELEVATION, WHICHEVER IS LESS. ALL BACKFILL IN EASEMENTS SHALL BE COMPACTED TO THE DENSITY REQUIRED BY THE GRADING PLAN.
28. THE INSPECTOR MAY HAVE THE OPTION TO REQUIRE CONCRETE BACKFILL DURING CONSTRUCTION WHEN THE BOX OR PIPE HAS LESS THAN ONE FOOT OF COVER AND IS SUBJECT TO HEAVY EQUIPMENT TRAFFIC. THE CONCRETE BACKFILL SHALL BE PLACED IN 6" LAYERS WITH EACH COURSE POURED FROM WAYS TO WALL OF TRENCH AND FROM BOTTOM OF TRENCH TO A MINIMUM DEPTH OF 4 INCHES OVER TOP OF PIPE.

**GENERAL NOTES:**

1. ELEVATIONS ARE IN FEET ABOVE U.S.C. & G.S. MEAN SEA LEVEL DATUM OF 1929. ALL WORK SHALL BE IN ACCORDANCE WITH THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION 1979 EDITION WITH 1980 & 1981 SUPPLEMENTS AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE CITY ENGINEER."
2. APPROVAL OF THIS PLAN BY THE CITY OF WALNUT DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OF THE LOCATION, OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THIS NOTE APPLIES TO ALL SHEETS.
3. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION SECTION OF THE CITY ENGINEER BY TELEPHONE, 595-2275 AT LEAST 48 HOURS BEFORE STARTING ANY WORK UNDER THIS CONTRACT.
4. ALL CONSTRUCTION JOINTS IN THE FOOTINGS OF SLABS AND WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
5. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAS BEEN PLACED, INSPECTED AND APPROVED.
6. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES (OR RADIAL) TO CONDUIT CENTERLINE EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
7. ALL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH AN ULTIMATE 28 DAYS COMPRESSIVE STRENGTH OF 4000 p.s.i. UNLESS OTHERWISE NOTED. *COMPRESSION TEST CYLINDERS ARE REQUIRED.*
8. ALL EXPOSED EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
9. ALL STEEL ADJACENT TO FACE OF CONCRETE SHALL HAVE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
10. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL AS PER A.S.T.M. A-615-GRADE 60.
11. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE "MANUAL OF STANDARD PRACTICE".
12. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTERLINE OF STEEL UNLESS OTHERWISE NOTED.
13. ALL BACKFILLS AND FILLS TO BE USED AS SUBGRADE SHALL BE COMPACTED TO A RELATIVE DENSITY OF 90% UNLESS OTHERWISE SPECIFIED.
14. ALL STEEL THAT IS TO BE CONTINUOUS SHALL HAVE A MINIMUM LAP OF 30 BAR DIAMETERS OR 18", WHICHEVER IS GREATER.
15. ALL CATCH BASINS AND CONNECTOR PIPES BETWEEN CATCH BASINS TO BE INSPECTED BY THE CITY ENGINEER.
16. PIPE SHALL BE EMBEDDED 9" INTO ALL STRUCTURES INCLUDING INLET & HEADWALLS, UNLESS OTHERWISE SPECIFIED.
17. WHERE PIPE IS TO BE PLACED IN FILL, THE FILL SHALL BE COMPACTED TO A MINIMUM DEPTH OF 3 FEET ABOVE THE TOP OF PIPE PRIOR TO TRENCHING.
18. ALL BACKFILL AND FILL AROUND CLOSED CONDUIT IN STREET RIGHTS OF WAY SHALL BE BROUGHT UP TO SUBGRADE OF THE ROAD OR TO 2 FEET ABOVE THE TOP OF THE CONDUIT, WHICHEVER IS LESS. THE CITY ENGINEER SHALL INSPECT ALL BACKFILL AND FILL ABOVE AFOREMENTIONED LIMITS.
19. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH LOS ANGELES COUNTY ENGINEER CASE NO. 40 BEDDING PER STANDARD DRAWING D-54, UNLESS OTHERWISE NOTED.
20. UNLESS OTHERWISE SHOWN, CONCRETE DIMENSIONS SHALL BE MEASURED VERTICALLY OR HORIZONTALLY AND PARALLEL OR AT RIGHT ANGLES (OR RADIAL) TO THE CENTER LINE OF CONSTRUCTION.
21. THIS STORM DRAIN WILL NOT BE ACCEPTED FOR MAINTENANCE UNTIL THE STREETS HAVE BEEN PAVED, MANHOLES BROUGHT TO GRADE, AND THE SYSTEM IS CLEANED TO THE SATISFACTION OF THE CITY ENGINEER.

**L.A. CO. FLOOD CONTROL STD. DWGS.**

| <u>DWG. NO.</u> | <u>DETAIL DESCRIPTION</u>                                  |
|-----------------|------------------------------------------------------------|
| 2-D 104         | MANHOLE NO.3 (BOX OR ARCH)                                 |
| 2-D 191         | JUNCTION STRUCTURE NO.3 (30" OR SMALLER SIDE INLET TO BOX) |
| 2-D 205         | WINDOW DETAILS FOR MULTIPLE BOX STRUCTURES.                |
| 2-D 261.1 TO .3 | PROJECTION BARRIER                                         |
| 2-D 251         | PROTECTION FOR SEWER CROSSING                              |
| 2-D 260         | TRANSITION STRUCTURE                                       |

### BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THESE PLANS IS THE CENTERLINE OF LA PUENTE ROAD BEING NORTH 12°08'40" EAST, AS SHOWN ON TRACT NO. 306225, RECORDED IN BOOK 790 PAGES 96 TO 97 INCLUSIVE, OF MAPS IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF LOS ANGELES.

## PRIVATE ENGINEERS NOTICE TO CONTRACTORS

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INSURE THE SAFETY OF A PERSON AND PROPERTY OF THIS PROJECT, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

| NO. | REVISION | REVISED BY | APPROVED BY | DATE |
|-----|----------|------------|-------------|------|
|     |          |            |             |      |
|     |          |            |             |      |
|     |          |            |             |      |
|     |          |            |             |      |

IF CONSTRUCTION OF IMPROVEMENTS SHOWN HEREON ARE NOT COMMENCED WITHIN 18 MONTHS OF APPROVAL DATE, THESE PLANS ARE SUBJECT TO REVIEW BY THE CITY.

