# APPENDIX A

## WDNR SEDIMENT CORING REPORT

# RESULTS OF SEDIMENT CORES TAKEN FROM MAGNOR LAKE, POLK COUNTY, WISCONSIN

*Paul Garrison, Wisconsin Department of Natural Resources*
*January 2006*

Aquatic organisms are good indicators of a lake's water quality because they are in direct contact with the water and are strongly affected by the chemical composition of their surroundings. Most indicator groups grow rapidly and are short lived so the community composition responds rapidly to changing environmental conditions. One of the most useful organisms for paleolimnological analysis are diatoms. These are a type of algae which possess siliceous cell walls, which enables them to be highly resistant to degradation and are usually abundant, diverse, and well-preserved in sediments. They are especially useful, as they are ecologically diverse. Diatom species have unique features as shown in Figure 1, which enable them to be readily identified. Certain taxa are usually found under nutrient poor conditions while others are more common under elevated nutrient levels. Some species float in the open water areas while others grow attached to objects such as aquatic plants or the lake bottom.

By determining changes in the diatom community it is possible to determine water quality changes that have occurred in the lake. The diatom community provides information about changes in nutrient, water color, and pH conditions as well as alterations in the aquatic plant (macrophyte) community.

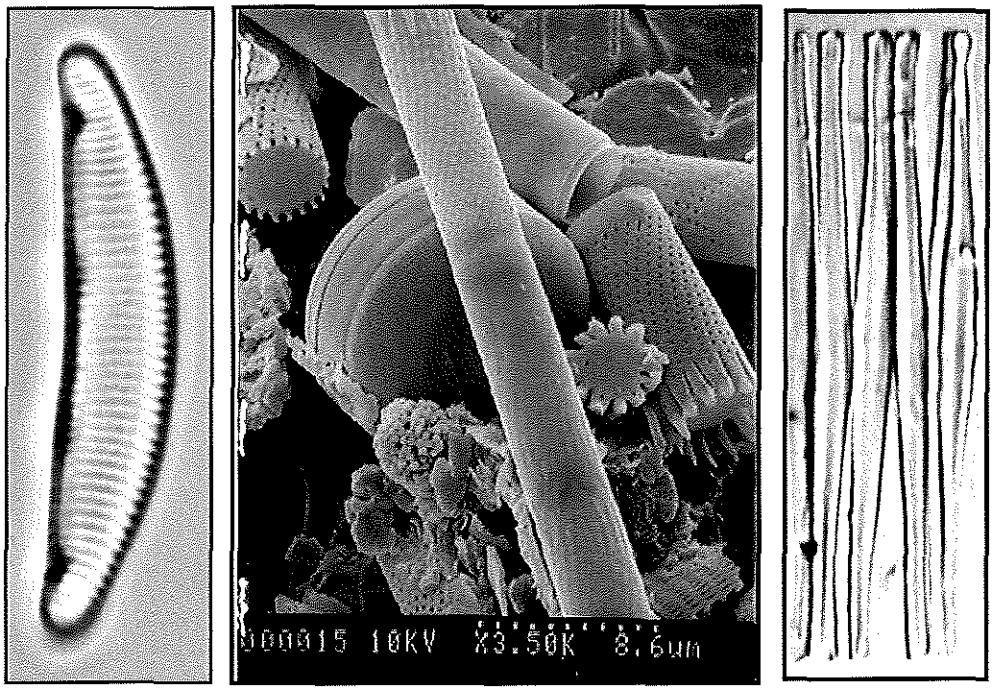


Figure 1. Photomicrographs of diatoms *Eunotia incisa* (left), *Aulacoseira* (middle), and *Fragilaria crotonensis* (right). *Eunotia* is frequently found in wetland or lower pH environments. *Aulacoseira* and *F. crotonensis* are diatoms typically found floating in the open water and are indicative of higher nutrient levels.

On 10 August 2005 cores were taken from five locations in Magnor Lake (Figure 2). At Site A a core was extracted to determine water quality changes in the lake during the last 150 years. This core was 70 cm long. The top 2 cm and bottom 2 cm were kept for analysis. It is assumed that the upper sample represents present conditions while the deeper sample is indicative of historical water quality conditions. At this and 4 other sites cores were extracted and the top 10 cm kept. These samples were used to determine the density of the upper sediment in order to estimate the depth to which alum would settle if it were applied to the lake.

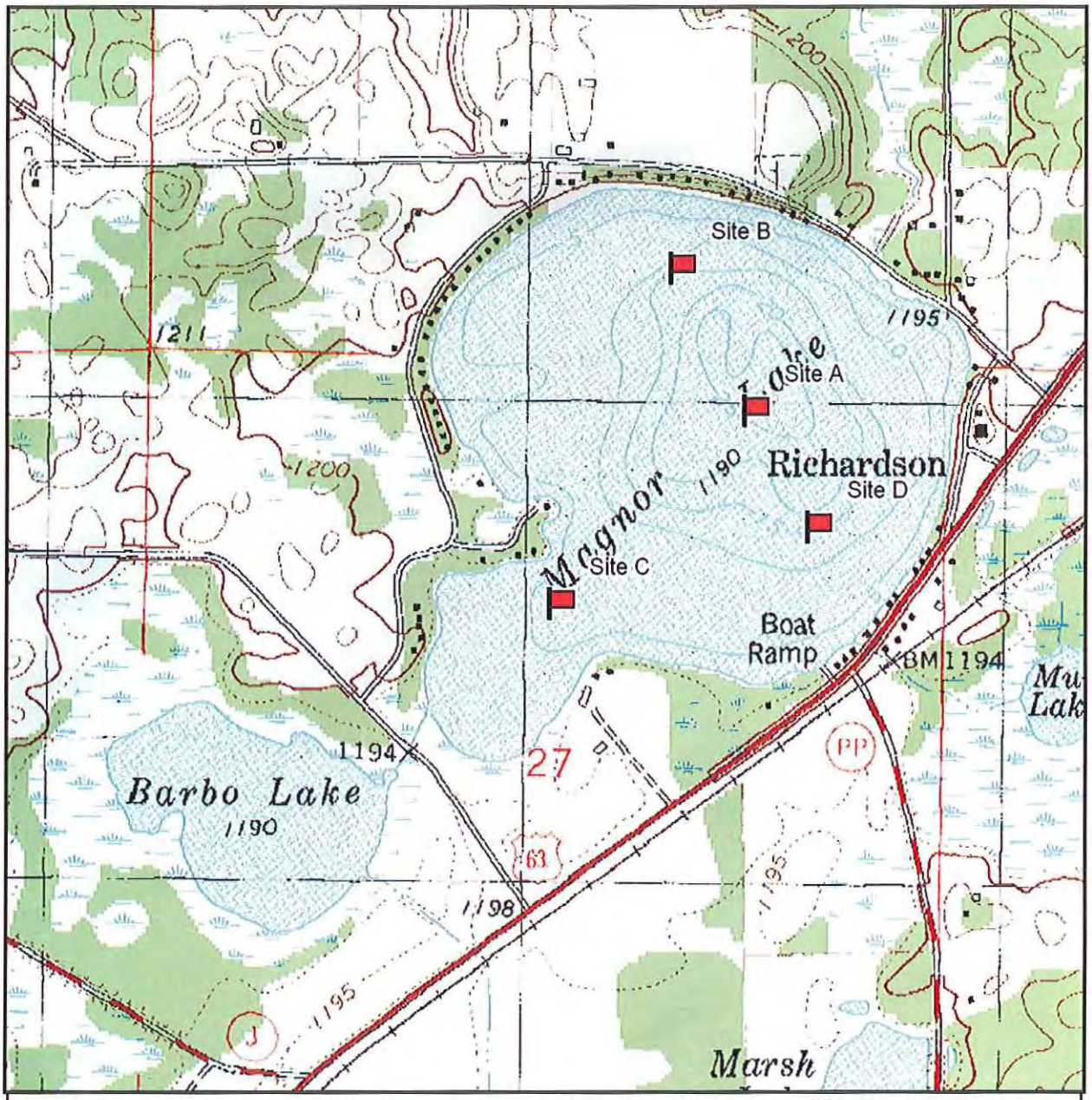


Figure 2. Location of sampling sites of cores collected on 10 August 2005. The top/bottom core was collected at Site A in about 25 feet of water.

*Water Quality Changes*

In Magnor Lake, at the present time and historically, the major component of the diatom community were those species that grow on the lake bottom or are associated with aquatic plants. The relatively low percentage of planktonic species (those that float in the open water area of the lake) in the sample from the bottom of the core is indicative of the relatively shallow depth in the lake (mean depth 3 meters) as well as good water clarity. If the lake had experienced large and frequent algal blooms there would not be enough light reaching the lake bottom to allow the growth of benthic diatoms.

At the top of the core there are fewer benthic diatoms than at the bottom of the core. At the bottom of the core benthic diatoms comprise 95% of the diatom community but 71% at the top of the core (Figure 3). Besides the decrease in relative amounts of benthic diatoms, there has also been a significant change in the dominant species of bottom dwelling diatoms. Historically the dominant diatom was the group *Eunotia* (Figure 3). These diatoms frequently are associated with wetland plants. The loss of these diatoms indicates there has been a significant decline in the acreage of wetlands or their water quality. Small *Fragilaria* also were present at lower levels compared with the sample from the bottom of the core (Figure 3). These species are often associated with submerged aquatic vegetation. Their decline indicates there likely are fewer plants at the current time compared to historical times.

Planktonic diatoms comprise 3% of the community at the bottom of the core but increase to 29% at the top of the core. The major species are *Aulacoseira ambigua* and *Fragilaria crotonensis*. The increase in planktonic diatoms from the bottom to the top of the core indicates a significant increase in phosphorus and resultant decline in water clarity. The increase in these two species is also indicative of higher nutrients since they prefer higher nutrient levels.

Frequently, when watersheds of lakes have undergone landuse changes, e.g. shoreline development or development of agriculture, the lake experiences an initial increase in submerged aquatic plants. In the core this would be indicated by an increase in species such as the small *Fragilaria*. This was not evident in this core but it is likely Lake Magnor has proceeded past this point and eutrophication has advanced to the point where frequent algal blooms are occurring such that they are inhibiting submerged plant growth because of low water clarity.

In summary, the diatom community indicates there has been a significant increase in phosphorus levels in the lake during the last 100 years. This is indicated by the large increase in planktonic diatoms. These types of diatoms are known to increase in response to increased nutrient levels in the water. There has also been a significant loss of wetlands in the watershed. This is indicated by the large decline in the diatom *Eunotia* from the bottom to the top of the core. Frequently modeling methods using weighted averaging regression and calibration can be used to quantitatively estimate historical phosphorus levels. This was attempted in this core but it was unsuccessful. The model underestimated the present day phosphorus levels (ca. 120 $\mu g\ L^{-1}$). The model predicted historical phosphorus levels are about 13 $\mu g\ L^{-1}$ which seem reasonable.

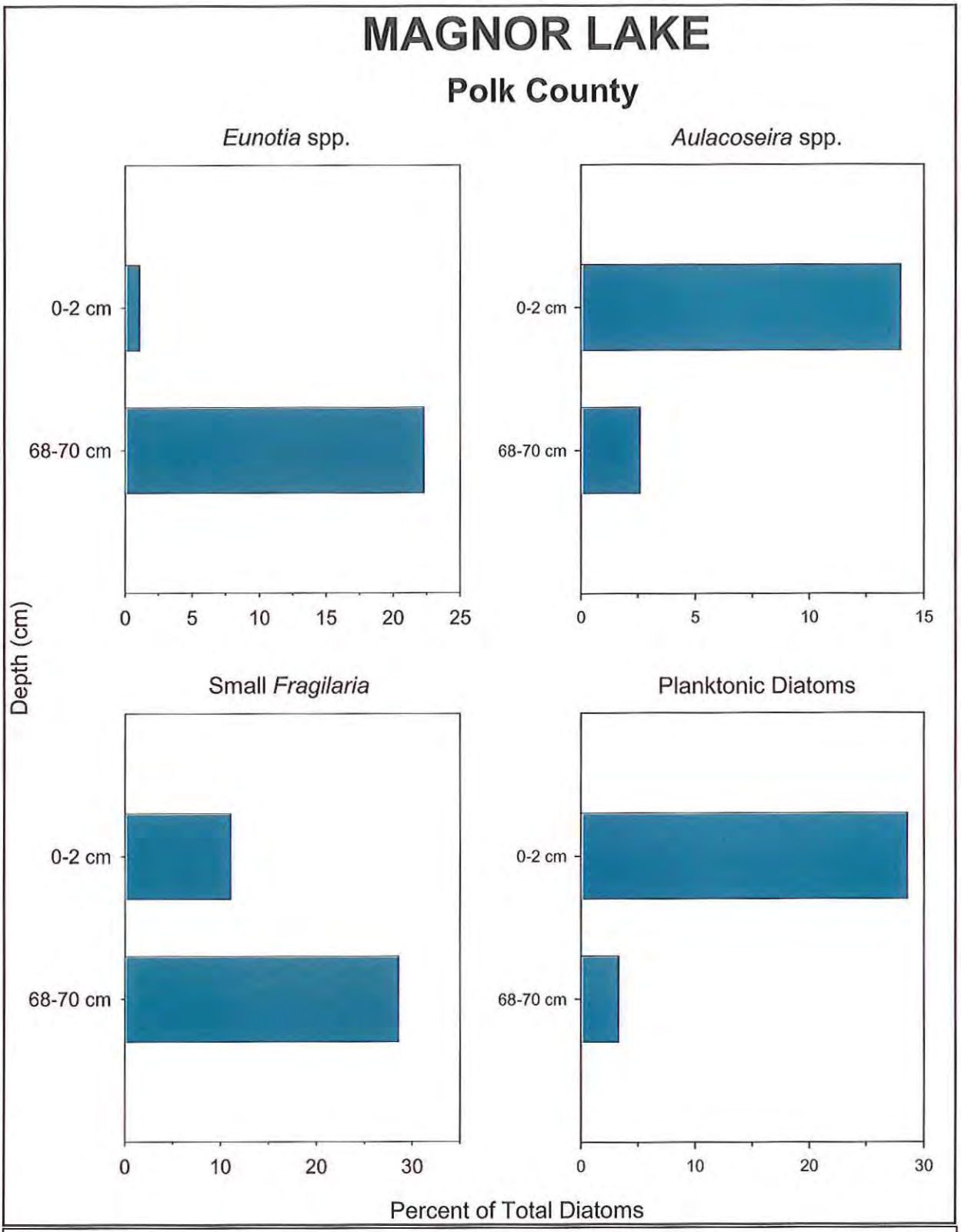


Figure 3. Changes in abundance of important diatoms found at present and presettlement times. *Eunotia* and small Fragilaria grow attached to substrates. *Aulacoseira* is a planktonic diatom and is found floating in the open water.

*Sediment density*

The density of the top 10 cm of sediment was measured at 5 locations in the lake. The purpose of this measurement was to estimate how deep alum (aluminum sulfate) might penetrate the sediments. Alum treatments have been successfully used to significantly reduce internal phosphorus loading from bottom sediments. Phosphorus is released when water overlying these sediments is devoid of oxygen. The lack of oxygen results in the form of iron changing from ferric (+3) to ferrous (+2). When this happens phosphorus that was bound to the iron is solubilized and moves from the sediments to the overlying water. Aluminum bound phosphorus does not become soluble in the absence of oxygen and thus stays in the sediment. Alum often is denser than lake sediments and when this is the case, alum will settle into the sediments until is reaches a depth where its density is equal to, or less than the sediments.

In most of the samples from Lake Magnor the percentage of water was greater than 90% (Table 1). Other studies have found that this can be a reasonable estimate of the depth alum will settle. This analysis indicates that an alum treatment may not be appropriate for this lake since alum is likely to sink into the sediments. A more accurate test of the effectiveness of alum would be to extract cores from the lake and treat them with sequential amounts of alum. This analysis will better estimate the amount of alum necessary to bind the sediment phosphorus. This analysis will also give a better estimate of the cost of an effective alum treatment.

TABLE 1. Percent water in the top 10 cm of sediments at 5 locatioins in Magnor Lake. Refer to Figure 1 for locations.