APPROVED  
CITY OF WALNUT

Ronald L Kranzer  
CITY ENGINEER - RON KRANZER  
R.C.E. 18503 DATE 10-4-82

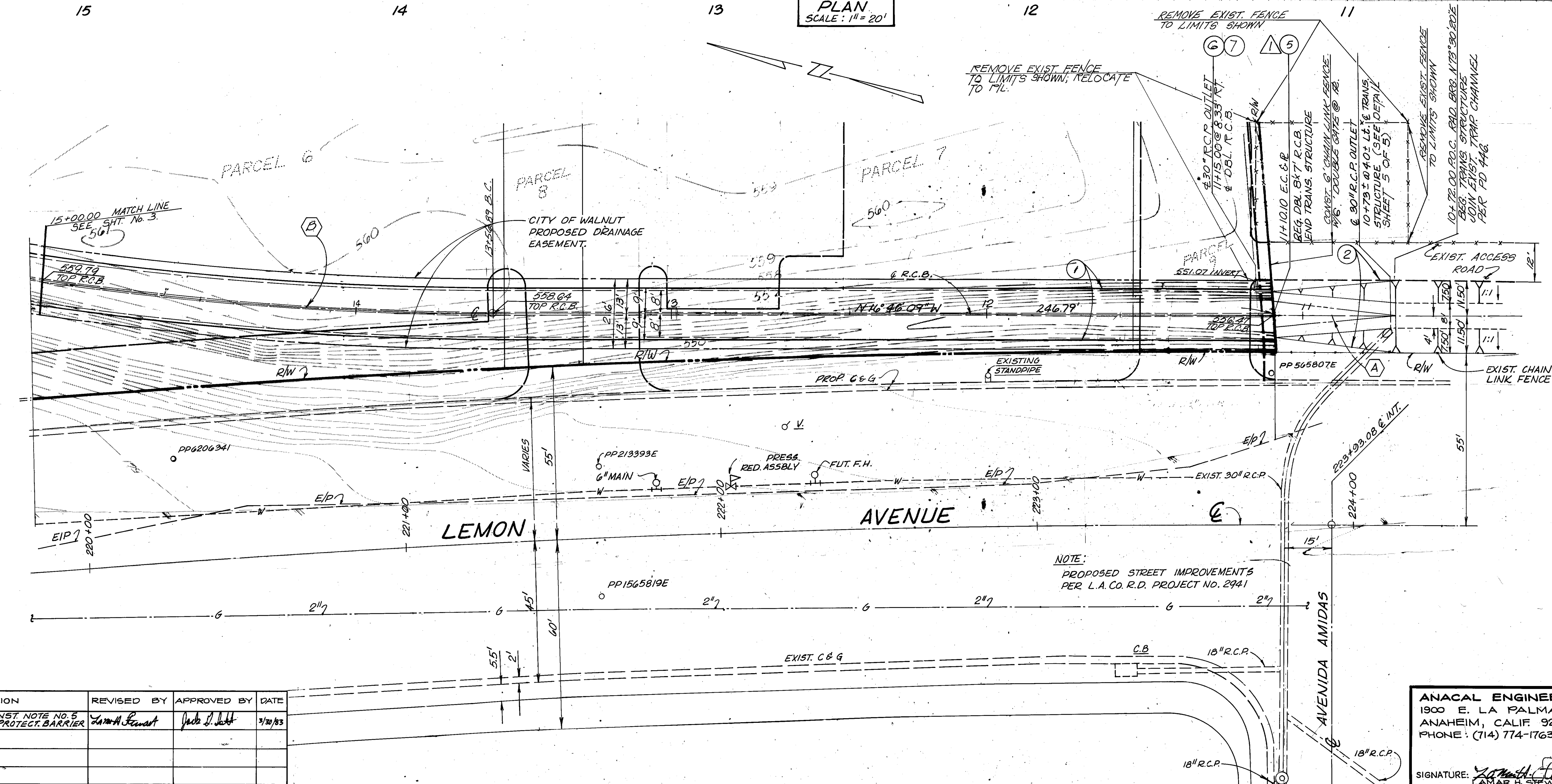
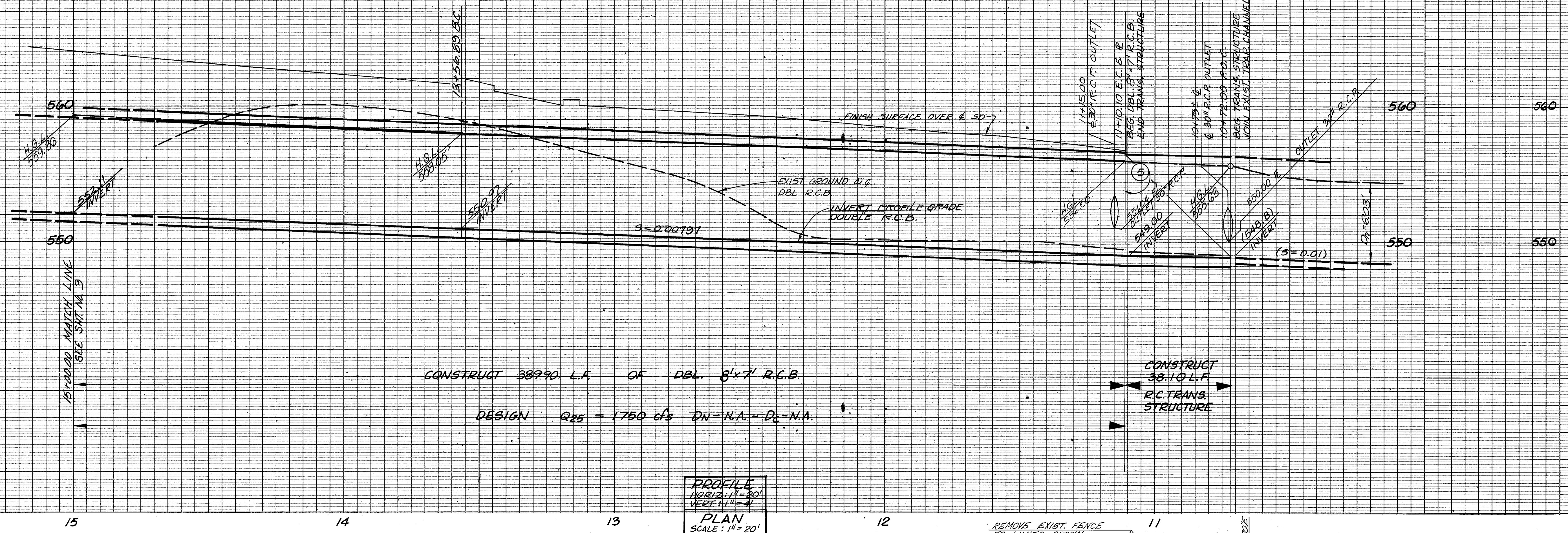
**ANACAL ENGINEERING CO.**  
1900 E. LA PALMA AVE.  
ANAHEIM, CALIF. 92803-3668  
PHONE: (714) 774-1763

SIGNATURE: Lamar H Stewart DATE 8/31/82  
LAMAR H STEWART R.C.E. NO. 29726

**STORM DRAIN**

for  
P.M. 14987

SHT 1 OF 5 SHTS



#### CONSTRUCTION NOTES

- ① CONSTRUCT DOUBLE 8'x7' REINFORCED CONCRETE BOX. SEE DETAILS PER SHEET 4.
- ② INSTALL PROTECTION BARRIER PER L.A. CO. F.C.D. NO. 3 PER D26.1.1 THRU 26.1.3. SUBSTITUTE INLET BARRIER FOR OUTLET BARRIER. INSTALL NORMAL TO R.C.B. WALL. RECESS AS REQ'D TO OPEN DOWNSTREAM.
- ③ REMOVE EXIST. TRAP CHANNEL B=8', Z=1, H=7.5' AND CONSTRUCT R.C. TRANSITION STRUCTURE PER SHT. 5.
- ④ CONSTRUCT JUNCTION STRUCTURE NO. 3 PER L.A. CO. F.C.D., NO. 2-D191.
- ⑤ INSTALL 8' L.F. OF 30" R.C.P. (1000 D) STUB & FLUG.

| CURVE DATA      |         |         |         |  |
|-----------------|---------|---------|---------|--|
| Δ               | R       | L       | T       |  |
| A 0°26'59" LT.  | 4851.50 | 38.10'  | 19.05'  |  |
| B 19°33'06" RT. | 1000.00 | 341.24' | 172.30' |  |

| NO. | REVISION                                                 | REVISED BY    | APPROVED BY     | DATE    |
|-----|----------------------------------------------------------|---------------|-----------------|---------|
| 1   | REVISED CONST. NOTE NO. 3<br>SUBSTITUTE PROTECT. BARRIER | Lamar Stewart | Jack D. Stewart | 3/20/83 |