**Site A**

| Depth | % Water |
|---|---|
| 0-2 | 95.2 |
| 2-4 | 94.0 |
| 4-6 | 92.8 |
| 6-8 | 92.0 |
| 8-10 | 91.9 |

**Site B**

| Depth | % Water |
|---|---|
| 0-2 | 95.2 |
| 2-4 | 93.7 |
| 4-6 | 92.2 |
| 6-8 | 91.8 |
| 8-10 | 89.4 |

**Site C**

| Depth | % Water |
|---|---|
| 0-2 | 93.6 |
| 2-4 | 93.3 |
| 4-6 | 92.6 |
| 6-8 | 92.9 |
| 8-10 | 93.1 |

**Site D**

| Depth | % Water |
|---|---|
| 0-2 | 94.0 |
| 2-4 | 92.9 |
| 4-6 | 92.7 |
| 6-8 | 92.3 |
| 8-10 | 92.0 |

# APPENDIX B-1

## STORM WATER QUANTITY – HYDROCAD SHEETS

## EXISTING CONDITIONS

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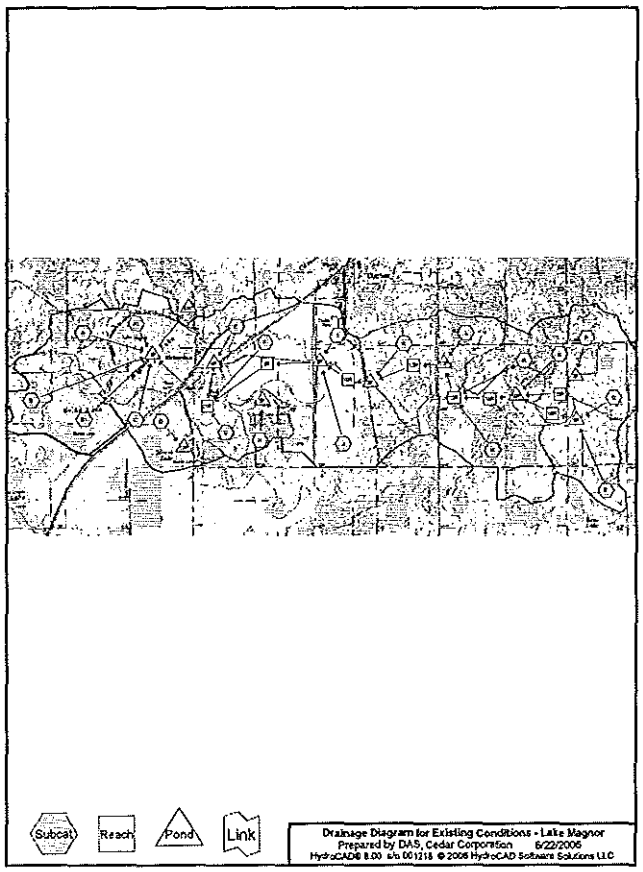





## Area Listing (all nodes)

| Area (acres) | CN | Description (subcats) |
|---|---|---|
| 292.100 | 65 | (L,N) |
| 242.600 | 68 | (R) |
| 534.100 | 69 | (A,E,O) |
| 121.200 | 71 | (P) |
| 469.100 | 76 | (M) |
| 492.000 | 78 | (J,Q) |
| 675.500 | 79 | (B,G) |
| 252.300 | 80 | (K) |
| 96.100 | 81 | (H) |
| 162.500 | 82 | (C,I) |
| 124.900 | 83 | (F) |
| 176.300 | 84 | (D) |
| 43.100 | 99 | BARBO LAKE (B1) |
| 217.500 | 99 | LAKE MAGNOR (A1) |
| 3,899.300 | | |



Time span=0.00-999.00 hrs, dt=0.02 hrs, 49951 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment A:** Runoff Area=250.400 ac Runoff Depth=0.52"
Flow Length=3,259' Slope=0.0086 '/' Tc=120.9 min CN=69 Runoff=31.69 cfs 10.759 af

**Subcatchment A1: Lake Magnor** Runoff Area=217.500 ac Runoff Depth=2.58"
Flow Length=4,425' Tc=4.1 min CN=99 Runoff=884.34 cfs 46.807 af

**Subcatchment B:** Runoff Area=300.300 ac Runoff Depth=0.97"
Flow Length=3,727' Slope=0.0100 '/' Tc=93.9 min CN=79 Runoff=104.16 cfs 24.378 af

**Subcatchment B1: Barbo Lake** Runoff Area=43.100 ac Runoff Depth=2.58"
Flow Length=2,070' Tc=2.7 min CN=99 Runoff=181.94 cfs 9.275 af

**Subcatchment C:** Runoff Area=51.000 ac Runoff Depth=1.15"
Flow Length=1,186' Slope=0.0051 '/' Tc=47.8 min CN=82 Runoff=35.87 cfs 4.876 af

**Subcatchment D:** Runoff Area=176.300 ac Runoff Depth=1.27"
Flow Length=1,485' Slope=0.0280 '/' Tc=22.9 min CN=84 Runoff=228.76 cfs 18.706 af

**Subcatchment E:** Runoff Area=178.000 ac Runoff Depth=0.52"
Flow Length=4,714' Slope=0.0051 '/' Tc=210.9 min CN=69 Runoff=15.19 cfs 7.648 af

**Subcatchment F:** Runoff Area=124.900 ac Runoff Depth=1.21"
Flow Length=5,559' Slope=0.0022 '/' Tc=242.6 min CN=83 Runoff=26.73 cfs 12.585 af

**Subcatchment G:** Runoff Area=375.200 ac Runoff Depth=0.97"
Flow Length=8,822' Slope=0.0030 '/' Tc=341.5 min CN=79 Runoff=47.88 cfs 30.458 af

**Subcatchment H:** Runoff Area=96.100 ac Runoff Depth=1.09"
Flow Length=2,080' Slope=0.0180 '/' Tc=41.2 min CN=81 Runoff=70.68 cfs 8.709 af

**Subcatchment I:** Runoff Area=111.500 ac Runoff Depth=1.15"
Flow Length=2,381' Slope=0.0130 '/' Tc=52.3 min CN=82 Runoff=73.19 cfs 10.659 af

**Subcatchment J:** Runoff Area=315.200 ac Runoff Depth=0.92"
Flow Length=5,288' Slope=0.0053 '/' Tc=175.9 min CN=78 Runoff=63.73 cfs 24.177 af

**Subcatchment K:** Runoff Area=252.300 ac Runoff Depth=1.03"
Flow Length=4,154' Slope=0.0096 '/' Tc=101.3 min CN=80 Runoff=88.57 cfs 21.651 af

**Subcatchment L:** Runoff Area=158.400 ac Runoff Depth=0.38"
Flow Length=3,591' Slope=0.0200 '/' Tc=95.2 min CN=65 Runoff=15.12 cfs 4.962 af

**Subcatchment M:** Runoff Area=469.100 ac Runoff Depth=0.82"
Flow Length=6,454' Slope=0.0120 '/' Tc=145.5 min CN=76 Runoff=93.29 cfs 32.001 af



**Subcatchment N:** Runoff Area=133.700 ac Runoff Depth=0.38"
Flow Length=5,467' Slope=0.0172 '/' Tc=143.6 min CN=65 Runoff=9.77 cfs 4.188 af

**Subcatchment O:** Runoff Area=105.700 ac Runoff Depth=0.52"
Flow Length=3,627' Slope=0.0193 '/' Tc=87.9 min CN=69 Runoff=16.64 cfs 4.541 af

**Subcatchment P:** Runoff Area=121.200 ac Runoff Depth=0.59"
Flow Length=3,452' Slope=0.0075 '/' Tc=128.4 min CN=71 Runoff=17.49 cfs 6.002 af

**Subcatchment Q:** Runoff Area=176.800 ac Runoff Depth=0.92"
Flow Length=4,105' Slope=0.0100 '/' Tc=104.6 min CN=78 Runoff=52.91 cfs 13.561 af

**Subcatchment R:** Runoff Area=242.600 ac Runoff Depth=0.48"
Flow Length=5,862' Slope=0.0078 '/' Tc=208.5 min CN=68 Runoff=18.63 cfs 9.674 af

**Reach 8R:** Avg. Depth=0.74' Max Vel=0.49 fps Inflow=72.62 cfs 119.393 af
n=0.050 L=5,615.0' S=0.0004 '/' Capacity=622.17 cfs Outflow=56.21 cfs 119.392 af

**Reach 10R:** Avg. Depth=0.24' Max Vel=0.67 fps Inflow=32.90 cfs 84.558 af
n=0.050 L=2,510.0' S=0.0034 '/' Capacity=2,299.12 cfs Outflow=32.86 cfs 84.557 af

**Reach 12R:** Avg. Depth=0.66' Max Vel=0.63 fps Inflow=98.86 cfs 62.907 af
n=0.050 L=3,585.0' S=0.0008 '/' Capacity=1,117.13 cfs Outflow=86.14 cfs 62.906 af

**Reach 13R:** Avg. Depth=0.44' Max Vel=1.12 fps Inflow=104.02 cfs 66.532 af
n=0.050 L=1,570.0' S=0.0043 '/' Capacity=2,584.96 cfs Outflow=101.61 cfs 66.532 af

**Reach 14R:** Avg. Depth=0.30' Max Vel=0.86 fps Inflow=56.38 cfs 30.342 af
n=0.050 L=2,200.0' S=0.0043 '/' Capacity=2,567.45 cfs Outflow=52.26 cfs 30.342 af

**Reach 16R:** Avg. Depth=0.02' Max Vel=0.24 fps Inflow=1.08 cfs 2.845 af
n=0.050 L=1,122.0' S=0.0070 '/' Capacity=3,295.84 cfs Outflow=1.04 cfs 2.845 af

**Reach 18R:** Avg. Depth=0.34' Max Vel=0.79 fps Inflow=60.73 cfs 23.235 af
n=0.050 L=1,610.0' S=0.0030 '/' Capacity=2,166.87 cfs Outflow=54.29 cfs 23.235 af

**Reach 21R:** Avg. Depth=0.91' Max Vel=0.46 fps Inflow=92.54 cfs 162.434 af
n=0.070 L=1,342.0' S=0.0006 '/' Capacity=732.00 cfs Outflow=92.19 cfs 162.434 af

**Pond 1P:** Peak Elev=1,190.60' Storage=10,257,522 cf Inflow=1,071.87 cfs 258.528 af
90.0" x 20.0' Culvert Outflow=5.93 cfs 178.106 af

**Pond 4P:** Peak Elev=1,194.99' Storage=333,015 cf Inflow=15.19 cfs 7.648 af
Outflow=0.00 cfs 0.000 af

**Pond 5P: Greley Lake** Peak Elev=1,192.56' Storage=379,345 cf Inflow=70.68 cfs 8.709 af
Outflow=0.00 cfs 0.000 af

**Pond 6P:** Peak Elev=1,200.11' Storage=51,779 cf Inflow=81.74 cfs 119.393 af
Outflow=72.62 cfs 119.393 af

**Pond 7P:** Peak Elev=1,259.60' Storage=235,568 cf Inflow=17.49 cfs 6.002 af
Outflow=1.08 cfs 2.845 af

**Pond 8P:** Peak Elev=1,257.03' Storage=2,148 cf Inflow=60.75 cfs 23.235 af
Outflow=60.73 cfs 23.235 af

**Pond 9P:** Peak Elev=1,208.88' Storage=1,630,410 cf Inflow=94.71 cfs 84.558 af
Outflow=32.90 cfs 84.558 af

**Pond 10P:** Peak Elev=1,225.66' Storage=99,016 cf Inflow=62.07 cfs 30.621 af
Outflow=56.38 cfs 30.342 af

**Pond 11P:** Peak Elev=1,209.46' Storage=545,821 cf Inflow=109.75 cfs 71.494 af
Outflow=98.86 cfs 62.907 af

**Pond 17P: Marsh Lake** Peak Elev=1,191.66' Storage=814,833 cf Inflow=228.76 cfs 18.706 af
Outflow=0.00 cfs 0.000 af

**Pond EXIT:** Inflow=5.93 cfs 178.106 af
Primary=5.93 cfs 178.106 af

Total Runoff Area = 3,899.300 ac Runoff Volume = 305.617 af Average Runoff Depth = 0.94"
93.32% Pervious Area = 3,638.700 ac 6.68% Impervious Area = 260.600 ac



## Subcatchment A:

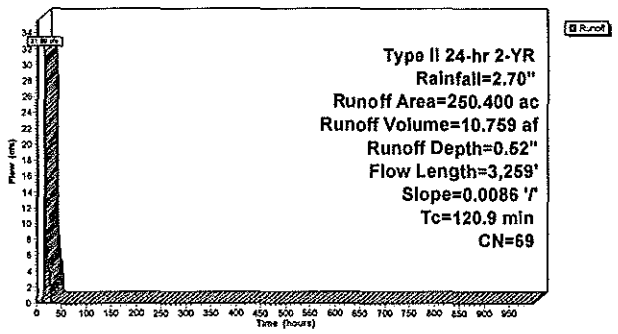
Runoff = 31.69 cfs @ 13.59 hrs, Volume= 10.759 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 250.400 | 69 | |
| 250.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 120.9 | 3,259 | 0.0086 | 0.45 | | Lag/CN Method, |

## Subcatchment A:






## Subcatchment A1: Lake Magnor

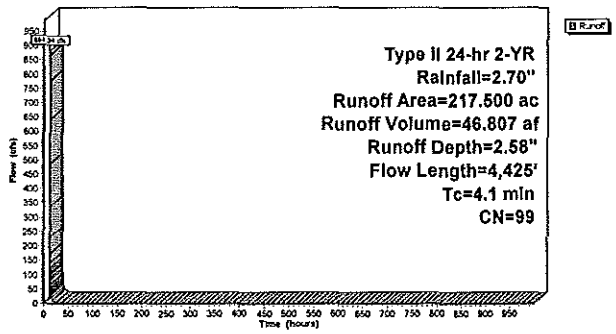
Runoff = 884.34 cfs @ 11.94 hrs, Volume= 46.807 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 217.500 | 99 | LAKE MAGNOR |
| 217.500 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.1 | 4,425 | | 17.94 | | Lake or Reservoir, Mean Depth= 10.00' |

## Subcatchment A1: Lake Magnor






## Subcatchment B:

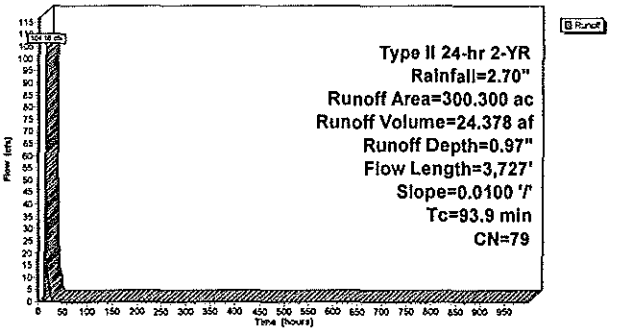
Runoff = 104.16 cfs @ 13.14 hrs, Volume= 24.378 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 300.300 | 79 | |
| 300.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 93.9 | 3,727 | 0.0100 | 0.66 | | Lag/CN Method, |

## Subcatchment B:



### Subcatchment B1: Barbo Lake

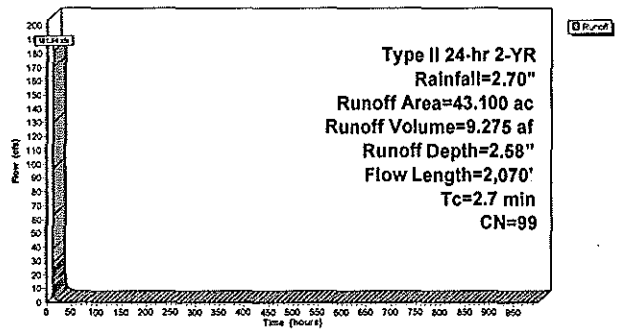
Runoff = 181.94 cfs @ 11.93 hrs, Volume= 9.275 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 43.100 | 99 | BARBO LAKE |
| 43.100 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.7 | 2,070 | | 12.69 | | Lake or Reservoir, Mean Depth= 5.00' |

### Subcatchment B1: Barbo Lake






### Subcatchment C:

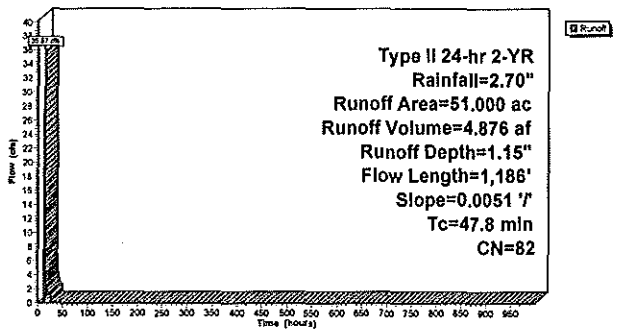
Runoff = 35.87 cfs @ 12.48 hrs, Volume= 4.876 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 51.000 | 82 | |
| 51.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.8 | 1,186 | 0.0051 | 0.41 | | Lag/CN Method, |