ANACAL ENGINEERING CO.  
1900 E. LA PALMA AVE.  
ANAHEIM, CALIF. 92803-3668  
PHONE: (714) 774-1763

DATE 8/30/82  
SIGNATURE: Lamar H. Stewart  
L.A. CO. R.C.E. NO. 29126

CITY OF WALNUT

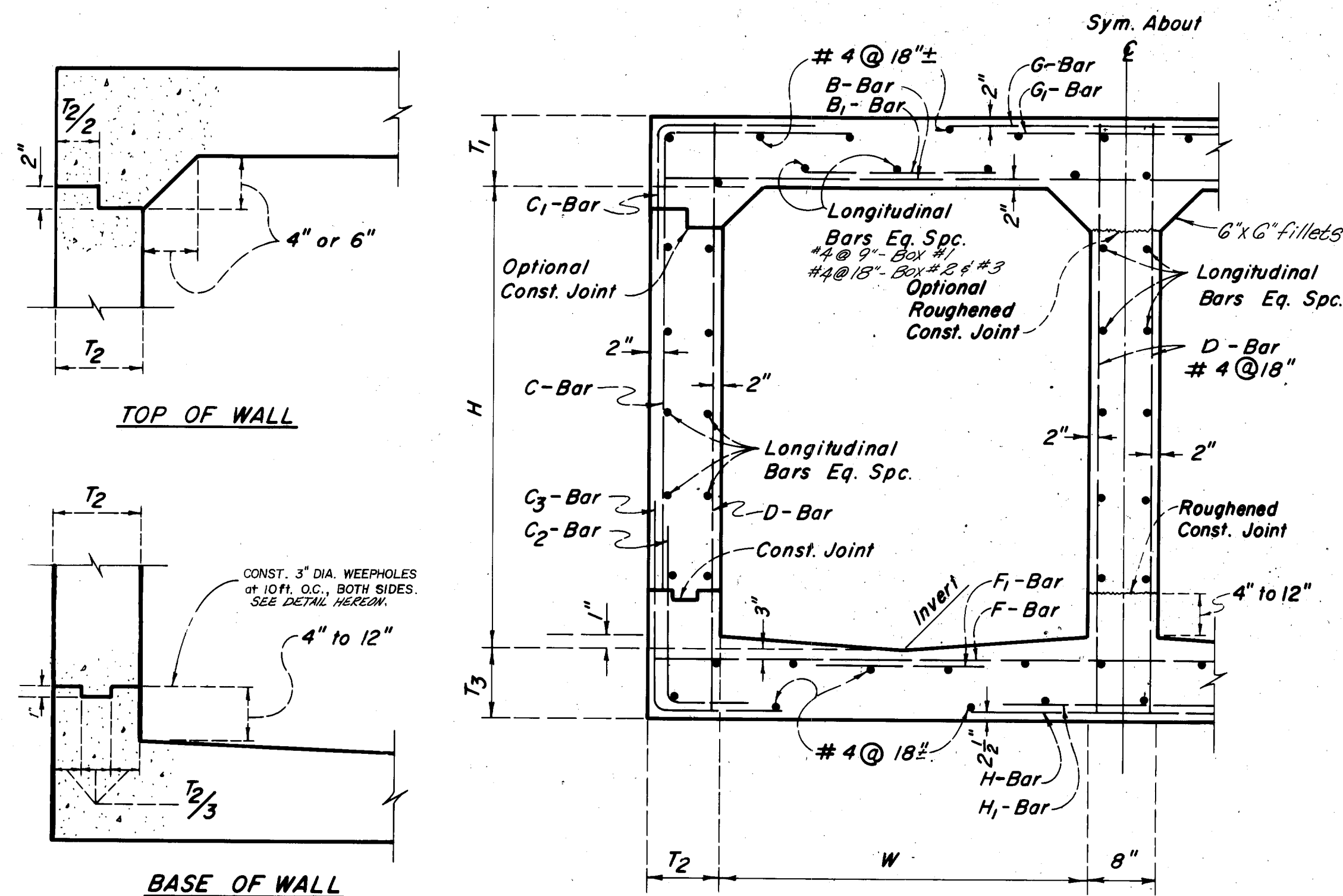
STORM DRAIN

for  
P.M. 14987

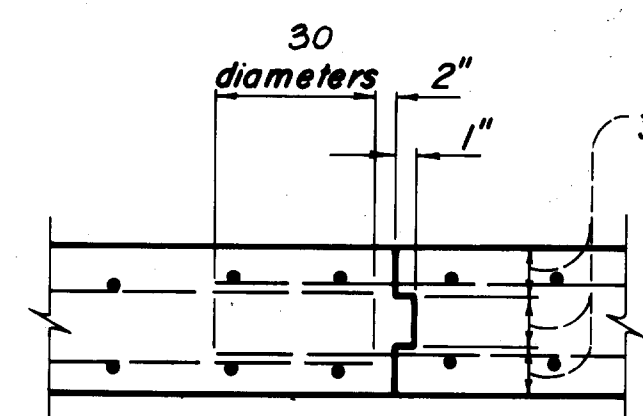
133B

SHEET 2 OF 5



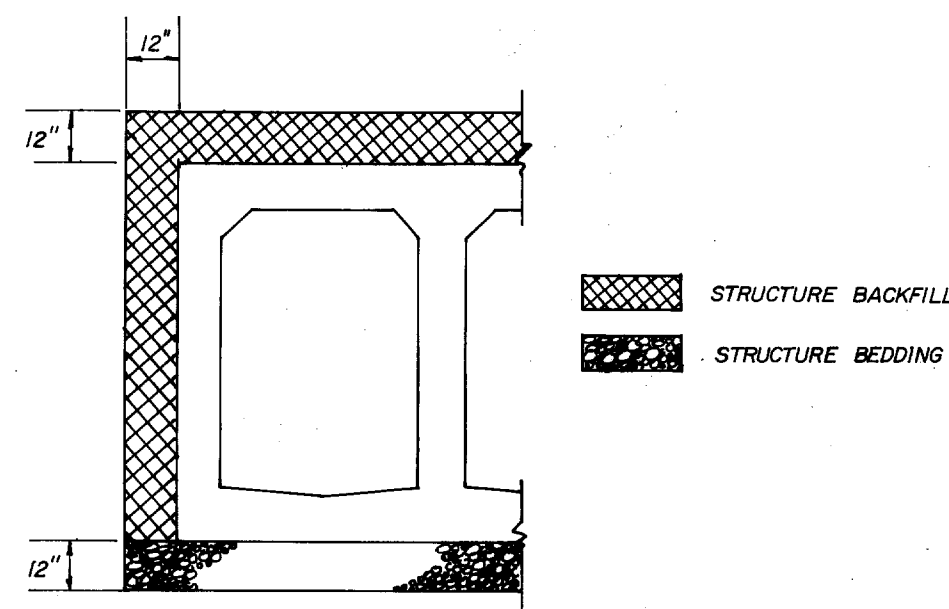


**TYPICAL R.C. BOX SECTION**  
NOT TO SCALE



**TRANSVERSE JOINT**

**CONSTRUCTION JOINT DETAILS**  
NOT TO SCALE



**R.C.B. BACKFILL & BEDDING DETAIL**  
NOT TO SCALE

### DESIGN DATA

#### LIVE LOAD

H20-S16-44 unless otherwise noted

#### DEAD LOAD

Earth load per Marston's formula:  $w = 110$  p.s.f.  
 $K_u = K_v = 0.150$   
 $B_d$  = Outside width of box plus 3 feet  
Side earth 37 p.s.f. per foot of depth  
Internal water pressure: 62.4 p.s.f. per foot of depth  
Weight of concrete: 150 p.c.f.

#### ALLOWABLE STRESSES

$f'_c = 4000$  p.s.i. at 28 days  
 $f'_c = 1800$  p.s.i.  
 $f_s = 24000$  p.s.i.  
 $n = 8$   
shear and bond stresses per A.C.I. 318-63

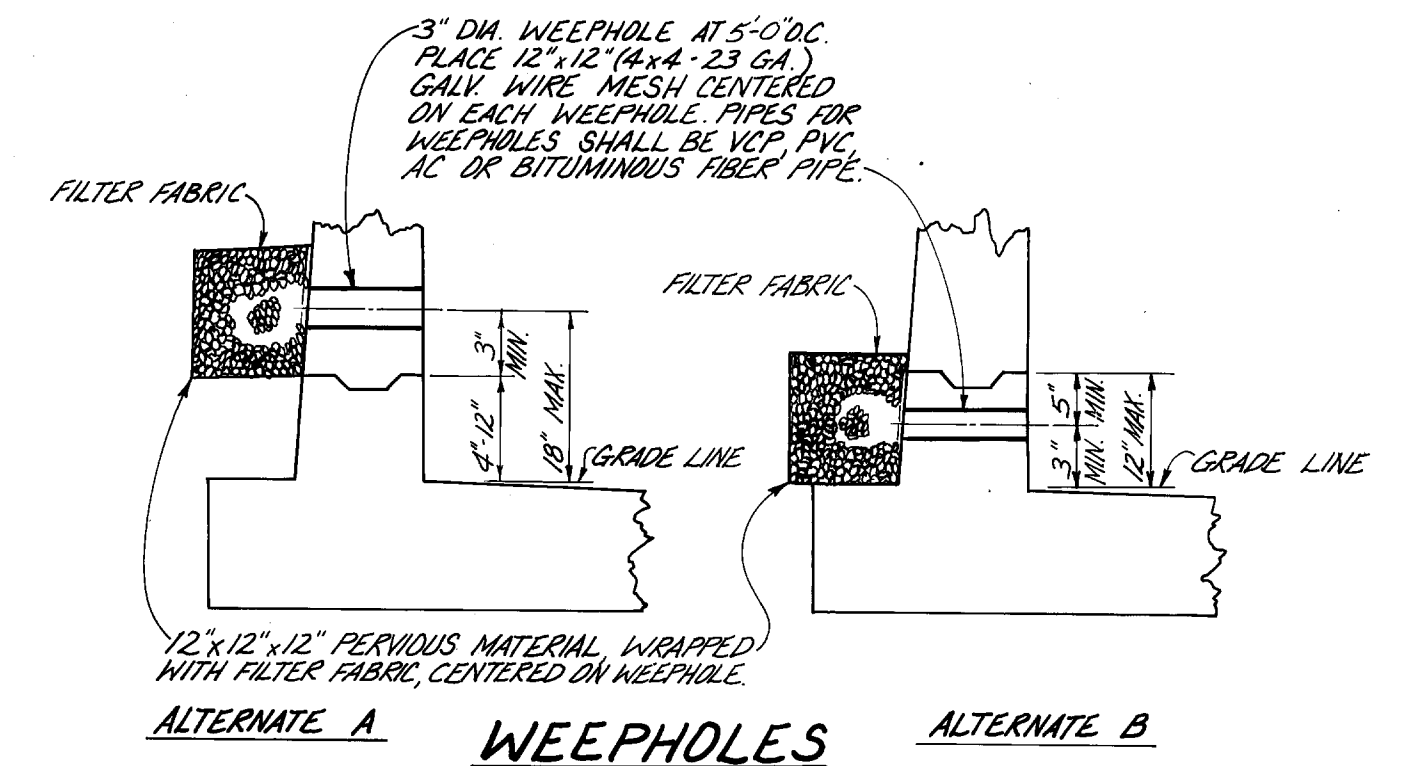
| BOX SECTION NO.             | 1                                                  | 2                              | 3                          |
|-----------------------------|----------------------------------------------------|--------------------------------|----------------------------|
| Design Cover                | 0'-0"                                              | 6'-0"                          | 7'-0"                      |
| Width W                     | 8'-0"                                              | 8'-0"                          | 8'-0" TO 10'-0"            |
| Height H                    | 7'-0"                                              | 7'-0"                          | 7'-0" TO 5'-0"             |
| Live Load                   | H-20                                               | H-20                           | H-20                       |
| Top Slab Thickness $T_1$    | 8.00"                                              | 8.00"                          | 9.50"                      |
| Side Wall Thickness $T_2$   | 8.00"                                              | 8.00"                          | 8.00"                      |
| Bottom Slab Thickness $T_3$ | 8.00"                                              | 8.00"                          | 10.00"                     |
| B Bars                      | Bar No. & Spacing<br>Length                        | #6 @ 7"<br>17'-9"              | #5 @ 16"<br>17'-9"         |
| B <sub>1</sub> Bars         | Bar No. & Spacing<br>Length                        | #5 @ 16"<br>7'-7 1/2"          | #7 @ 8"<br>Varies          |
| C Bars                      | Bar No. & Spacing<br>Horiz. Length<br>Vert. Length | #4 @ 14"<br>3'-8 1/2"<br>7'-1" | #4 @ 14"<br>3'-5"<br>7'-1" |
| C <sub>1</sub> Bars         | Bar No. & Spacing<br>Horiz. Length<br>Vert. Length | #4 @ 14"<br>2'-1"<br>3'-2 1/2" | #4 @ 14"<br>2'-1"<br>2'-1" |
| C <sub>2</sub> Bars         | Bar No. & Spacing<br>Horiz. Length<br>Vert. Length | #4 @ 14"<br>3'-3"<br>2'-1"     | #5 @ 14"<br>4'-0"<br>2'-1" |
| C <sub>3</sub> Bars         | Bar No. & Spacing<br>Horiz. Length<br>Vert. Length | #4 @ 14"<br>3'-3"<br>2'-1"     | #4 @ 14"<br>4'-3"<br>2'-6" |
| D Bars                      | Bar No. & Spacing<br>Length                        | #4 @ 18"<br>8'-1"              | #4 @ 18"<br>8'-1"          |
| F Bars                      | Bar No. & Spacing<br>Length                        | #4 @ 20"<br>17'-9"             | #6 @ 10"<br>17'-9"         |
| F <sub>1</sub> Bars         | Bar No. & Spacing<br>Length                        | #6 @ 20"<br>7'-10 1/2"         | #4 @ 18" O.C.<br>Varies    |
| G Bars                      | Bar No. & Spacing<br>Length                        | #5 @ 12"<br>12'-8"             | #4 @ 9"<br>6'-5 1/2"       |
| G <sub>1</sub> Bars         | Bar No. & Spacing<br>Length                        | #5 @ 12"<br>4'-8"              | #5 @ 9"<br>5'-0"           |
| H Bars                      | Bar No. & Spacing<br>Length                        | #4 @ 11"<br>7'-7"              | #5 @ 11"<br>13'-0"         |
| H <sub>1</sub> Bars         | Bar No. & Spacing<br>Length                        | #5 @ 11"<br>4'-0"              | #7 @ 11"<br>5'-0"          |

| NUMBER LONGITUDINAL REINFORCEMENT # 4 BARS | 1  | 2  | 3  |
|--------------------------------------------|----|----|----|
| Top Slab (Includes Distrib.)               | 44 | 27 | 31 |
| Ext. Walls                                 | 16 | 16 | 16 |
| Int. Walls                                 | 8  | 8  | 8  |
| Inv. Slab                                  | 28 | 26 | 31 |
| TOTAL                                      | 96 | 77 | 86 |

| QUANTITIES                | 1    | 2    | 3            |
|---------------------------|------|------|--------------|
| Concrete Cu.Yds./Lin. Ft. | 1.45 | 1.45 | 1.65 Average |
| Steel Lbs./Lin. Ft.       | 184  | 187  | 265          |

\* Spacing as measured at center wall.

| R. C. BOX LOCATION SCHEDULE |          |          |           |         |    |
|-----------------------------|----------|----------|-----------|---------|----|
| Box Sect.                   | Station  |          | Box Sect. | Station |    |
|                             | From     | To       |           | From    | To |
| 1                           | 11+10.10 | 13+45.00 |           |         |    |
| 2                           | 13+45.00 | 18+81.59 |           |         |    |
| 3                           | 18+81.59 | 19+02.64 |           |         |    |
|                             |          |          |           |         |    |



### ADDITIONAL NOTES FOR BOX SECTIONS

- LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
- UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
- UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADially, STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS: SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON THE OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
- AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C<sub>1</sub>, D, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
- THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 30 BAR DIAMETERS IN LENGTH.
- IN ALL SECTIONS LAP C AND C<sub>1</sub> BARS. THE VERTICAL LENGTH OF C AND C<sub>1</sub> BARS HAS BEEN CALCULATED FOR A FOUR-INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C<sub>1</sub> BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 30 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BAR.
- CONCRETE QUANTITIES ARE BASED ON A SIX-BY-SIX INCH FILLET.
- THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING THE 3 INCH DIAMETER WEEPHOLES, INDICATED ON THE "BASE OF WALL" DETAIL, ABOVE OR BELOW THE CONSTRUCTION JOINT, IF THE BOTTOM OF THE CONSTRUCTION JOINT IS AT LEAST 6 INCHES ABOVE THE BOTTOM OF THE BOX.
- THE STRUCTURE BACKFILL AND BEDDING SHALL CONFORM TO THE R.C.B. BACKFILL AND BEDDING DETAIL HEREON, AND SECTIONS 200 AND 300 7.4 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