### Subcatchment C:






### Subcatchment D:

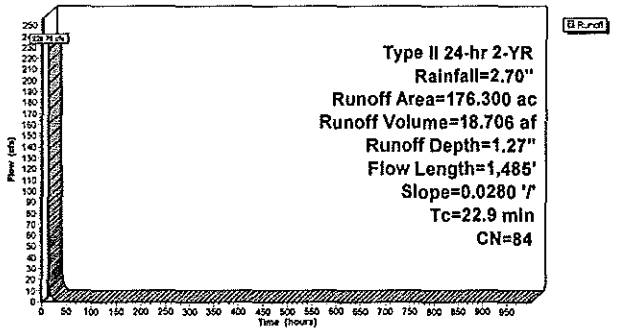
Runoff = 228.76 cfs @ 12.16 hrs, Volume= 18.706 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 176.300 | 84 | |
| 176.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 22.9 | 1,485 | 0.0280 | 1.08 | | Lag/CN Method, |

### Subcatchment D:






### Subcatchment E:

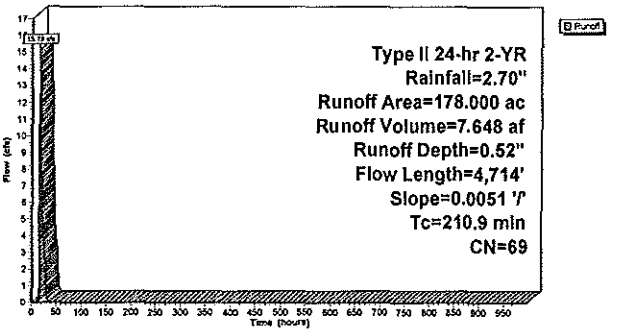
Runoff = 15.19 cfs @ 15.00 hrs, Volume= 7.648 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 178.000 | 69 | |
| 178.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 210.9 | 4,714 | 0.0051 | 0.37 | | Lag/CN Method, |

### Subcatchment E:



### Subcatchment F:

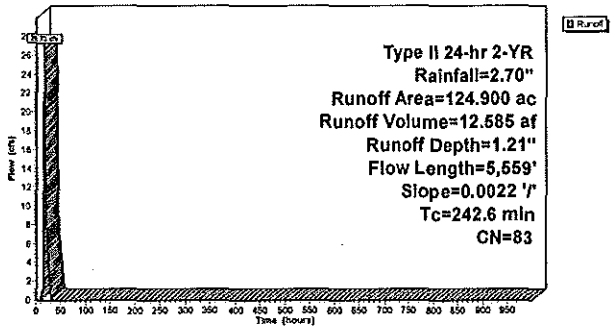
Runoff = 26.73 cfs @ 15.11 hrs, Volume= 12.585 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 124.900 | 83 | |
| 124.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 242.6 | 5,559 | 0.0022 | 0.38 | | Lag/CN Method, |

### Subcatchment F:






### Subcatchment G:

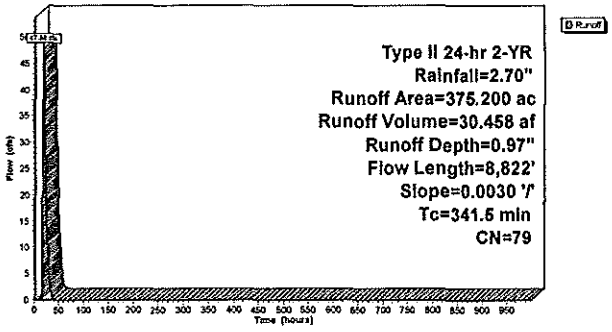
Runoff = 47.88 cfs @ 16.33 hrs, Volume= 30.458 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 375.200 | 79 | |
| 375.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 341.5 | 8,822 | 0.0030 | 0.43 | | Lag/CN Method, |

### Subcatchment G:






### Subcatchment H:

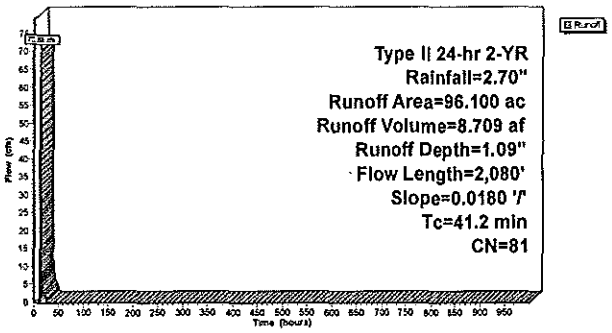
Runoff = 70.68 cfs @ 12.40 hrs, Volume= 8.709 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 96.100 | 81 | |
| 96.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 41.2 | 2,080 | 0.0180 | 0.84 | | Lag/CN Method, |

### Subcatchment H:






### Subcatchment I:

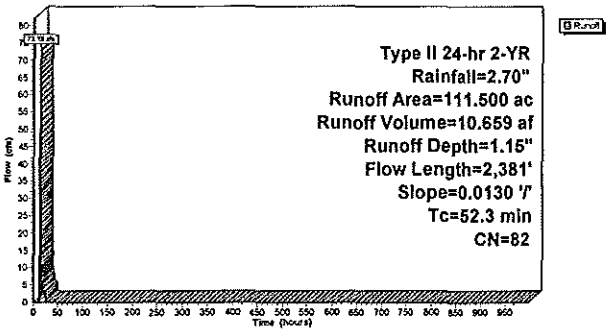
Runoff = 73.19 cfs @ 12.54 hrs, Volume= 10.659 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 111.500 | 82 | |
| 111.500 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 52.3 | 2,381 | 0.0130 | 0.76 | | Lag/CN Method, |

### Subcatchment I:



### Subcatchment J:

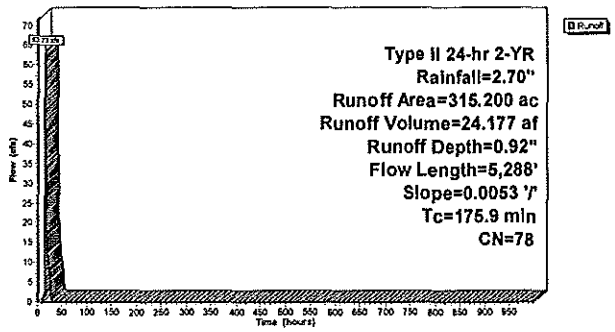
Runoff = 63.73 cfs @ 14.27 hrs, Volume= 24.177 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 315.200 | 78 | |
| 315.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 175.9 | 5,288 | 0.0053 | 0.50 | | Lag/CN Method, |

### Subcatchment J:






### Subcatchment K:

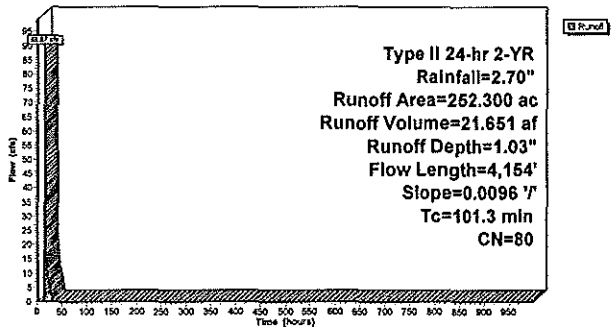
Runoff = 88.57 cfs @ 13.18 hrs, Volume= 21.651 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 252.300 | 80 | |
| 252.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 101.3 | 4,154 | 0.0096 | 0.68 | | Lag/CN Method, |

### Subcatchment K:






### Subcatchment L:

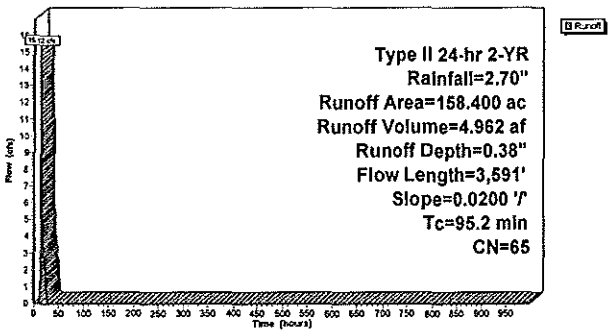
Runoff = 15.12 cfs @ 13.33 hrs, Volume= 4.962 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 158.400 | 65 | |
| 158.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 95.2 | 3,591 | 0.0200 | 0.63 | | Lag/CN Method, |

### Subcatchment L:






### Subcatchment M:

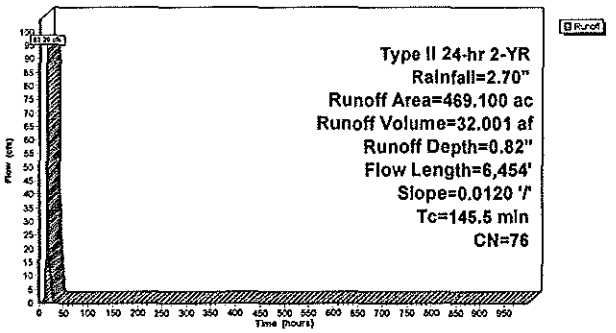
Runoff = 93.29 cfs @ 13.76 hrs, Volume= 32.001 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 469.100 | 76 | |
| 469.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 145.5 | 6,454 | 0.0120 | 0.74 | | Lag/CN Method, |

### Subcatchment M:



### Subcatchment N:

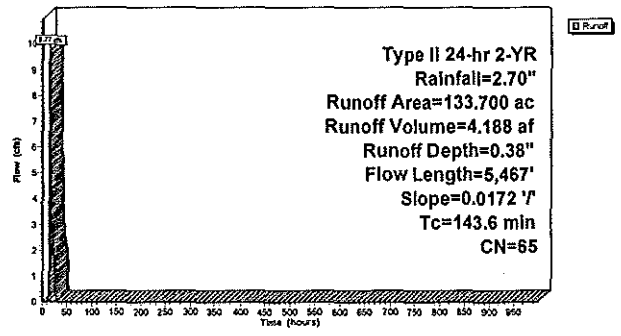
Runoff = 9.77 cfs @ 14.18 hrs, Volume= 4.188 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 133.700 | 65 | |
| 133.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 143.6 | 5,467 | 0.0172 | 0.63 | | Lag/CN Method, |

### Subcatchment N:






### Subcatchment O:

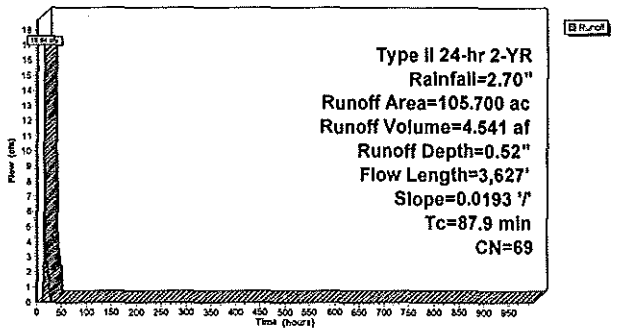
Runoff = 16.64 cfs @ 13.18 hrs, Volume= 4.541 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 105.700 | 69 | |
| 105.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 87.9 | 3,627 | 0.0193 | 0.69 | | Lag/CN Method, |

### Subcatchment O:






### Subcatchment P:

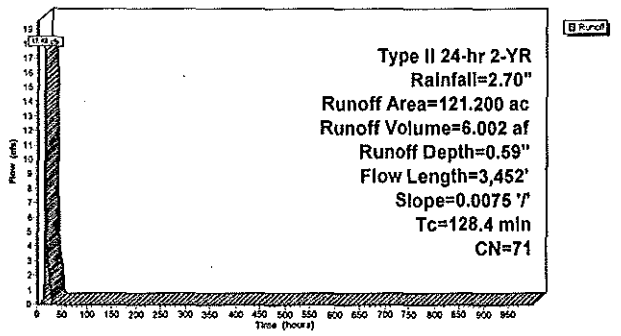
Runoff = 17.49 cfs @ 13.69 hrs, Volume= 6.002 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 121.200 | 71 | |
| 121.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 128.4 | 3,452 | 0.0075 | 0.45 | | Lag/CN Method, |

### Subcatchment P:






### Subcatchment Q:

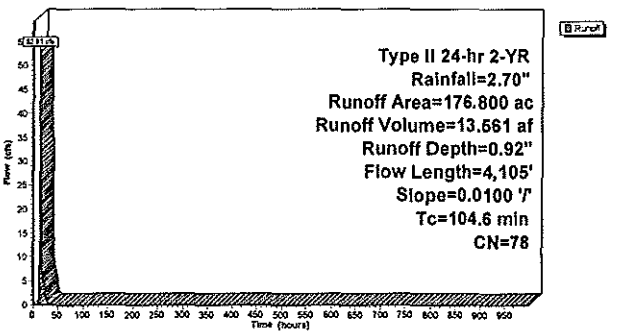
Runoff = 52.91 cfs @ 13.35 hrs, Volume= 13.561 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 176.800 | 78 | |
| 176.800 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 104.6 | 4,105 | 0.0100 | 0.65 | | Lag/CN Method, |

### Subcatchment Q:



### Subcatchment R:

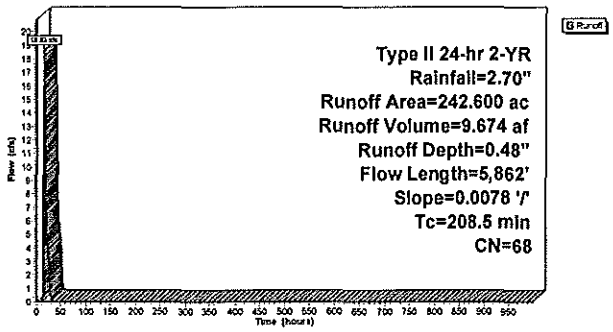
Runoff = 18.63 cfs @ 15.05 hrs, Volume= 9.674 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 242.600 | 68 | |
| 242.600 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 208.5 | 5,862 | 0.0078 | 0.47 | | Lag/CN Method, |

### Subcatchment R:






### Reach 8R:

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 0.54'

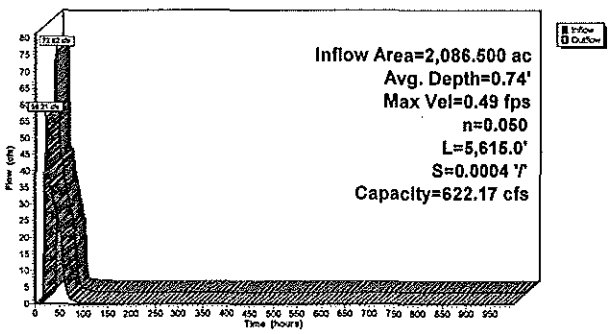
Inflow Area = 2,086.500 ac, Inflow Depth = 0.69" for 2-YR event
Inflow = 72.62 cfs @ 15.18 hrs, Volume= 119.393 af
Outflow = 56.21 cfs @ 19.76 hrs, Volume= 119.392 af, Atten= 23%, Lag= 275.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.49 fps, Min. Travel Time= 192.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 1,236.1 min

Peak Storage= 649,939 cf @ 16.55 hrs, Average Depth at Peak Storage= 0.74'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 622.17 cfs

150.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 210.00'
Length= 5,615.0' Slope= 0.0004 '/'
Inlet Invert= 1,196.90', Outlet Invert= 1,194.50'

### Reach 8R:






### Reach 10R:

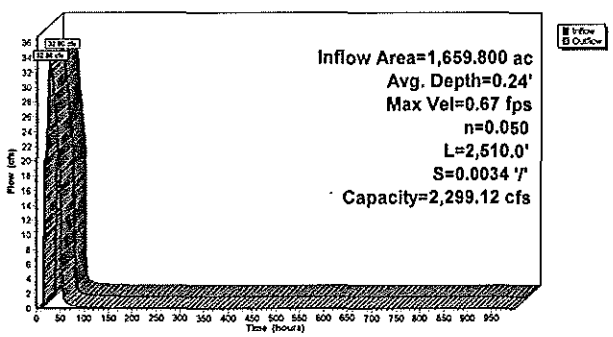
Inflow Area = 1,659.800 ac, Inflow Depth = 0.61" for 2-YR event
Inflow = 32.90 cfs @ 26.37 hrs, Volume= 84.558 af
Outflow = 32.86 cfs @ 28.14 hrs, Volume= 84.557 af, Atten= 0%, Lag= 106.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.67 fps, Min. Travel Time= 62.4 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 225.8 min