### DOUBLE R.C.B. DETAILS

### CITY OF WALNUT

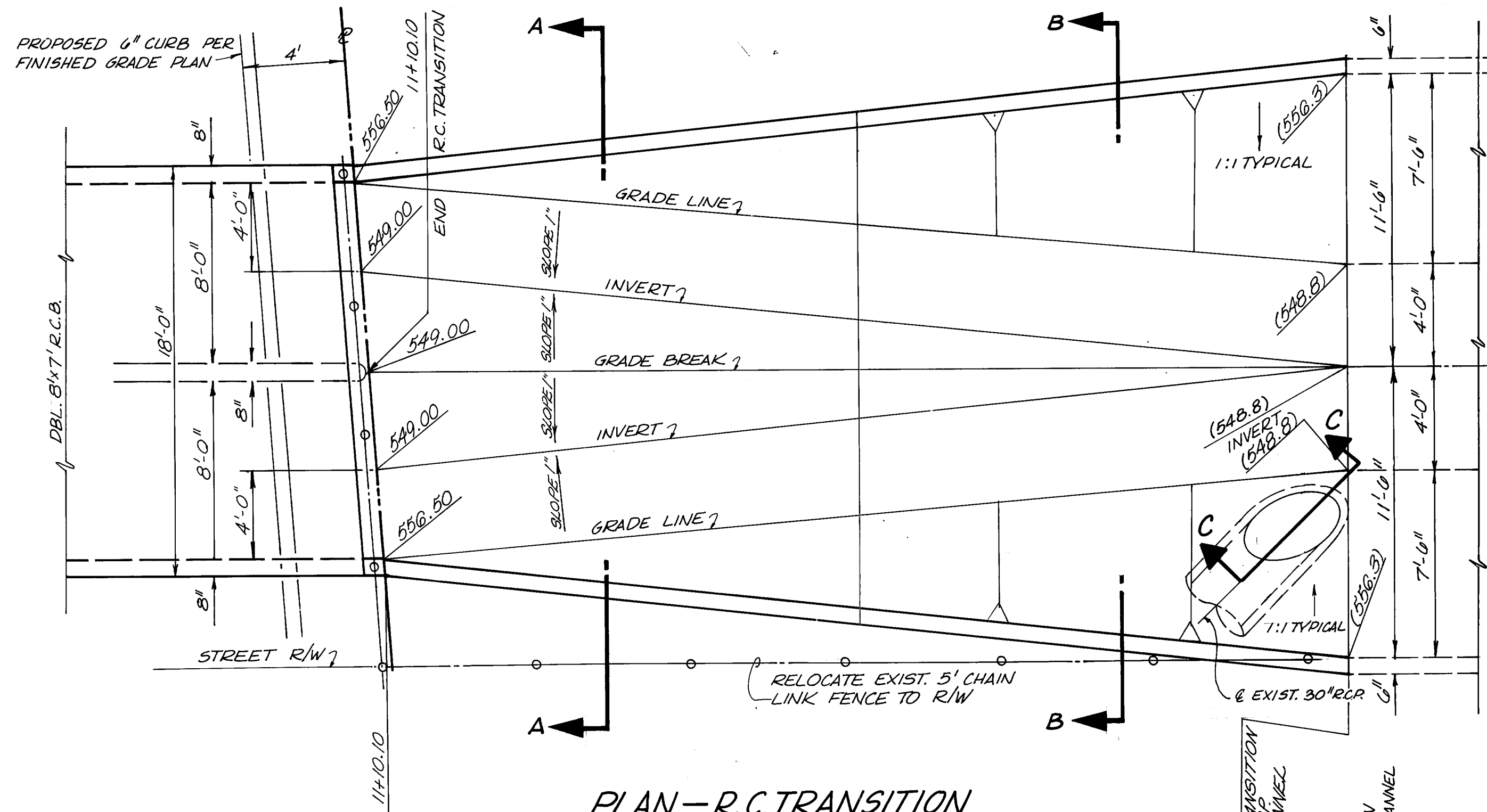
### STORM DRAIN

for  
P.M. 14987

133D

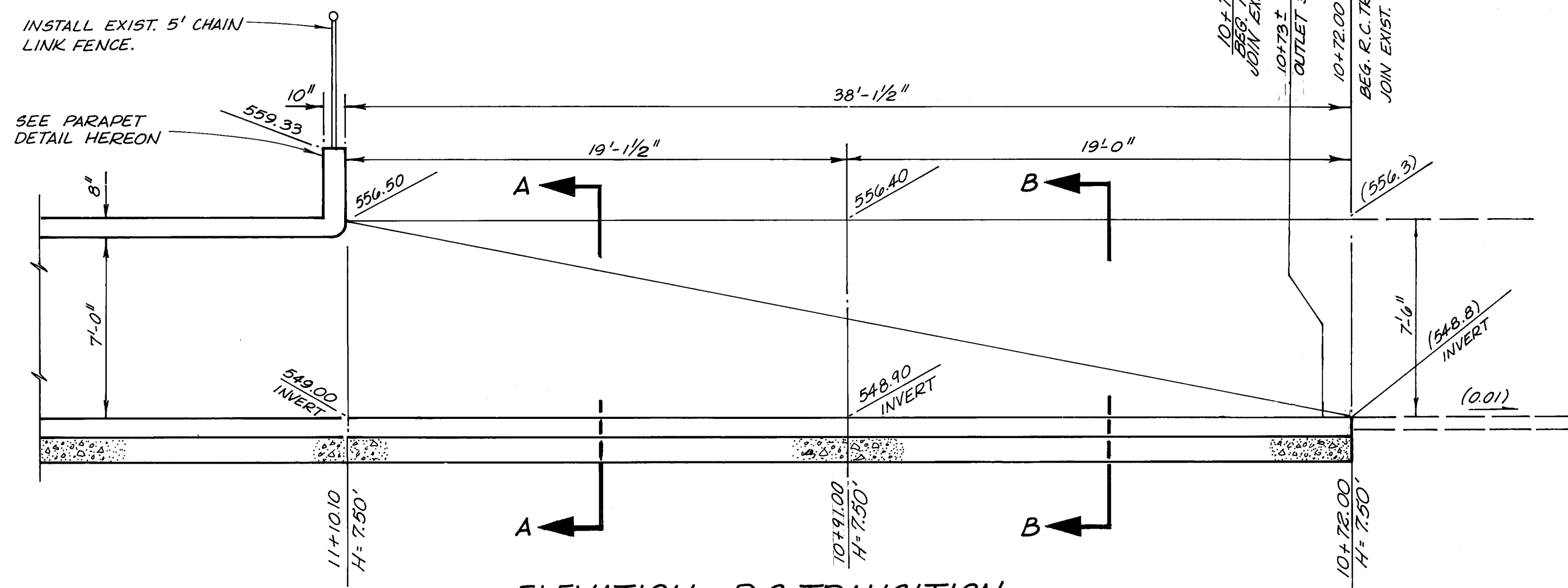
| NO. | REVISION | REVISED BY | APPROVED BY | DATE |
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|     |          |            |             |      |
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|     |          |            |             |      |

ANACAL ENGINEERING CO.  
1900 E. LA PALMA AVE.  
ANAHEIM, CALIF 92803-3668  
PHONE: (714) 774-1763  
DATE 8/31/82  
SIGNATURE: *Lamar H. Stewart* R.C.E. NO. 27726