Peak Storage= 122,987 cf @ 27.10 hrs, Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,299.12 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,510.0' Slope= 0.0034 '/'
Inlet Invert= 1,205.80', Outlet Invert= 1,197.20'

### Reach 10R:






### Reach 12R:

[61] Warning: Exceeded Pond 11P by 2.00' @ 0.00 hrs

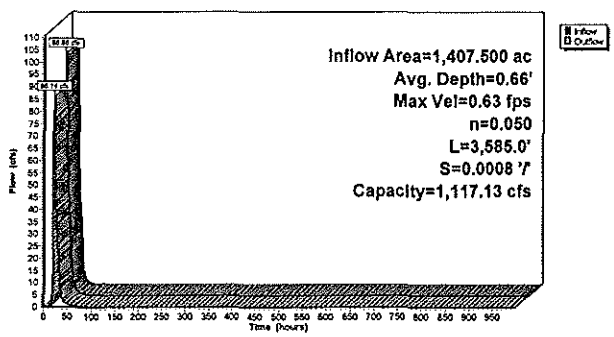
Inflow Area = 1,407.500 ac, Inflow Depth = 0.54" for 2-YR event
Inflow = 98.86 cfs @ 16.67 hrs, Volume= 62.907 af
Outflow = 86.14 cfs @ 19.58 hrs, Volume= 62.906 af, Atten= 13%, Lag= 174.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.63 fps, Min. Travel Time= 95.0 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 669.4 min

Peak Storage= 490,923 cf @ 17.99 hrs, Average Depth at Peak Storage= 0.66'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,117.13 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 3,585.0' Slope= 0.0008 '/'
Inlet Invert= 1,209.00', Outlet Invert= 1,206.10'

### Reach 12R:



## Reach 13R:

[61] Hint: Submerged 4% of Reach 14R bottom

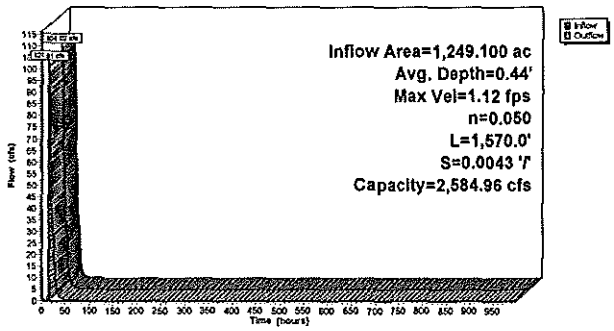
Inflow Area = 1,249.100 ac, Inflow Depth = 0.64" for 2-YR event
Inflow = 104.02 cfs @ 14.05 hrs, Volume= 66.532 af
Outflow = 101.61 cfs @ 14.67 hrs, Volume= 66.532 af, Atten= 2%, Lag= 37.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.12 fps, Min. Travel Time= 23.3 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 131.4 min

Peak Storage= 142,272 cf @ 14.28 hrs, Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,584.96 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,570.0' Slope= 0.0043 '/'
Inlet Invert= 1,214.00', Outlet Invert= 1,207.20'

## Reach 13R:






## Reach 14R:

[81] Warning: Exceeded Pond 10P by 0.50' @ 0.00 hrs

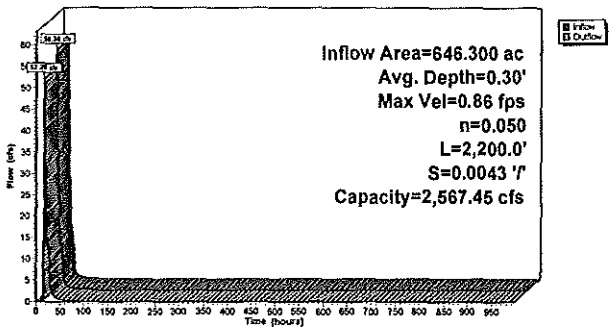
Inflow Area = 646.300 ac, Inflow Depth = 0.56" for 2-YR event
Inflow = 56.38 cfs @ 14.90 hrs, Volume= 30.342 af
Outflow = 52.26 cfs @ 16.22 hrs, Volume= 30.342 af, Atten= 7%, Lag= 79.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 42.6 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 189.1 min

Peak Storage= 133,604 cf @ 15.51 hrs, Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,567.45 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,200.0' Slope= 0.0043 '/'
Inlet Invert= 1,223.50', Outlet Invert= 1,214.10'

## Reach 14R:





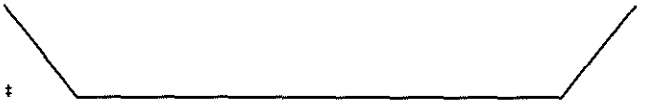

## Reach 15R:

Inflow Area = 121.200 ac, Inflow Depth > 0.28" for 2-YR event
Inflow = 1.08 cfs @ 25.73 hrs, Volume= 2.845 af
Outflow = 1.04 cfs @ 28.21 hrs, Volume= 2.845 af, Atten= 4%, Lag= 148.4 min

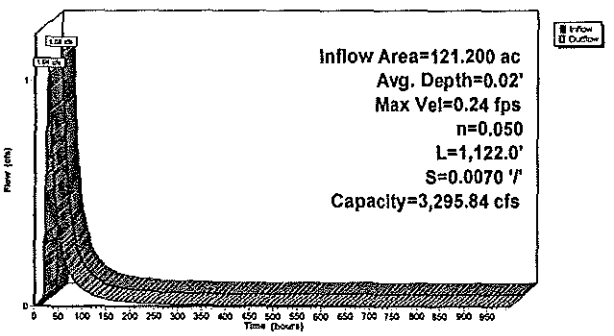
Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.24 fps, Min. Travel Time= 77.7 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 77.7 min

Peak Storage= 4,834 cf @ 26.91 hrs, Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 3,295.84 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,122.0' Slope= 0.0070 '/'
Inlet Invert= 1,258.00', Outlet Invert= 1,250.10'



## Reach 15R:






## Reach 16R:

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 2.34'

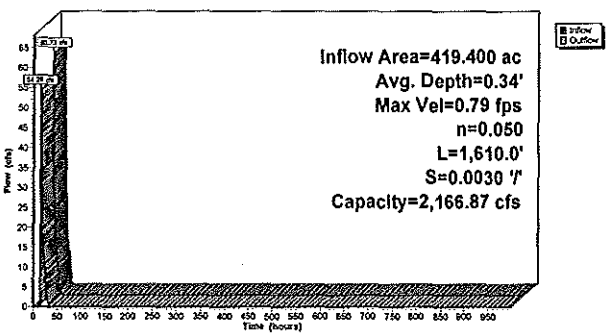
Inflow Area = 419.400 ac, Inflow Depth = 0.66" for 2-YR event
Inflow = 60.73 cfs @ 13.40 hrs, Volume= 23.235 af
Outflow = 54.29 cfs @ 14.45 hrs, Volume= 23.235 af, Atten= 11%, Lag= 63.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 34.0 min
Avg. Velocity = 0.26 fps, Avg. Travel Time= 104.8 min

Peak Storage= 110,677 cf @ 13.89 hrs, Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,166.87 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,610.0' Slope= 0.0030 '/'
Inlet Invert= 1,255.00', Outlet Invert= 1,250.10'

## Reach 16R:



## Reach 21R:

[81] Hint: Submerged 59% of Reach 8R bottom

Inflow Area = 2,764.600 ac, Inflow Depth = 0.71" for 2-YR event
Inflow = 92.54 cfs @ 19.22 hrs, Volume= 162.434 af
Outflow = 92.19 cfs @ 20.49 hrs, Volume= 162.434 af, Atten= 0%, Lag= 76.5 min

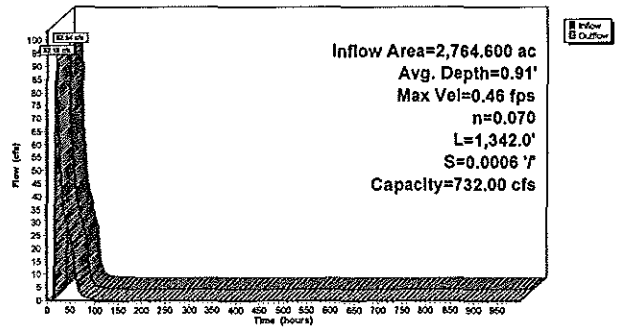
Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.46 fps, Min. Travel Time= 48.4 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 344.1 min

Peak Storage= 267,522 cf @ 19.69 hrs, Average Depth at Peak Storage= 0.91'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 732.00 cfs

200.00' x 3.00' deep channel, n= 0.070 Sluggish weedy reaches w/pools
Side Slope Z-value= 20.0 '/' Top Width= 320.00'
Length= 1,342.0' Slope= 0.0006 '/'
Inlet Invert= 1,195.00', Outlet Invert= 1,194.20'

‡

## Reach 21R:






## Pond 1P:

Inflow Area = 3,626.900 ac, Inflow Depth = 0.86" for 2-YR event
Inflow = 1,071.87 cfs @ 11.94 hrs, Volume= 258.528 af
Outflow = 5.93 cfs @ 63.92 hrs, Volume= 178.106 af, Atten= 99%, Lag= 3,119.0 min
Primary = 5.93 cfs @ 63.92 hrs, Volume= 178.106 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,190.60' @ 63.92 hrs Surf.Area= 17,375,918 sf Storage= 10,257,522 cf

Plug-Flow detention time= 19,156.8 min calculated for 178.106 af (69% of inflow)
Center-of-Mass det. time= 18,583.8 min ( 20,208.5 - 1,624.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 39,292,918 cf | Lake Magnor (Prismatic)Listed below (Recalc) |
| #2 | 1,190.00' | 24,221,898 cf | Barbo Lake (Prismatic)Listed below (Recalc) |
| #3 | 1,190.00' | 19,504,098 cf | Mud Lake (Prismatic)Listed below (Recalc) |
| | | 83,018,913 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 9,474,713 | 0 | 0 |
| 1,192.00 | 9,822,176 | 19,296,891 | 19,296,891 |
| 1,194.00 | 10,173,849 | 19,996,027 | 39,292,918 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,912,341 | 0 | 0 |
| 1,195.00 | 5,776,418 | 24,221,898 | 24,221,898 |

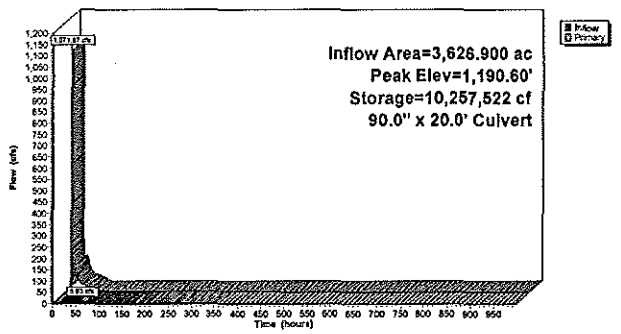
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,587,635 | 0 | 0 |
| 1,195.00 | 4,214,004 | 19,504,098 | 19,504,098 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,190.00' | 90.0" x 20.0' long Culvert X 2.00<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,189.70' S= 0.0150 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |

Primary OutFlow Max=5.93 cfs @ 63.92 hrs HW=1,190.60' (Free Discharge)
└1=Culvert (Barrel Controls 5.93 cfs @ 2.76 fps)



## Pond 1P:






## Pond 4P:

Inflow Area = 178.000 ac, Inflow Depth = 0.52" for 2-YR event
Inflow = 15.19 cfs @ 15.00 hrs, Volume= 7.648 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

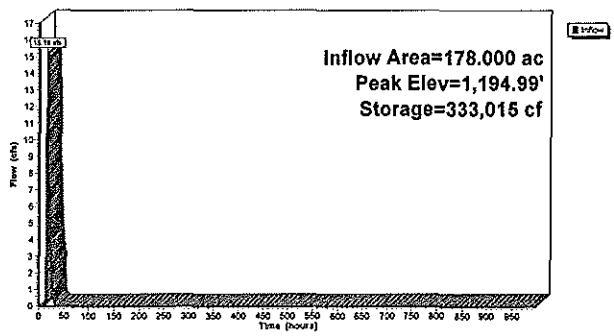
Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,194.99' @ 36.10 hrs Surf.Area= 1,083,405 sf Storage= 333,015 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,194.50' | 2,879,843 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,194.50 | 279,331 | 0 | 0 |
| 1,195.00 | 1,101,921 | 345,313 | 345,313 |
| 1,197.00 | 1,432,609 | 2,534,530 | 2,879,843 |

## Pond 4P:



## Pond 5P: Greley Lake

Inflow Area = 96.100 ac, Inflow Depth = 1.09" for 2-YR event
Inflow = 70.68 cfs @ 12.40 hrs, Volume= 8.709 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,192.56' @ 26.38 hrs Surf.Area= 677,872 sf Storage= 379,345 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,192.00' | 6,458,361 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

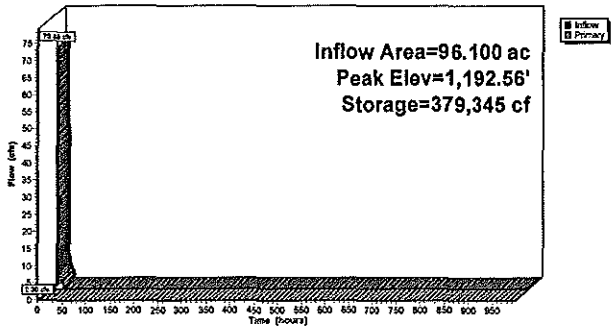
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,192.00 | 666,399 | 0 | 0 |
| 1,194.00 | 707,054 | 1,373,453 | 1,373,453 |
| 1,196.00 | 748,224 | 1,455,278 | 2,828,731 |
| 1,198.00 | 789,737 | 1,537,961 | 4,366,692 |
| 1,200.00 | 1,301,932 | 2,091,669 | 6,458,361 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,199.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,192.00' (Free Discharge)
└1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 5P: Greley Lake






## Pond 6P:

[61] Hint: Submerged 34% of Reach 10R bottom

Inflow Area = 2,086.500 ac, Inflow Depth = 0.69" for 2-YR event
Inflow = 81.74 cfs @ 12.60 hrs, Volume= 119.393 af
Outflow = 72.62 cfs @ 15.18 hrs, Volume= 119.393 af, Atten= 11%, Lag= 154.5 min
Primary = 72.62 cfs @ 15.18 hrs, Volume= 119.393 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,200.11' @ 15.18 hrs Surf.Area= 515,164 sf Storage= 51,779 cf

Plug-Flow detention time= 3.9 min calculated for 119.393 af (100% of inflow)
Center-of-Mass det. time= 3.9 min ( 1,812.5 - 1,808.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,200.00' | 5,386,561 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

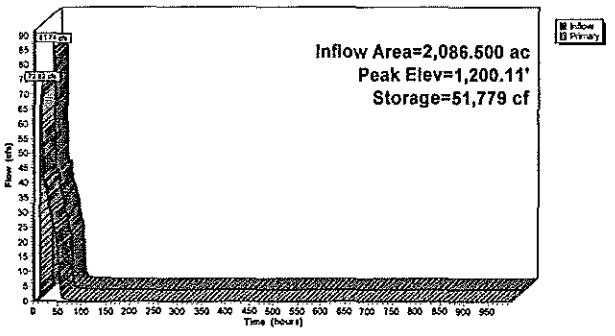
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,200.00 | 404,702 | 0 | 0 |
| 1,201.00 | 1,385,892 | 895,297 | 895,297 |
| 1,203.00 | 3,105,372 | 4,491,264 | 5,386,561 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,197.10' | **48.0" x 20.0' long Culvert X 2.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,197.00' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,202.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=72.62 cfs @ 15.18 hrs HW=1,200.11' (Free Discharge)
├1=Culvert (Barrel Controls 72.62 cfs @ 4.96 fps)
└2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 6P:



## Pond 7P:

Inflow Area = 121.200 ac, Inflow Depth = 0.59" for 2-YR event
Inflow = 17.49 cfs @ 13.69 hrs, Volume= 6.002 af
Outflow = 1.08 cfs @ 25.73 hrs, Volume= 2.845 af, Atten= 94%, Lag= 722.4 min
Primary = 1.08 cfs @ 25.73 hrs, Volume= 2.845 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,259.60' @ 25.73 hrs Surf.Area= 179,568 sf Storage= 235,568 cf

Plug-Flow detention time= 4,145.3 min calculated for 2.845 af (47% of inflow)
Center-of-Mass det. time= 3,979.4 min ( 4,975.1 - 995.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,258.00' | 505,511 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

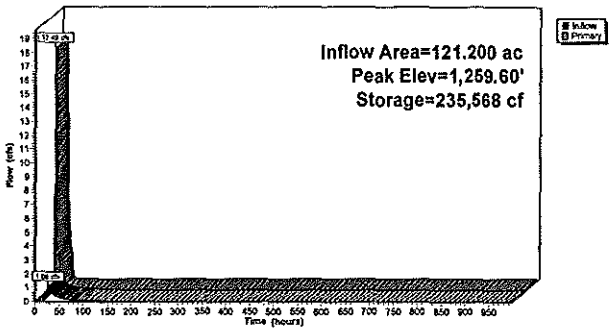
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,258.00 | 114,081 | 0 | 0 |
| 1,260.00 | 195,715 | 309,796 | 309,796 |
| 1,261.00 | 195,715 | 195,715 | 505,511 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,259.00' | **24.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,258.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=1.07 cfs @ 25.73 hrs HW=1,259.60' (Free Discharge)**
**1=Culvert (Barrel Controls 1.07 cfs @ 2.01 fps)**
**2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**



## Pond 7P:






## Pond 8P:

Inflow Area = 419.400 ac, Inflow Depth = 0.66" for 2-YR event
Inflow = 60.75 cfs @ 13.38 hrs, Volume= 23.235 af
Outflow = 60.73 cfs @ 13.40 hrs, Volume= 23.235 af, Atten= 0%, Lag= 0.8 min
Primary = 60.73 cfs @ 13.40 hrs, Volume= 23.235 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,257.03' @ 13.40 hrs Surf.Area= 79,025 sf Storage= 2,148 cf

Plug-Flow detention time= 0.6 min calculated for 23.235 af (100% of inflow)
Center-of-Mass det. time= 0.6 min ( 1,004.6 - 1,004.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,257.00' | 3,038,942 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

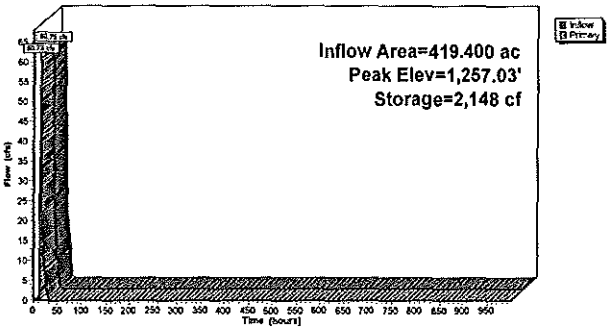
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,257.00 | 68,271 | 0 | 0 |
| 1,260.00 | 1,174,614 | 1,864,328 | 1,864,328 |
| 1,261.00 | 1,174,614 | 1,174,614 | 3,038,942 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,253.00' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,252.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=82.91 cfs @ 13.40 hrs HW=1,257.03' TW=1,255.00' (Fixed TW Elev= 1,255.00')**
**1=Culvert (Barrel Controls 82.91 cfs @ 5.81 fps)**
**2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**



## Pond 8P:



## Pond 9P:

[61] Hint: Submerged 96% of Reach 12R bottom

Inflow Area = 1,659.800 ac, Inflow Depth = 0.61" for 2-YR event
Inflow = 94.71 cfs @ 19.50 hrs, Volume= 84.558 af
Outflow = 32.90 cfs @ 26.37 hrs, Volume= 84.558 af, Atten= 65%, Lag= 412.1 min
Primary = 32.90 cfs @ 26.37 hrs, Volume= 84.558 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,208.88' @ 26.37 hrs Surf.Area= 2,307,542 sf Storage= 1,630,410 cf

Plug-Flow detention time= 555.8 min calculated for 84.558 af (100% of inflow)
Center-of-Mass det. time= 555.8 min ( 2,015.4 - 1,459.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,208.00' | 16,083,958 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

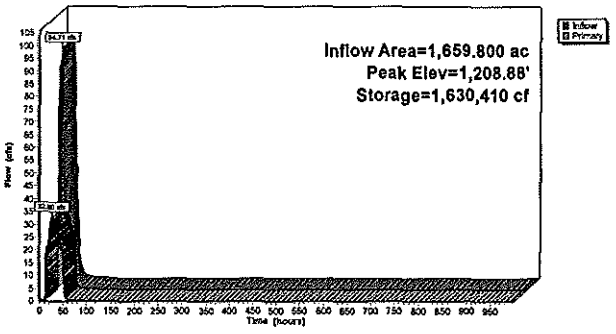
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,208.00 | 1,411,294 | 0 | 0 |
| 1,210.00 | 3,455,564 | 4,866,858 | 4,866,858 |
| 1,212.00 | 3,880,768 | 7,336,332 | 12,203,190 |
| 1,213.00 | 3,880,768 | 3,880,768 | 16,083,958 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,206.00' | **48.0" x 25.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,205.90' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,212.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=32.90 cfs @ 26.37 hrs HW=1,208.88' TW=1,207.00' (Fixed TW Elev= 1,207.00')
1=Culvert (Barrel Controls 32.90 cfs @ 4.76 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 9P:






## Pond 10P:

Inflow Area = 646.300 ac, Inflow Depth = 0.57" for 2-YR event
Inflow = 62.07 cfs @ 14.39 hrs, Volume= 30.621 af
Outflow = 56.38 cfs @ 14.90 hrs, Volume= 30.342 af, Atten= 9%, Lag= 30.6 min
Primary = 56.38 cfs @ 14.90 hrs, Volume= 30.342 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,225.66' @ 14.90 hrs Surf.Area= 53,138 sf Storage= 99,016 cf

Plug-Flow detention time= 225.5 min calculated for 30.342 af (99% of inflow)
Center-of-Mass det. time= 28.0 min ( 1,475.0 - 1,447.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,223.00' | 596,246 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

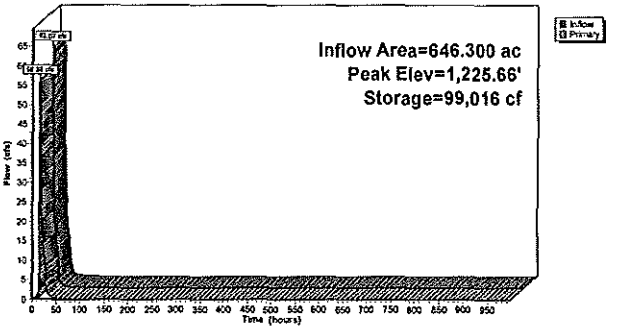
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,223.00 | 21,295 | 0 | 0 |
| 1,228.00 | 81,139 | 258,085 | 258,085 |
| 1,230.00 | 129,511 | 210,650 | 468,735 |
| 1,231.00 | 129,511 | 129,511 | 596,246 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,222.50' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,222.30' S= 0.0100 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,230.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=56.37 cfs @ 14.90 hrs HW=1,225.66' TW=1,223.50' (Fixed TW Elev= 1,223.50')
1=Culvert (Barrel Controls 56.37 cfs @ 5.43 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 10P:



## Pond 11P:

[61] Hint: Submerged 33% of Reach 13R bottom

Inflow Area = 1,407.500 ac, Inflow Depth = 0.61" for 2-YR event
Inflow = 109.75 cfs @ 14.62 hrs, Volume= 71.494 af
Outflow = 98.86 cfs @ 16.67 hrs, Volume= 62.907 af, Atten= 10%, Lag= 122.8 min
Primary = 98.86 cfs @ 16.67 hrs, Volume= 62.907 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,209.46' @ 16.67 hrs Surf.Area= 408,919 sf Storage= 545,821 cf

Plug-Flow detention time= 317.0 min calculated for 62.907 af (68% of inflow)
Center-of-Mass det. time= 86.1 min ( 1,389.1 - 1,303.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,207.00' | 2,933,772 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

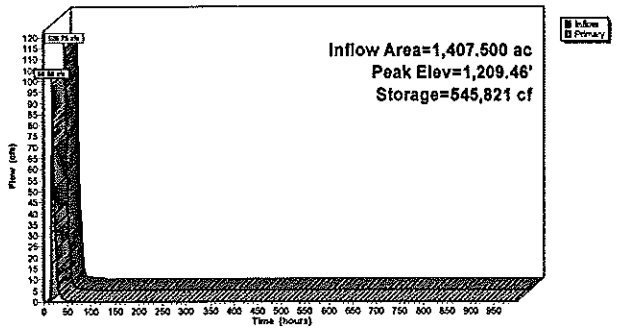
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,207.00 | 34,962 | 0 | 0 |
| 1,210.00 | 491,135 | 789,146 | 789,146 |
| 1,214.00 | 581,178 | 2,144,626 | 2,933,772 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,207.10' | **72.0" x 25.0' long Culvert X 4.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,207.00' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,214.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=98.85 cfs @ 16.67 hrs HW=1,209.46' TW=1,209.00' (Fixed TW Elev= 1,209.00')
↑1=Culvert (Outlet Controls 98.85 cfs @ 3.55 fps)
↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 11P:






## Pond 17P: Marsh Lake

Inflow Area = 176.300 ac, Inflow Depth = 1.27" for 2-YR event
Inflow = 228.76 cfs @ 12.16 hrs, Volume= 18.706 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,191.66' @ 25.32 hrs Surf.Area= 511,235 sf Storage= 814,833 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 3,205,992 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

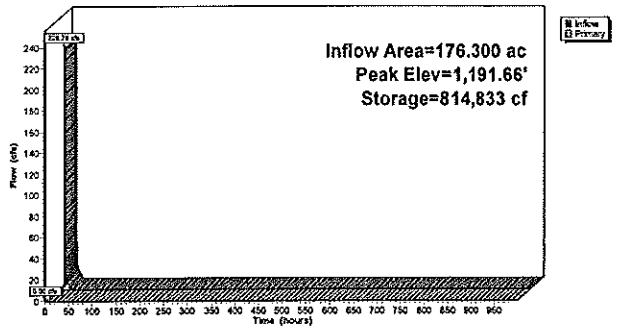
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 473,448 | 0 | 0 |
| 1,194.00 | 564,774 | 2,076,444 | 2,076,444 |
| 1,196.00 | 564,774 | 1,129,548 | 3,205,992 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,193.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,190.00' (Free Discharge)
↑1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 17P: Marsh Lake



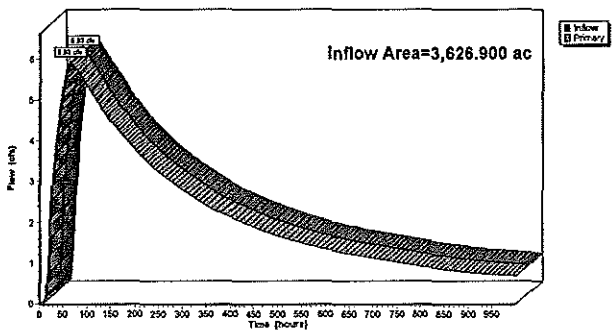
## Pond EXIT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,626.900 ac, Inflow Depth > 0.59" for 2-YR event
Inflow = 5.93 cfs @ 63.92 hrs, Volume= 178.106 af
Primary = 5.93 cfs @ 63.92 hrs, Volume= 178.106 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs

## Pond EXIT:






Time span=0.00-999.00 hrs, dt=0.02 hrs, 49951 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment A:** Runoff Area=250.400 ac Runoff Depth=1.33"
Flow Length=3,259' Slope=0.0088 '/' Tc=120.9 min CN=69 Runoff=96.52 cfs 27.796 af

**Subcatchment A1: Lake Magnor** Runoff Area=217.500 ac Runoff Depth=3.98"
Flow Length=4,425' Tc=4.1 min CN=99 Runoff=1,346.10 cfs 72.160 af

**Subcatchment B:** Runoff Area=300.300 ac Runoff Depth=2.04"
Flow Length=3,727' Slope=0.0100 '/' Tc=93.8 min CN=79 Runoff=231.37 cfs 51.175 af

**Subcatchment B1: Barbo Lake** Runoff Area=43.100 ac Runoff Depth=3.98"
Flow Length=2,070' Tc=2.7 min CN=99 Runoff=276.92 cfs 14.299 af

**Subcatchment C:** Runoff Area=51.000 ac Runoff Depth=2.29"
Flow Length=1,165' Slope=0.0051 '/' Tc=47.8 min CN=82 Runoff=73.56 cfs 9.727 af

**Subcatchment D:** Runoff Area=176.300 ac Runoff Depth=2.46"
Flow Length=1,485' Slope=0.0280 '/' Tc=22.9 min CN=84 Runoff=444.98 cfs 36.133 af

**Subcatchment E:** Runoff Area=178.000 ac Runoff Depth=1.33"
Flow Length=4,714' Slope=0.0051 '/' Tc=210.9 min CN=69 Runoff=44.90 cfs 19.759 af

**Subcatchment F:** Runoff Area=124.900 ac Runoff Depth=2.37"
Flow Length=5,559' Slope=0.0022 '/' Tc=242.6 min CN=83 Runoff=53.90 cfs 24.701 af

**Subcatchment G:** Runoff Area=375.200 ac Runoff Depth=2.04"
Flow Length=8,822' Slope=0.0030 '/' Tc=341.5 min CN=79 Runoff=105.79 cfs 63.939 af

**Subcatchment H:** Runoff Area=96.100 ac Runoff Depth=2.21"
Flow Length=2,080' Slope=0.0180 '/' Tc=41.2 min CN=81 Runoff=148.03 cfs 17.665 af

**Subcatchment I:** Runoff Area=111.500 ac Runoff Depth=2.29"
Flow Length=2,381' Slope=0.0130 '/' Tc=52.3 min CN=82 Runoff=150.66 cfs 21.266 af

**Subcatchment J:** Runoff Area=315.200 ac Runoff Depth=1.97"
Flow Length=5,288' Slope=0.0053 '/' Tc=175.9 min CN=78 Runoff=144.23 cfs 51.665 af

**Subcatchment K:** Runoff Area=252.300 ac Runoff Depth=2.12"
Flow Length=4,154' Slope=0.0096 '/' Tc=101.3 min CN=80 Runoff=191.79 cfs 44.670 af

**Subcatchment L:** Runoff Area=158.400 ac Runoff Depth=1.09"
Flow Length=3,591' Slope=0.0200 '/' Tc=95.2 min CN=65 Runoff=56.40 cfs 14.348 af

**Subcatchment M:** Runoff Area=469.100 ac Runoff Depth=1.82"
Flow Length=6,454' Slope=0.0120 '/' Tc=145.5 min CN=76 Runoff=225.67 cfs 70.970 af



**Subcatchment N:** Runoff Area=133.700 ac Runoff Depth=1.09"
Flow Length=5,467' Slope=0.0172 '/' Tc=143.6 min CN=65 Runoff=35.05 cfs 12.111 af

**Subcatchment O:** Runoff Area=105.700 ac Runoff Depth=1.33"
Flow Length=3,627' Slope=0.0193 '/' Tc=87.9 min CN=69 Runoff=51.43 cfs 11.733 af

**Subcatchment P:** Runoff Area=121.200 ac Runoff Depth=1.46"
Flow Length=3,452' Slope=0.0075 '/' Tc=128.4 min CN=71 Runoff=49.79 cfs 14.776 af

**Subcatchment Q:** Runoff Area=176.800 ac Runoff Depth=1.97"
Flow Length=4,105' Slope=0.0100 '/' Tc=104.6 min CN=78 Runoff=119.94 cfs 28.979 af

**Subcatchment R:** Runoff Area=242.600 ac Runoff Depth=1.27"
Flow Length=5,862' Slope=0.0078 '/' Tc=208.5 min CN=68 Runoff=57.34 cfs 25.649 af

**Reach 8R:** Avg. Depth=1.04' Max Vel=0.60 fps Inflow=108.46 cfs 284.142 af
n=0.050 L=5,615.0' S=0.0004 '/' Capacity=622.17 cfs Outflow=100.41 cfs 284.141 af

**Reach 10R:** Avg. Depth=0.35' Max Vel=0.86 fps Inflow=61.60 cfs 211.213 af
n=0.050 L=2,510.0' S=0.0034 '/' Capacity=2,299.12 cfs Outflow=61.57 cfs 211.212 af