PLAN - R.C. TRANSITION

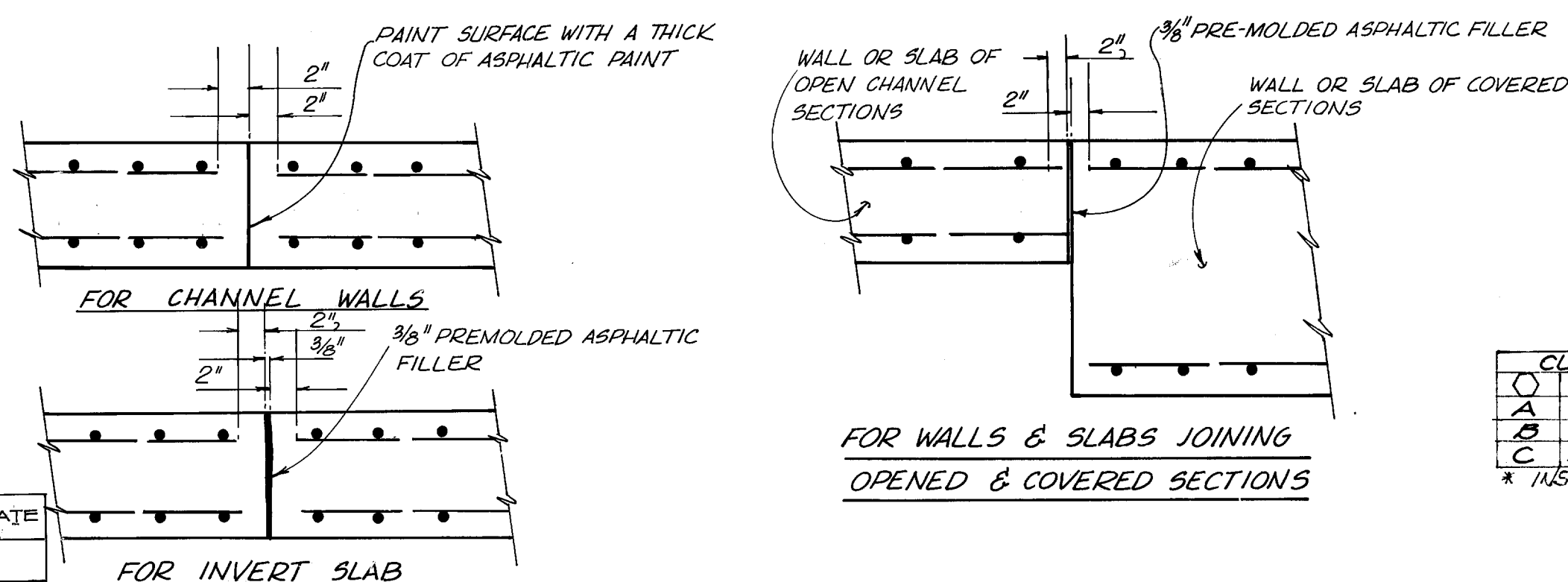
SCALE: 1/4" = 1'-0"



ELEVATION - R.C. TRANSITION

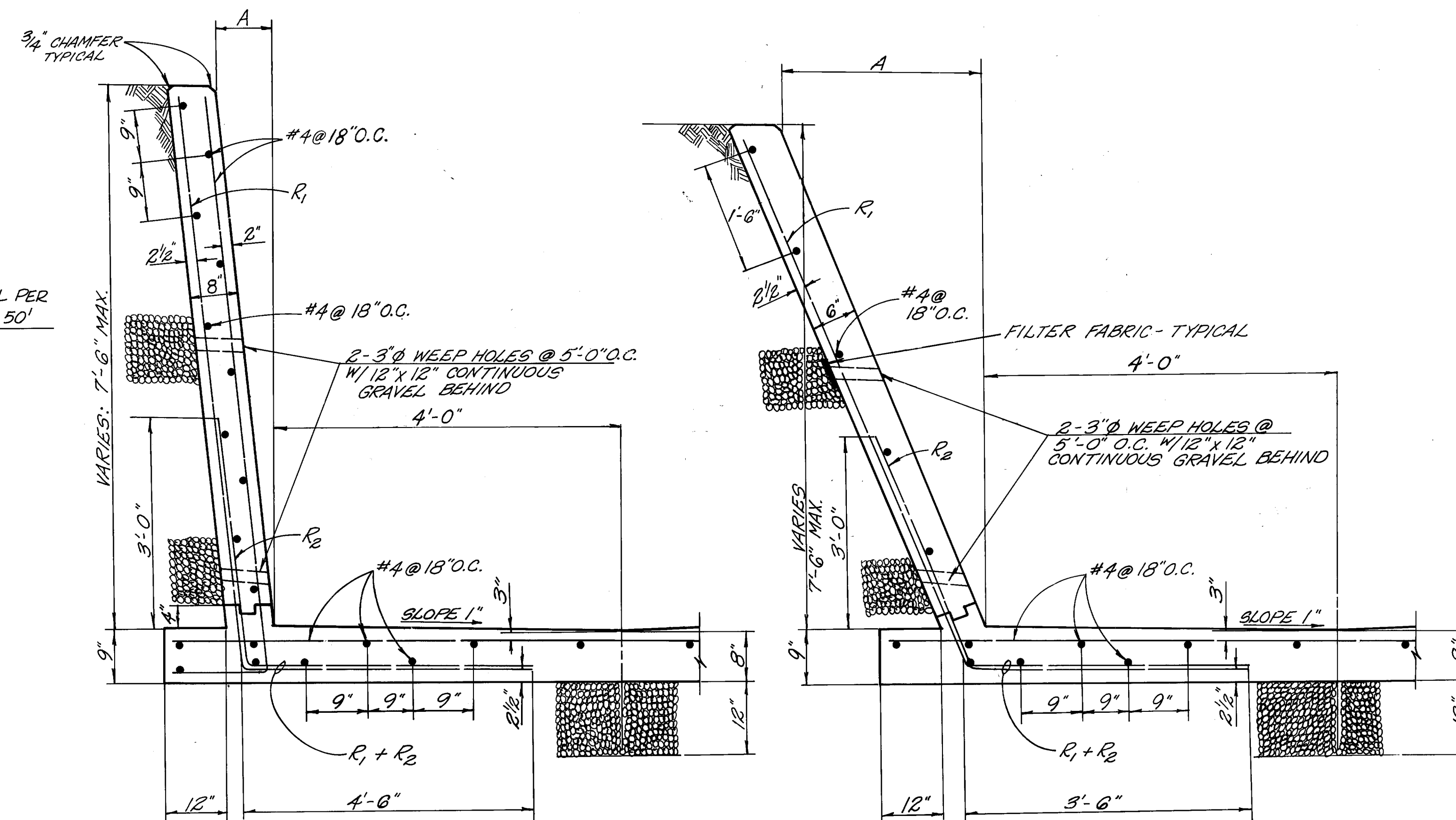
SCALE: 1/4" = 1'-0"

**DESIGN DATA**  
LOADS  
EXTERNAL 625 P.S.F., E.F.P.  
INTERNAL 40.0 P.S.F., E.F.P.  
 $f'_c = 4000$  P.S.I.  
 $f_s = 1800$  P.S.I.  
 $f_s = 24,000$  P.S.I.  
 $n = 8$



TRANSVERSE CONSTRUCTION JOINT DETAILS

NOT TO SCALE



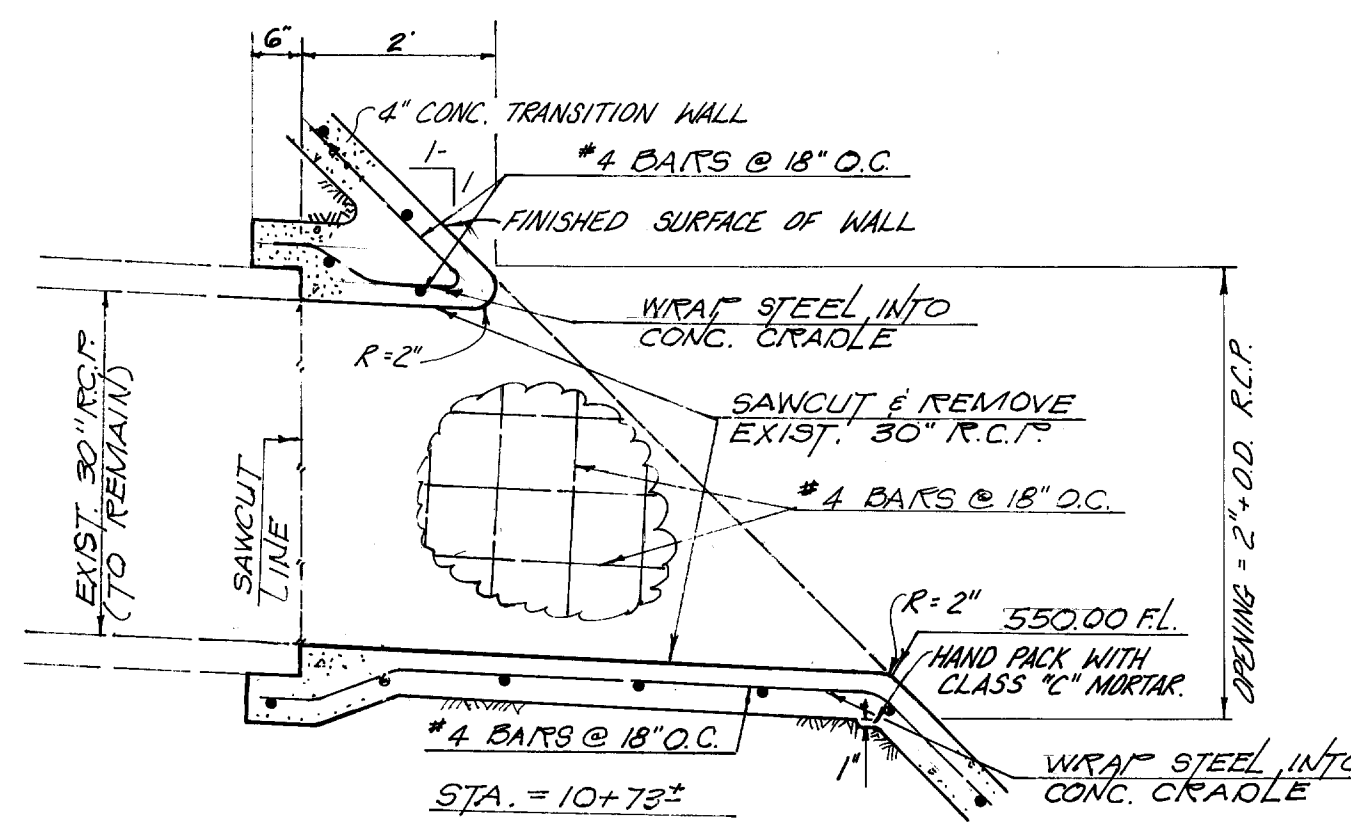
SECTION A-A

NOT TO SCALE

SECTION B-B

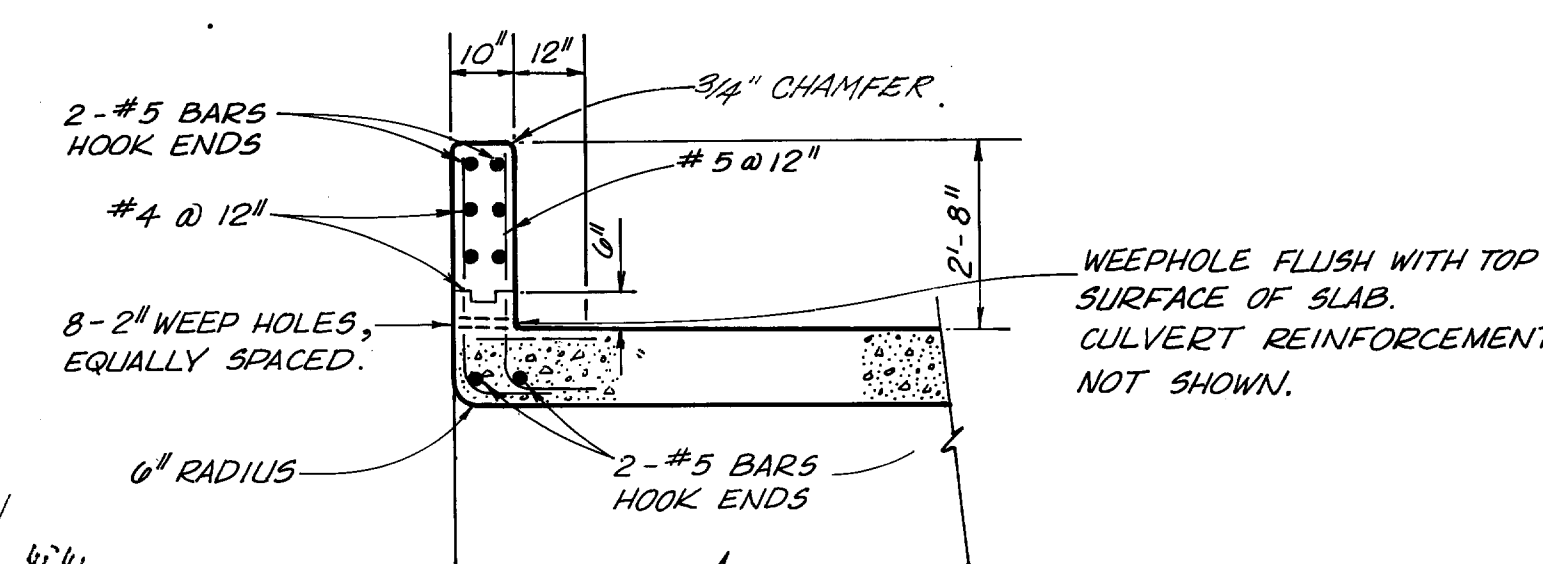
NOT TO SCALE

|             | A             | R <sub>1</sub> | R <sub>2</sub> |
|-------------|---------------|----------------|----------------|
| 0' TO 3'-0" | #5 @ 18" O.C. | #4 @ 18" O.C.  | #4 @ 18" O.C.  |
| > 3'-0"     | #4 @ 18" O.C. | OMIT           | OMIT           |



SECTION C-C

NOT TO SCALE



PARAPET DETAIL

SCALE: 3/8" = 1'-0"

# OPEN CHANNEL STRUCTURAL NOTES

1. LONGITUDINAL STEEL SHALL TERMINATE TWO INCHES FROM TRANSVERSE CONSTRUCTION JOINTS.
2. TRANSVERSE JOINTS SHALL BE SPACED NOT TO EXCEED 50 FEET NOR BE LESS THAN 10 FEET, MEASURED ALONG THE CENTERLINE OF CONSTRUCTION, EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
3. TRANSVERSE JOINTS SHALL BE PLACED AT THE JUNCTION OF RECTANGULAR OPEN CHANNEL SECTIONS WITH CLOSED CONDUIT SECTIONS.
4. ALL RECTANGULAR OPEN CHANNEL WALLS SHALL BE FINISHED IN ACCORDANCE WITH STANDARD DRAWING 2-2180, EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
5. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, IN CURVED SECTIONS THE MAXIMUM SPACING OF BARS SHALL NOT EXCEED THAT SHOWN ON THE TYPICAL SECTIONS. STEEL SHALL BE PLACED RADIALLY FROM THE MAXIMUM SPACING.
6. AT THE BEGINNING AND ENDING OF ALL POURS, A COMPLETE CURTAIN OF REINFORCEMENT COMPOSED OF B1, B3 AND B5 BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
7. BAR LENGTHS INDICATED ARE MAXIMUM REQUIRED, AND VARY PER VERTICAL WALL HEIGHT.
8. SECTION "B-B" B1 BARS SHALL BE PLACED IN THE MIDDLE OF THE WALL AND SLAB SECTIONS.
9. ALL REINFORCING STEEL SHALL CONFORM TO A.S.T.M. A-615 GRADE 60. (NO FIELD BENDING)
10. ALL CONCRETE SHALL HAVE AN ULTIMATE COMPRESSIVE STRENGTH OF 4000 P.S.I. @ 28 DAYS. COMPRESSION TEST CYLINDERS ARE REQUIRED.