**Reach 12R:** Avg. Depth=1.23' Max Vel=0.94 fps Inflow=263.37 cfs 166.544 af
n=0.050 L=3,585.0' S=0.0008 '/' Capacity=1,117.13 cfs Outflow=245.64 cfs 166.543 af

**Reach 13R:** Avg. Depth=0.84' Max Vel=1.69 fps Inflow=296.80 cfs 160.783 af
n=0.050 L=1,570.0' S=0.0043 '/' Capacity=2,584.96 cfs Outflow=294.23 cfs 160.782 af

**Reach 14R:** Avg. Depth=0.50' Max Vel=1.20 fps Inflow=123.55 cfs 77.702 af
n=0.050 L=2,200.0' S=0.0043 '/' Capacity=2,567.45 cfs Outflow=122.97 cfs 77.702 af

**Reach 15R:** Avg. Depth=0.11' Max Vel=0.58 fps Inflow=13.50 cfs 11.619 af
n=0.050 L=1,122.0' S=0.0070 '/' Capacity=3,295.84 cfs Outflow=13.10 cfs 11.619 af

**Reach 16R:** Avg. Depth=0.52' Max Vel=1.04 fps Inflow=111.99 cfs 54.629 af
n=0.050 L=1,610.0' S=0.0030 '/' Capacity=2,166.87 cfs Outflow=111.41 cfs 54.629 af

**Reach 21R:** Avg. Depth=1.37' Max Vel=0.59 fps Inflow=185.66 cfs 372.781 af
n=0.070 L=1,342.0' S=0.0006 '/' Capacity=732.00 cfs Outflow=184.57 cfs 372.780 af

**Pond 1P:** Peak Elev=1,191.13' Storage=19,695,556 cf Inflow=1,653.01 cfs 547.938 af
90.0" x 20.0' Culvert Outflow=20.52 cfs 450.688 af

**Pond 4P:** Peak Elev=1,195.45' Storage=860,704 cf Inflow=44.90 cfs 19.759 af
Outflow=0.00 cfs 0.000 af

**Pond 5P: Greley Lake** Peak Elev=1,193.14' Storage=769,475 cf Inflow=148.03 cfs 17.665 af
Outflow=0.00 cfs 0.000 af

**Pond 6P:** Peak Elev=1,200.95' Storage=822,030 cf Inflow=178.39 cfs 284.142 af
Outflow=108.46 cfs 284.142 af



**Pond 7P:** Peak Elev=1,260.30' Storage=368,254 cf Inflow=49.79 cfs 14.776 af
Outflow=13.50 cfs 11.619 af

**Pond 8P:** Peak Elev=1,257.79' Storage=170,366 cf Inflow=148.63 cfs 54.629 af
Outflow=111.99 cfs 54.629 af

**Pond 9P:** Peak Elev=1,210.24' Storage=5,685,803 cf Inflow=265.40 cfs 211.213 af
Outflow=61.60 cfs 211.213 af

**Pond 10P:** Peak Elev=1,227.48' Storage=215,173 cf Inflow=126.01 cfs 77.981 af
Outflow=123.55 cfs 77.702 af

**Pond 11P:** Peak Elev=1,210.67' Storage=1,122,807 cf Inflow=317.67 cfs 175.131 af
Outflow=263.37 cfs 166.544 af

**Pond 17P: Marsh Lake** Peak Elev=1,193.08' Storage=1,568,258 cf Inflow=444.98 cfs 36.133 af
Outflow=1.34 cfs 1.168 af

**Pond EXIT:** Inflow=20.52 cfs 450.688 af
Primary=20.52 cfs 450.688 af

Total Runoff Area = 3,899.300 ac Runoff Volume = 633.622 af Average Runoff Depth = 1.95"
93.32% Pervious Area = 3,638.700 ac 6.68% Impervious Area = 260.600 ac

### Subcatchment A:

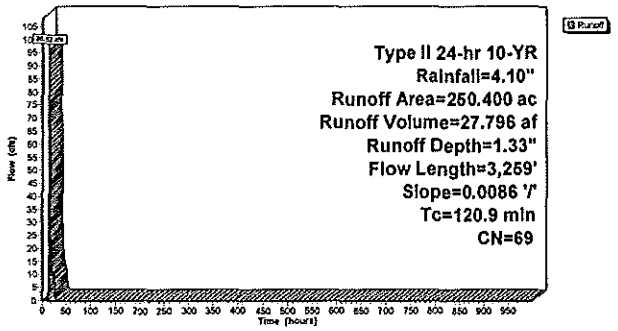
Runoff = 96.52 cfs @ 13.56 hrs, Volume= 27.796 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 250.400 | 69 | |
| 250.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 120.9 | 3,259 | 0.0086 | 0.45 | | Lag/CN Method, |

### Subcatchment A:






### Subcatchment A1: Lake Magnor

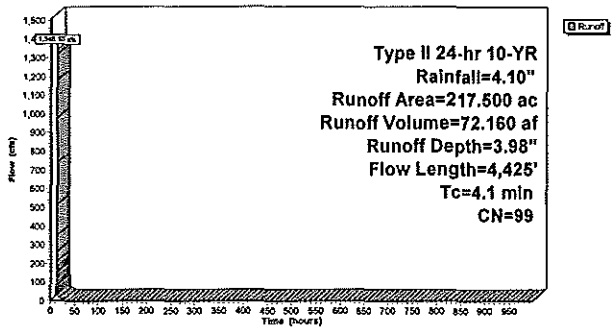
Runoff = 1,346.10 cfs @ 11.94 hrs, Volume= 72.160 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 217.500 | 99 | LAKE MAGNOR |
| 217.500 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.1 | 4,425 | | 17.94 | | Lake or Reservoir, Mean Depth= 10.00' |

### Subcatchment A1: Lake Magnor






### Subcatchment B:

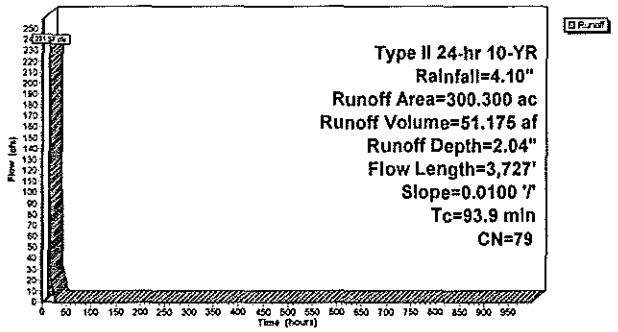
Runoff = 231.37 cfs @ 13.05 hrs, Volume= 51.175 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 300.300 | 79 | |
| 300.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 93.9 | 3,727 | 0.0100 | 0.66 | | Lag/CN Method, |

### Subcatchment B:






### Subcatchment B1: Barbo Lake

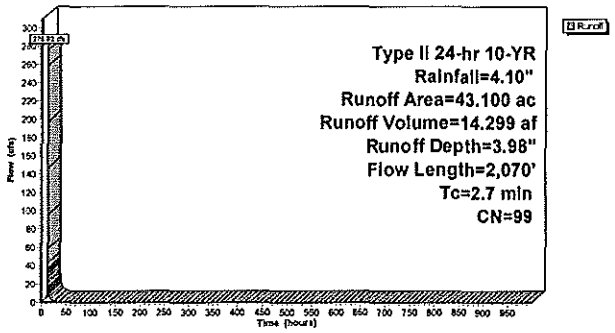
Runoff = 276.92 cfs @ 11.93 hrs, Volume= 14.299 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 43.100 | 99 | BARBO LAKE |
| 43.100 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.7 | 2,070 | | 12.69 | | Lake or Reservoir, Mean Depth= 5.00' |

### Subcatchment B1: Barbo Lake



## Subcatchment C:

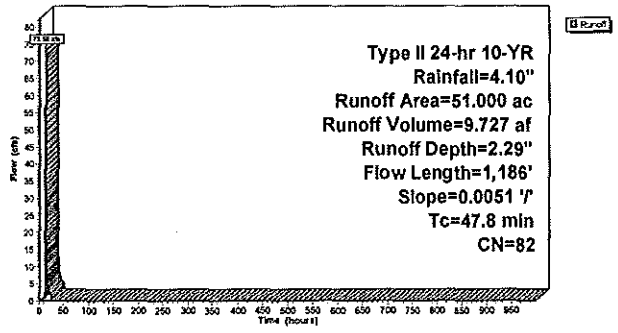
Runoff = 73.56 cfs @ 12.48 hrs, Volume= 9.727 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 51.000 | 82 | |
| 51.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.8 | 1,186 | 0.0051 | 0.41 | | Lag/CN Method, |

## Subcatchment C:






## Subcatchment D:

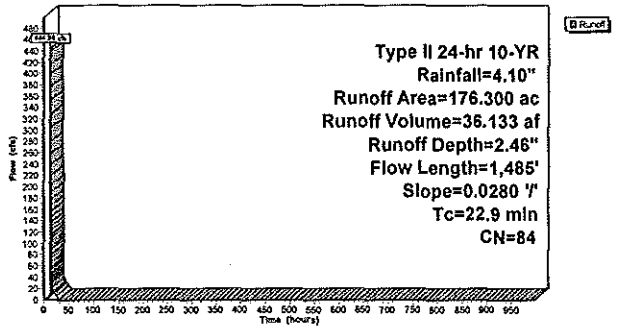
Runoff = 444.98 cfs @ 12.16 hrs, Volume= 36.133 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 176.300 | 84 | |
| 176.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 22.9 | 1,485 | 0.0280 | 1.08 | | Lag/CN Method, |

## Subcatchment D:






## Subcatchment E:

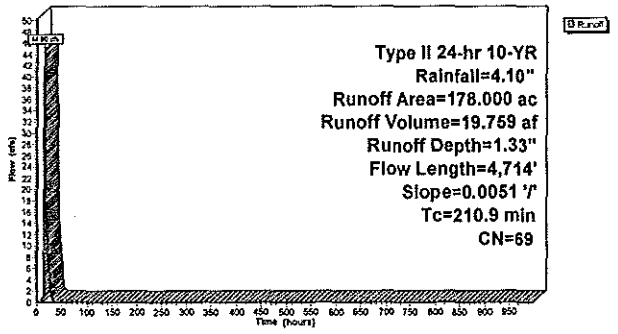
Runoff = 44.90 cfs @ 14.77 hrs, Volume= 19.759 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 178.000 | 69 | |
| 178.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 210.9 | 4,714 | 0.0051 | 0.37 | | Lag/CN Method, |

## Subcatchment E:






## Subcatchment F:

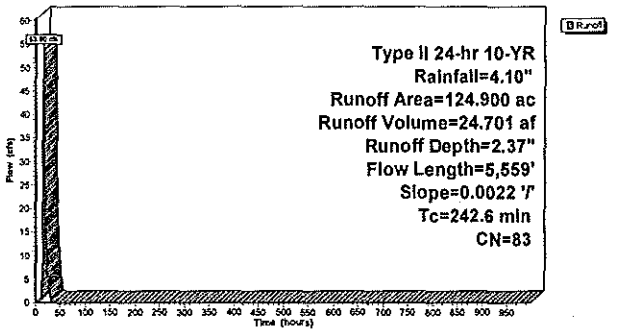
Runoff = 53.90 cfs @ 15.09 hrs, Volume= 24.701 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 124.900 | 83 | |
| 124.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 242.6 | 5,559 | 0.0022 | 0.38 | | Lag/CN Method, |

## Subcatchment F:



### Subcatchment G:

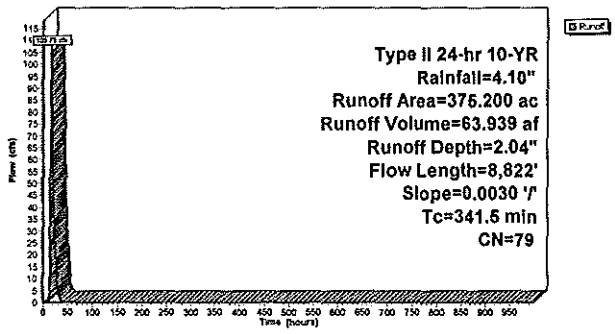
Runoff = 105.79 cfs @ 16.32 hrs, Volume= 63.939 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 375.200 | 79 | |
| 375.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 341.5 | 8,822 | 0.0030 | 0.43 | | Lag/CN Method, |

### Subcatchment G:






### Subcatchment H:

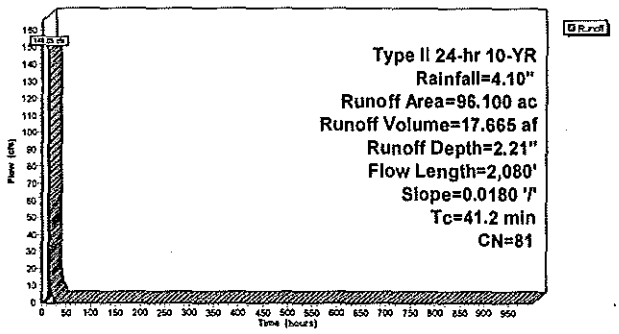
Runoff = 148.03 cfs @ 12.39 hrs, Volume= 17.665 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 96.100 | 81 | |
| 96.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 41.2 | 2,080 | 0.0180 | 0.84 | | Lag/CN Method, |

### Subcatchment H:






### Subcatchment I:

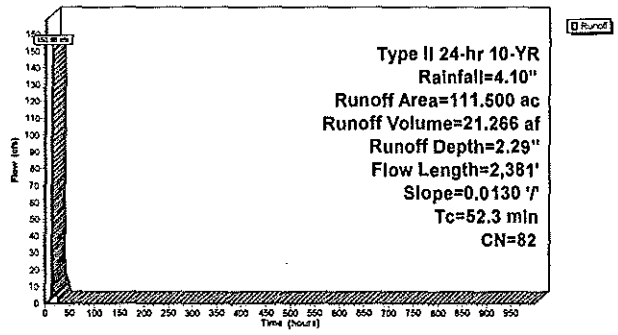
Runoff = 150.66 cfs @ 12.51 hrs, Volume= 21.266 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 111.500 | 82 | |
| 111.500 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 52.3 | 2,381 | 0.0130 | 0.76 | | Lag/CN Method, |

### Subcatchment I:






### Subcatchment J:

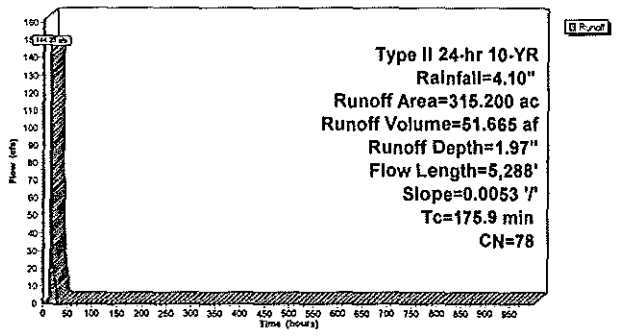
Runoff = 144.23 cfs @ 14.26 hrs, Volume= 51.665 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 315.200 | 78 | |
| 315.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 175.9 | 5,288 | 0.0053 | 0.50 | | Lag/CN Method, |

### Subcatchment J:



## Subcatchment K:

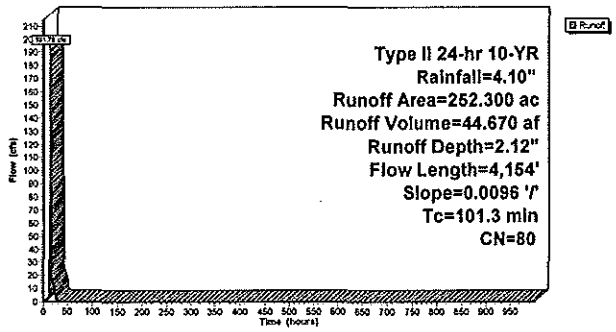
Runoff = 191.79 cfs @ 13.17 hrs, Volume= 44.670 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 252.300 | 80 | |
| 252.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 101.3 | 4,154 | 0.0096 | 0.68 | | Lag/CN Method, |