# R.C. TRANSITION STRUCTURE DETAILS

# CITY OF WALNUT

# STORM DRAIN

for  
PM. 14987

133E

SHEET 5 OF 5

ANACAL ENGINEERING CO.  
1900 E. LA PALMA AVE.  
ANAHEIM, CALIF. 92803-3668  
PHONE: (714) 774-1763  
DATE: 8/5/82  
R.C.E. NO. 29126  
SIGNATURE: [Signature]  
LAMAR H. STEWART

| CURVE DATA | Δ         | R      | L      | T     |
|------------|-----------|--------|--------|-------|
| A          | 25°43'04" | 30.14' | 135.3' | 6.88' |
| B          | 25°43'04" | 4.0'   | 17.75' | 3.13' |
| C          | 25°43'04" | 25'    | 11.22' | 3.71' |

\* INSIDE FACE OF R.C.B.

18+77.57 INSTALL  
2" MANHOLE NO. 3  
PER L.A.C.F.C.D. STD. NO.  
2-D104, SECTION 15-B  
& EQUALIZING WINDOW  
PER L.A.C.F.C.D. NO. 2-D205

TRANSITION STRUCTURE DETAIL

NO SCALE

| NO. | REVISION | REVISED BY | APPROVED BY | DATE |
|-----|----------|------------|-------------|------|
|     |          |            |             |      |
|     |          |            |             |      |
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## **APPENDIX Q**

### **STRUCTURAL ENGINEERING REPORT**





# **ESI/FME, Inc.**

## **STRUCTURAL ENGINEERS & CONSULTANTS**

December 13, 2019

Jack Su  
800 Meadow Pass Rd  
Walnut, CA 91789

Re: ESI/FME Job No. K406

Dear Mr. Su,

Per your request, Emily Wright from this office performed a site visit on October 28, 2019, to observe the state of the existing structural members of the 2 horse stable structures located at 800 Meadow Pass Road in the City of Walnut. Building 1, the Main Barn and Stables, is a U-shaped structure with horse stables on the first level with a residence above. Building 2, the Minor Barn and Stables, is immediately east of Building 1 (see Figure 1). Building 1 was constructed in 1935 and altered in 1985 and 1995. Building 2 was constructed in 1935 and altered in 1984 and 1995. During the site visit, the interior of the upper level of Building 1 was not accessible due to the removal of the exterior stairs, therefore only the exterior was observed. Building 2 was also inaccessible, therefore only the exterior was observed.

The purpose of this report is to document our observations of the current condition of the structural elements of the buildings. We were also asked to provide feedback on the potential structural elements which would likely need to be addressed to bring the structures up to code if the buildings were to be re-modeled for residential or community use. These observations are for general information purposes only and are not to be construed as a building inspection or a complete list of requirements to bring the structures up to current code.

To summarize our findings below, the buildings do not meet current building codes which protect human life in a seismic event. The buildings would require what would amount to demolition and reconstruction to bring them up to code. The buildings were originally constructed in 1935 and were built to the standards required at that time. To bring the buildings up to code for human occupancy of any kind, the buildings would require what would amount to demolition and reconstruction.

### **Roof Framing**

#### **Existing Elements**

- The roofing material on both buildings looks to be in good shape, but the condition of the sheathing underneath was not able to be observed.



# **ESI/FME, Inc.**

## **STRUCTURAL ENGINEERS & CONSULTANTS**

- The original roof diaphragm for the stables looks to be 1x4 or 2x4 horizontal decking. Many locations around the eaves showed signs of water damage, and there was evidence some roof areas had been repaired with plywood prior to the latest re-roofing.
- The condition of the roof joists in those affected areas and any deterioration due to weathering could not be observed.
- In general, the existing hips, ridge beams, and ridge boards throughout the interior of Building 1 look to be in good shape.

### Potential Future Elements Required

- Updating to the current code would require removing the roofing material and adding a layer of 15/32" plywood for the roof diaphragm.
- Existing beams and rafters may need to be replaced due to weathering or water damage. Also, the spans would need to be checked for current roof live loads and replaced in found to be inadequate to carry the load.
- The areas of the roof conventionally framed with a 2x ridge board and collar ties do not meet current code and would require a new ridge beam with supporting posts and pad footings.
- Due to the amount of retrofitting and replacing required, the costs of remodeling would be excessive. We would recommend demolition and complete reconstruction.

### Wall Framing

#### Existing Elements

- The existing walls appear to be constructed with a mix of flat studs and 4x4s at 24" on center, each located under a rafter above, and with 1x12 horizontal sheathing on the interior side of the wall. The 4x4s occur approximately every six feet and are anchored to the stem wall footing with a post base.
- The 3x4 sill plates are broken at each 4x4 post and are secured with anchor bolts to the stem footing. There is not a continuous top chord or top plates, the 4x beam at the top of the wall is toe nailed at each end to the top of the 4x4 posts.
- All structural elements have been exposed to weather and are painted.

#### Potential Future Elements Required

- Most of the sill plates are weathered and would not be usable in a remodel.
- A continuous top plate or top chord with straps would be required.
- The let-in diagonal braces and horizontal sheathing are not adequate lateral resisting elements to resist earthquake loads. An entire lateral analysis would be required with new plywood shear walls and holddowns at all exterior walls.
- No shear transfer hardware was visible and would be required to resist earthquake loads, also additional blocking and edge nailing around the perimeter of the porch roofs would need to be added for shear transfer.



# **ESI/FME, Inc.**

## **STRUCTURAL ENGINEERS & CONSULTANTS**

- The post bases and pad footings of the posts at the porches would have to be upgraded with moment resisting hardware and new pad footings to perform adequately during a seismic event.
- No lateral resisting elements or shear transfer was visible from the upper level residence and deck to the lower level. If it is lacking, it would need to be added.
- Due to the amount of retrofitting and replacing required, the costs of remodeling would be excessive. We would recommend demolition and complete reconstruction.

### **Foundation**

#### **Existing Elements**

- Concrete stem wall footings are visible from the exterior, but there was no way to observe their depth or reinforcement. Vertical cracks are present in several locations which could mean the footings have been compromised with possible water intrusion and corrosion of rebar, and also possible differential settlement.
- The stem wall looks to be standard 6" curbs above exterior finished grade.
- Structural slab was not able to be observed.

#### **Potential Future Elements Required**

- New footings would be needed to accommodate the new holddowns from the lateral analysis.
- New slab would be required with a water vapor barrier underlayment, which would require demolition of all existing flooring and existing slab in order to install the visqueen vapor barrier before pouring of new structural slab.
- Finished grade would need to be remediated to accommodate current code requirement of 8" minimum between wood elements and finished grade.
- Pouring new footings and slabs and remediating the finished grade under an existing structure would require extensive shoring of the existing framing and drilling and epoxy of new reinforcement into existing footings of unknown quality. This is an extremely expensive method of construction and is not recommended.
- Due to the amount of retrofitting and replacing required, the costs of remodeling would be excessive. We would recommend demolition and complete reconstruction.

In summary, the buildings do not meet current building codes which exist to protect human life from the risks due to earthquakes. A complete vertical load path and lateral analysis would be required to update these 2 buildings to the current code. Due to the exposure to weather, most of the existing structural elements would not be usable and would need to be repaired or replaced. The extent of the repair and replacement that would be required for human occupancy of any kind would amount to a reconstruction of the buildings.

Please feel free to contact us with any questions.



# **ESI/FME, Inc.**

## STRUCTURAL ENGINEERS & CONSULTANTS

Regards,

ESI/FME, Inc.  
Structural Engineers

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Emily Wright, CE



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Dale L. Forbes, CE





**ESI/FME, Inc.**  
STRUCTURAL ENGINEERS & CONSULTANTS

**Figure 1**