## Subcatchment K:






## Subcatchment L:

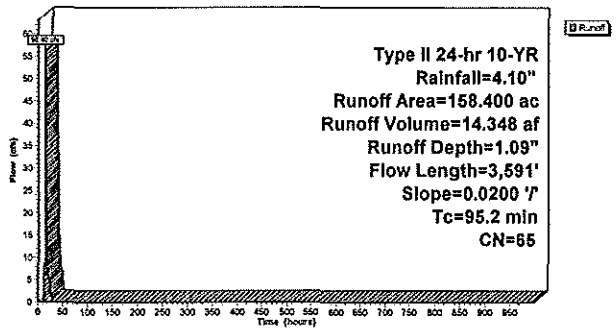
Runoff = 58.40 cfs @ 13.22 hrs, Volume= 14.348 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 158.400 | 65 | |
| 158.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 95.2 | 3,591 | 0.0200 | 0.63 | | Lag/CN Method, |

## Subcatchment L:






## Subcatchment M:

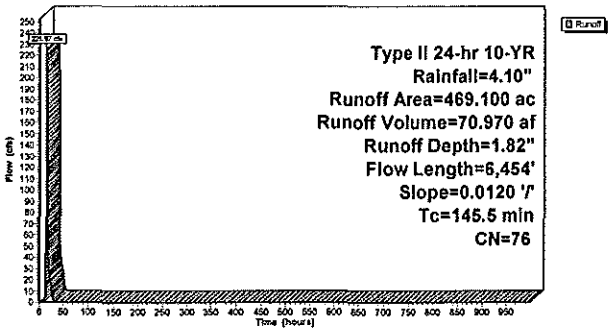
Runoff = 225.67 cfs @ 13.74 hrs, Volume= 70.970 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 469.100 | 76 | |
| 469.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 145.5 | 6,454 | 0.0120 | 0.74 | | Lag/CN Method, |

## Subcatchment M:






## Subcatchment N:

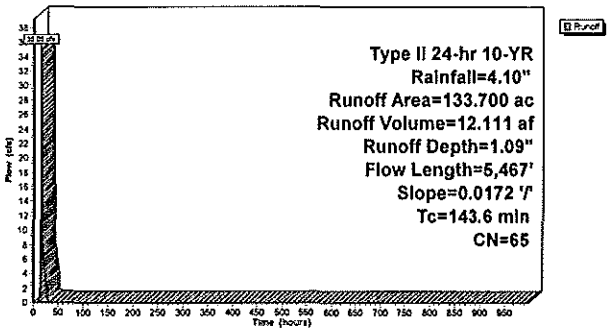
Runoff = 35.05 cfs @ 13.89 hrs, Volume= 12.111 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 133.700 | 65 | |
| 133.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 143.6 | 5,467 | 0.0172 | 0.63 | | Lag/CN Method, |

## Subcatchment N:



### Subcatchment O:

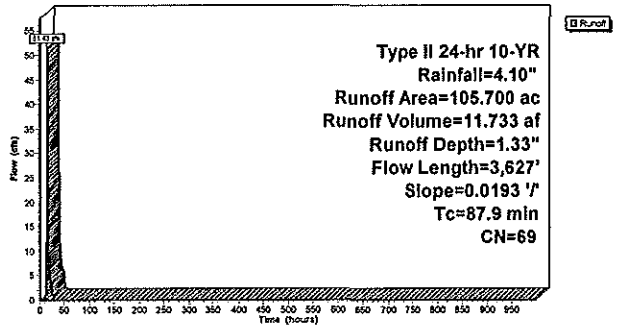
Runoff = 51.43 cfs @ 13.01 hrs, Volume= 11.733 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 105.700 | 69 | |
| 105.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 87.9 | 3,627 | 0.0193 | 0.69 | | Lag/CN Method, |

### Subcatchment O:






### Subcatchment P:

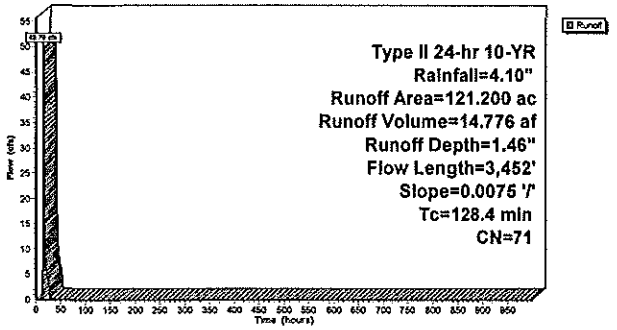
Runoff = 49.79 cfs @ 13.56 hrs, Volume= 14.776 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 121.200 | 71 | |
| 121.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 128.4 | 3,452 | 0.0075 | 0.45 | | Lag/CN Method, |

### Subcatchment P:






### Subcatchment Q:

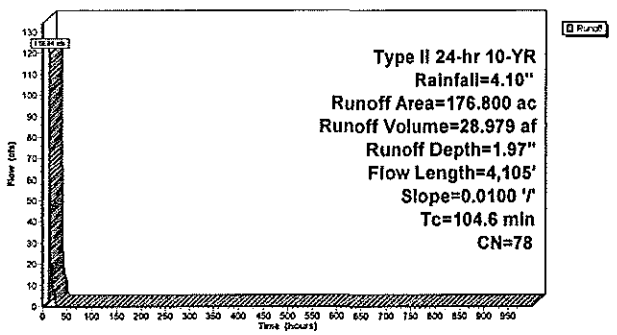
Runoff = 119.94 cfs @ 13.25 hrs, Volume= 28.979 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 176.800 | 78 | |
| 176.800 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 104.6 | 4,105 | 0.0100 | 0.65 | | Lag/CN Method, |

### Subcatchment Q:






### Subcatchment R:

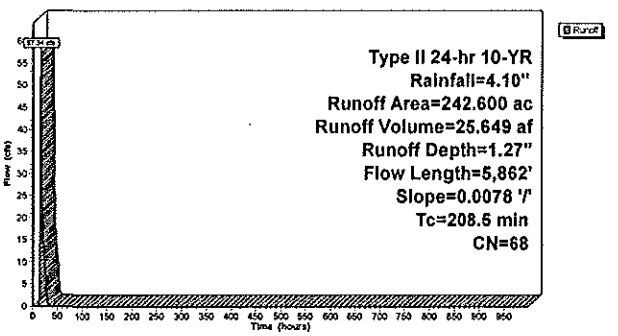
Runoff = 57.34 cfs @ 14.61 hrs, Volume= 25.649 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 242.600 | 68 | |
| 242.600 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 208.5 | 5,862 | 0.0078 | 0.47 | | Lag/CN Method, |

### Subcatchment R:



## Reach 8R:

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 0.84'

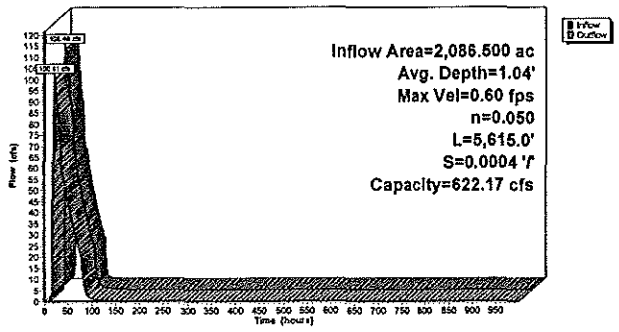
Inflow Area = 2,086.500 ac, Inflow Depth = 1.63" for 10-YR event
Inflow = 108.46 cfs @ 16.03 hrs, Volume= 284.142 af
Outflow = 100.41 cfs @ 21.54 hrs, Volume= 284.141 af, Atten= 7%, Lag= 330.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.60 fps, Min. Travel Time= 155.0 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 1,066.5 min

Peak Storage= 933,979 cf @ 18.96 hrs, Average Depth at Peak Storage= 1.04'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 622.17 cfs

150.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 210.00'
Length= 5,615.0' Slope= 0.0004 '/'
Inlet Invert= 1,196.90', Outlet Invert= 1,194.50'

## Reach 8R:






## Reach 10R:

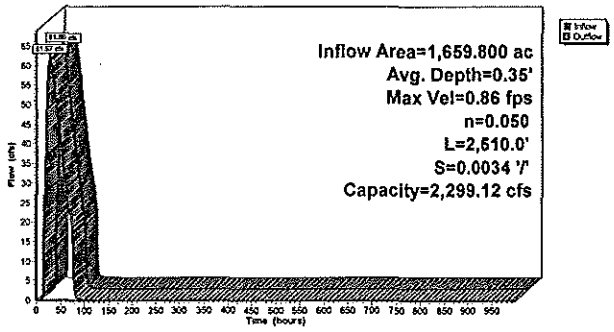
Inflow Area = 1,659.800 ac, Inflow Depth = 1.53" for 10-YR event
Inflow = 61.60 cfs @ 26.60 hrs, Volume= 211.213 af
Outflow = 61.57 cfs @ 27.96 hrs, Volume= 211.212 af, Atten= 0%, Lag= 81.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 48.7 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 206.3 min

Peak Storage= 180,007 cf @ 27.15 hrs, Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,299.12 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,510.0' Slope= 0.0034 '/'
Inlet Invert= 1,205.80', Outlet Invert= 1,197.20'

## Reach 10R:






## Reach 12R:

[61] Warning: Exceeded Pond 11P by 2.00' @ 0.00 hrs

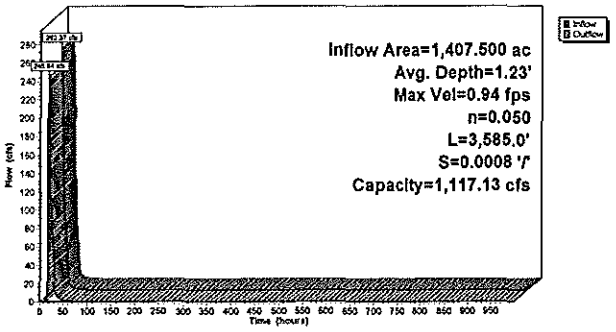
Inflow Area = 1,407.500 ac, Inflow Depth = 1.42" for 10-YR event
Inflow = 263.37 cfs @ 15.68 hrs, Volume= 166.544 af
Outflow = 245.64 cfs @ 17.80 hrs, Volume= 166.543 af, Atten= 7%, Lag= 127.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 63.8 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 637.4 min

Peak Storage= 940,134 cf @ 16.74 hrs, Average Depth at Peak Storage= 1.23'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,117.13 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 3,585.0' Slope= 0.0008 '/'
Inlet Invert= 1,209.00', Outlet Invert= 1,206.10'

## Reach 12R:






## Reach 13R:

[61] Hint: Submerged 8% of Reach 14R bottom

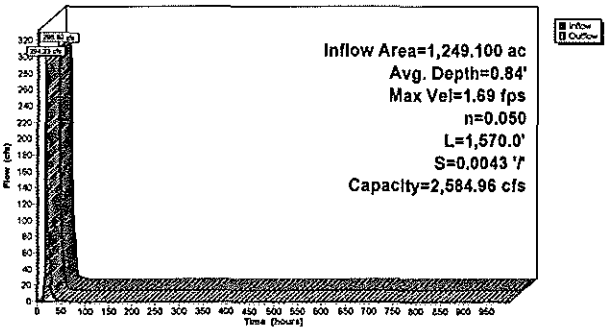
Inflow Area = 1,249.100 ac, Inflow Depth = 1.54" for 10-YR event
Inflow = 296.80 cfs @ 14.22 hrs, Volume= 160.783 af
Outflow = 294.23 cfs @ 14.64 hrs, Volume= 160.782 af, Atten= 1%, Lag= 25.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.69 fps, Min. Travel Time= 15.5 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 127.5 min

Peak Storage= 273,338 cf @ 14.38 hrs, Average Depth at Peak Storage= 0.84'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,584.96 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,570.0' Slope= 0.0043 '/'
Inlet Invert= 1,214.00', Outlet Invert= 1,207.20'

## Reach 13R:



## Reach 14R:

[81] Warning: Exceeded Pond 10P by 0.50' @ 0.00 hrs

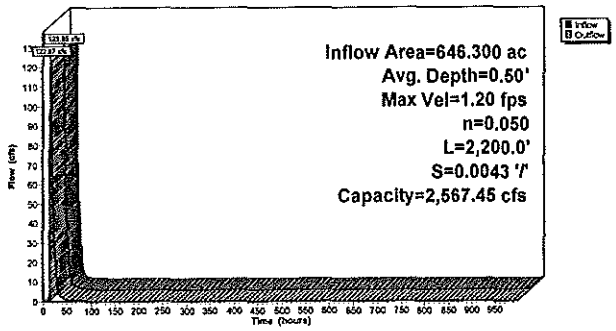
Inflow Area = 646.300 ac, Inflow Depth = 1.44" for 10-YR event
Inflow = 123.55 cfs @ 15.38 hrs, Volume= 77.702 af
Outflow = 122.97 cfs @ 16.45 hrs, Volume= 77.702 af, Atten= 0%, Lag= 64.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 30.5 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 184.4 min

Peak Storage= 224,930 cf @ 15.94 hrs, Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,567.45 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,200.0' Slope= 0.0043 '/'
Inlet Invert= 1,223.50', Outlet Invert= 1,214.10'

## Reach 14R:






## Reach 15R:

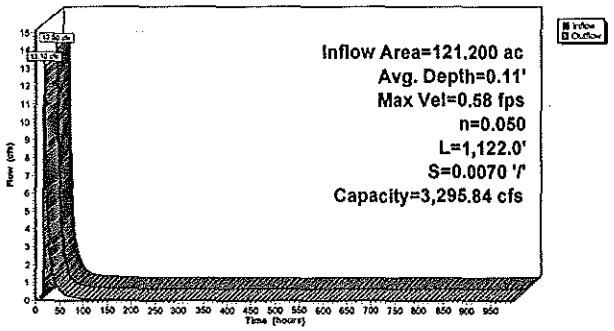
Inflow Area = 121.200 ac, Inflow Depth = 1.15" for 10-YR event
Inflow = 13.50 cfs @ 16.32 hrs, Volume= 11.619 af
Outflow = 13.10 cfs @ 17.32 hrs, Volume= 11.619 af, Atten= 3%, Lag= 60.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.58 fps, Min. Travel Time= 32.1 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 76.8 min

Peak Storage= 25,269 cf @ 16.79 hrs, Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 3,295.84 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,122.0' Slope= 0.0070 '/'
Inlet Invert= 1,258.00', Outlet Invert= 1,250.10'

## Reach 15R:






## Reach 16R:

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 2.52'

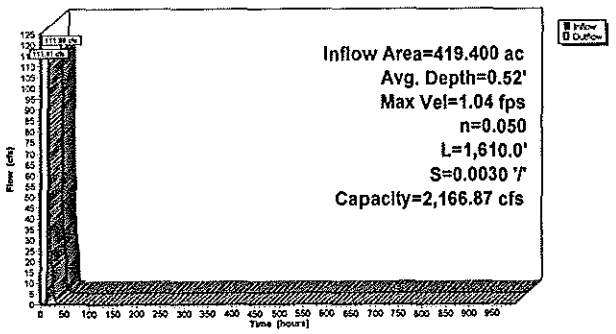
Inflow Area = 419.400 ac, Inflow Depth = 1.56" for 10-YR event
Inflow = 111.99 cfs @ 14.41 hrs, Volume= 54.629 af
Outflow = 111.41 cfs @ 15.16 hrs, Volume= 54.629 af, Atten= 1%, Lag= 44.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.04 fps, Min. Travel Time= 25.7 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 87.6 min

Peak Storage= 171,911 cf @ 14.73 hrs, Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,166.87 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,610.0' Slope= 0.0030 '/'
Inlet Invert= 1,255.00', Outlet Invert= 1,250.10'

## Reach 16R:






## Reach 21R:

[61] Hint: Submerged 78% of Reach 8R bottom

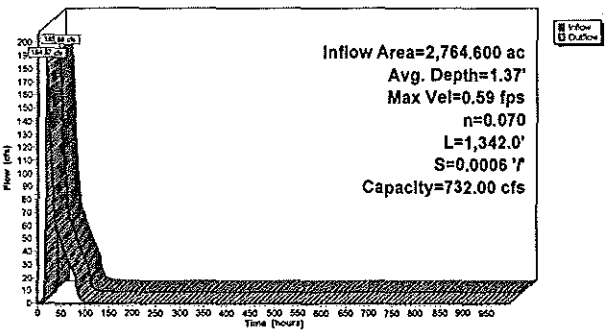
Inflow Area = 2,764.600 ac, Inflow Depth = 1.62" for 10-YR event
Inflow = 185.66 cfs @ 17.44 hrs, Volume= 372.781 af
Outflow = 184.57 cfs @ 18.34 hrs, Volume= 372.780 af, Atten= 1%, Lag= 54.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.59 fps, Min. Travel Time= 37.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 298.2 min

Peak Storage= 418,030 cf @ 17.71 hrs, Average Depth at Peak Storage= 1.37'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 732.00 cfs

200.00' x 3.00' deep channel, n= 0.070 Sluggish weedy reaches w/pools
Side Slope Z-value= 20.0 '/' Top Width= 320.00'
Length= 1,342.0' Slope= 0.0006 '/'
Inlet Invert= 1,195.00', Outlet Invert= 1,194.20'

## Reach 21R:



## Pond 1P:

Inflow Area = 3,626.900 ac, Inflow Depth = 1.81" for 10-YR event
Inflow = 1,653.01 cfs @ 11.94 hrs, Volume= 547.938 af
Outflow = 20.52 cfs @ 78.35 hrs, Volume= 450.688 af, Atten= 99%, Lag= 3,984.5 min
Primary = 20.52 cfs @ 78.35 hrs, Volume= 450.688 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,191.13' @ 78.35 hrs Surf.Area= 17,737,076 sf Storage= 19,695,556 cf

Plug-Flow detention time= 15,006.7 min calculated for 450.679 af (82% of inflow)
Center-of-Mass det. time= 14,529.6 min ( 16,344.1 - 1,814.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 39,292,918 cf | Lake Magnor (Prismatic)Listed below (Recalc) |
| #2 | 1,190.00' | 24,221,898 cf | Barbo Lake (Prismatic)Listed below (Recalc) |
| #3 | 1,190.00' | 19,504,098 cf | Mud Lake (Prismatic)Listed below (Recalc) |
| | | 83,018,913 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 9,474,713 | 0 | 0 |
| 1,192.00 | 9,822,178 | 19,296,891 | 19,296,891 |
| 1,194.00 | 10,173,849 | 19,996,027 | 39,292,918 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,912,341 | 0 | 0 |
| 1,195.00 | 5,776,418 | 24,221,898 | 24,221,898 |

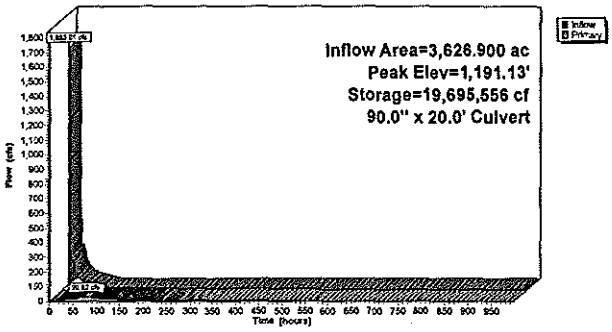
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,587,635 | 0 | 0 |
| 1,195.00 | 4,214,004 | 19,504,098 | 19,504,098 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,190.00' | 90.0" x 20.0' long Culvert X 2.00<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,189.70' S= 0.0150 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |

Primary OutFlow Max=20.51 cfs @ 78.35 hrs HW=1,191.13' (Free Discharge)
└1=Culvert (Barrel Controls 20.51 cfs @ 3.71 fps)



## Pond 1P:






## Pond 4P:

Inflow Area = 178.000 ac, Inflow Depth = 1.33" for 10-YR event
Inflow = 44.90 cfs @ 14.77 hrs, Volume= 19.759 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

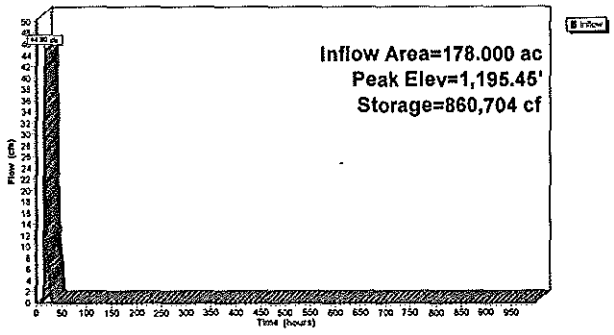
Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,195.45' @ 36.10 hrs Surf.Area= 1,176,717 sf Storage= 860,704 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,194.50' | 2,879,843 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,194.50 | 279,331 | 0 | 0 |
| 1,195.00 | 1,101,921 | 345,313 | 345,313 |
| 1,197.00 | 1,432,609 | 2,534,530 | 2,879,843 |

## Pond 4P:






## Pond 5P: Greley Lake

Inflow Area = 96.100 ac, Inflow Depth = 2.21" for 10-YR event
Inflow = 148.03 cfs @ 12.39 hrs, Volume= 17.665 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.14' @ 26.38 hrs Surf.Area= 689,471 sf Storage= 769,475 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

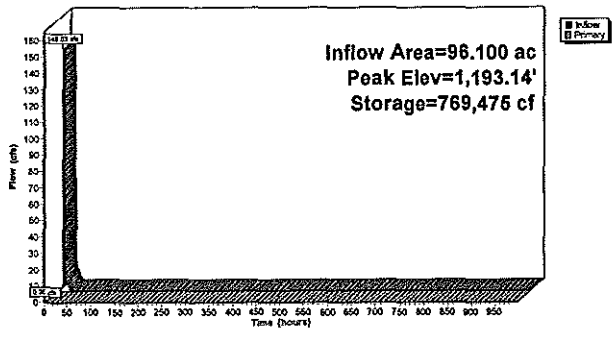
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,192.00' | 6,458,361 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,192.00 | 666,399 | 0 | 0 |
| 1,194.00 | 707,054 | 1,373,453 | 1,373,453 |
| 1,196.00 | 748,224 | 1,455,278 | 2,828,731 |
| 1,198.00 | 789,737 | 1,537,961 | 4,366,692 |
| 1,200.00 | 1,301,932 | 2,091,669 | 6,458,361 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,199.00' | 20.0' long x 20.0' breadth Broad-Crested Rectangular Weir<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,192.00' (Free Discharge)
└1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

## Pond 5P: Greley Lake






## Pond 6P:

[61] Hint: Submerged 44% of Reach 10R bottom

Inflow Area = 2,086.500 ac, Inflow Depth = 1.63" for 10-YR event
Inflow = 178.39 cfs @ 14.26 hrs, Volume= 284.142 af
Outflow = 108.46 cfs @ 16.03 hrs, Volume= 284.142 af, Atten= 39%, Lag= 106.7 min
Primary = 108.46 cfs @ 16.03 hrs, Volume= 284.142 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,200.95' @ 16.03 hrs Surf.Area= 1,333,011 sf Storage= 822,030 cf

Plug-Flow detention time= 35.3 min calculated for 284.137 af (100% of inflow)
Center-of-Mass det. time= 35.3 min ( 2,150.7 - 2,115.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,200.00' | 5,386,561 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

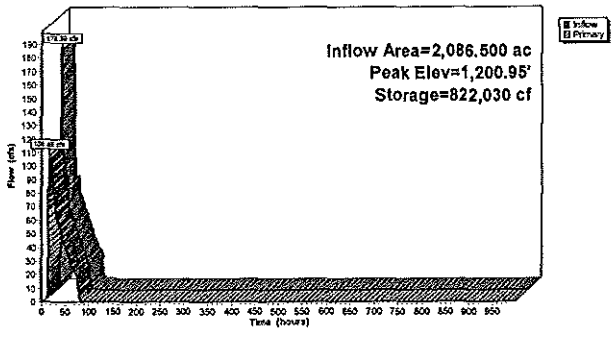
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,200.00 | 404,702 | 0 | 0 |
| 1,201.00 | 1,385,892 | 895,297 | 895,297 |
| 1,203.00 | 3,105,372 | 4,491,264 | 5,386,561 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,197.10' | **48.0" x 20.0' long Culvert X 2.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,197.00' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,202.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=108.46 cfs @ 16.03 hrs HW=1,200.95' (Free Discharge)
↑1=Culvert (Barrel Controls 108.46 cfs @ 5.59 fps)
└2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 6P:






## Pond 7P:

Inflow Area = 121.200 ac, Inflow Depth = 1.46" for 10-YR event
Inflow = 49.79 cfs @ 13.56 hrs, Volume= 14.776 af
Outflow = 13.50 cfs @ 16.32 hrs, Volume= 11.619 af, Atten= 73%, Lag= 165.4 min
Primary = 13.50 cfs @ 16.32 hrs, Volume= 11.619 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,260.30' @ 16.32 hrs Surf.Area= 195,715 sf Storage= 368,254 cf

Plug-Flow detention time= 1,466.0 min calculated for 11.618 af (79% of inflow)
Center-of-Mass det. time= 1,374.5 min ( 2,340.2 - 965.7 )

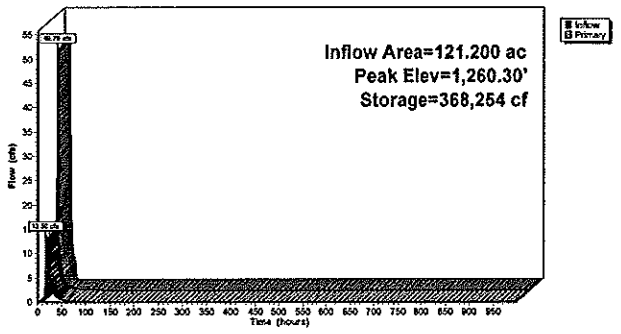
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,258.00' | 505,511 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,258.00 | 114,081 | 0 | 0 |
| 1,260.00 | 195,715 | 309,796 | 309,796 |
| 1,261.00 | 195,715 | 195,715 | 505,511 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,259.00' | **24.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,258.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=13.49 cfs @ 16.32 hrs HW=1,260.30' (Free Discharge)
↑1=Culvert (Barrel Controls 4.71 cfs @ 3.10 fps)
└2=Broad-Crested Rectangular Weir (Weir Controls 8.78 cfs @ 1.47 fps)

**Pond 7P:**






**Pond 8P:**

Inflow Area = 419.400 ac, Inflow Depth = 1.56" for 10-YR event
Inflow = 146.63 cfs @ 13.39 hrs, Volume= 54.629 af
Outflow = 111.99 cfs @ 14.41 hrs, Volume= 54.629 af, Atten= 24%, Lag= 61.3 min
Primary = 111.99 cfs @ 14.41 hrs, Volume= 54.629 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,257.79' @ 14.41 hrs Surf.Area= 360,993 sf Storage= 170,366 cf

Plug-Flow detention time= 10.3 min calculated for 54.629 af (100% of inflow)
Center-of-Mass det. time= 10.3 min ( 993.2 - 982.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,257.00' | 3,038,942 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

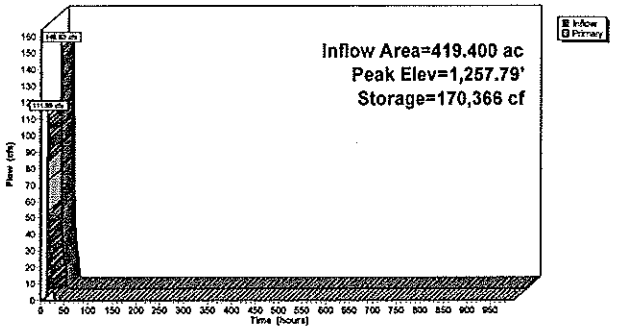
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,257.00 | 68,271 | 0 | 0 |
| 1,260.00 | 1,174,614 | 1,864,328 | 1,864,328 |
| 1,261.00 | 1,174,614 | 1,174,614 | 3,038,942 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,253.00' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,252.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=111.99 cfs @ 14.41 hrs HW=1,257.79' TW=1,255.00' (Fixed TW Elev= 1,255.00')
1=Culvert (Barrel Controls 111.99 cfs @ 6.33 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



**Pond 8P:**






**Pond 9P:**

[63] Warning: Exceeded Reach 12R inflow depth by 0.90' @ 31.08 hrs

Inflow Area = 1,659.800 ac, Inflow Depth = 1.53" for 10-YR event
Inflow = 265.40 cfs @ 17.71 hrs, Volume= 211.213 af
Outflow = 61.60 cfs @ 26.60 hrs, Volume= 211.213 af, Atten= 77%, Lag= 533.6 min
Primary = 61.60 cfs @ 26.60 hrs, Volume= 211.213 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,210.24' @ 26.60 hrs Surf.Area= 3,505,587 sf Storage= 5,685,803 cf

Plug-Flow detention time= 1,116.3 min calculated for 211.208 af (100% of inflow)
Center-of-Mass det. time= 1,116.2 min ( 2,408.7 - 1,292.5 )

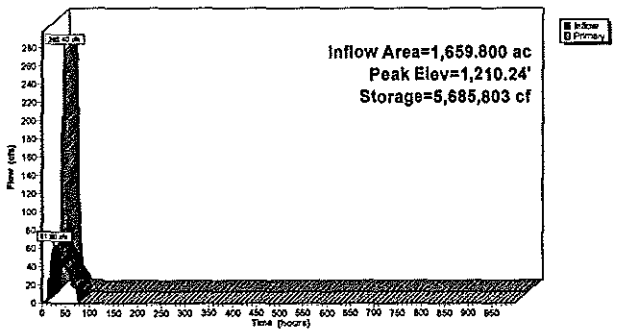
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,208.00' | 16,083,958 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,208.00 | 1,411,294 | 0 | 0 |
| 1,210.00 | 3,455,564 | 4,866,858 | 4,866,858 |
| 1,212.00 | 3,880,768 | 7,336,332 | 12,203,190 |
| 1,213.00 | 3,880,768 | 3,880,768 | 16,083,958 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,206.00' | **48.0" x 25.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,205.90' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,212.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=61.60 cfs @ 26.60 hrs HW=1,210.24' TW=1,207.00' (Fixed TW Elev= 1,207.00')
1=Culvert (Barrel Controls 61.60 cfs @ 5.76 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond 9P:**






**Pond 10P:**

Inflow Area = 646.300 ac, Inflow Depth = 1.45" for 10-YR event
Inflow = 126.01 cfs @ 14.60 hrs, Volume= 77.981 af
Outflow = 123.55 cfs @ 15.38 hrs, Volume= 77.702 af, Atten= 2%, Lag= 46.4 min
Primary = 123.55 cfs @ 15.38 hrs, Volume= 77.702 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,227.48' @ 15.38 hrs Surf.Area= 74,861 sf Storage= 215,173 cf

Plug-Flow detention time= 106.2 min calculated for 77.700 af (100% of inflow)
Center-of-Mass det. time= 26.8 min ( 1,267.9 - 1,241.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,223.00' | 596,246 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

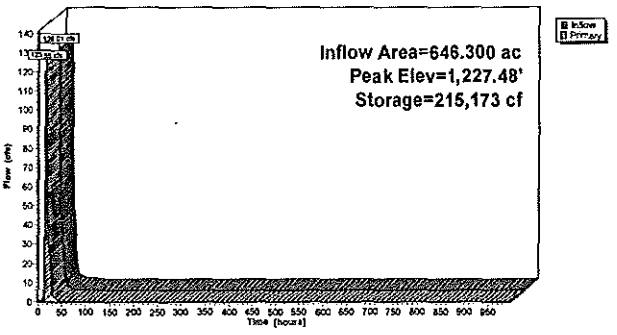
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,223.00 | 21,295 | 0 | 0 |
| 1,228.00 | 81,139 | 256,085 | 256,085 |
| 1,230.00 | 129,511 | 210,650 | 466,735 |
| 1,231.00 | 129,511 | 129,511 | 596,246 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,222.50' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,222.30' S= 0.0100 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,230.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=123.55 cfs@ 15.38 hrs HW=1,227.48' TW=1,223.50' (Fixed TW Elev= 1,223.50')
1=Culvert (Barrel Controls 123.55 cfs @ 6.68 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



**Pond 10P:**






**Pond 11P:**

[61] Hint: Submerged 51% of Reach 13R bottom

Inflow Area = 1,407.500 ac, Inflow Depth = 1.49" for 10-YR event
Inflow = 317.67 cfs @ 14.54 hrs, Volume= 175.131 af
Outflow = 263.37 cfs @ 15.68 hrs, Volume= 166.544 af, Atten= 17%, Lag= 68.3 min
Primary = 263.37 cfs @ 15.68 hrs, Volume= 166.544 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,210.67' @ 15.68 hrs Surf.Area= 506,197 sf Storage= 1,122,807 cf

Plug-Flow detention time= 168.2 min calculated for 166.544 af (95% of inflow)
Center-of-Mass det. time= 56.4 min ( 1,229.8 - 1,173.4 )

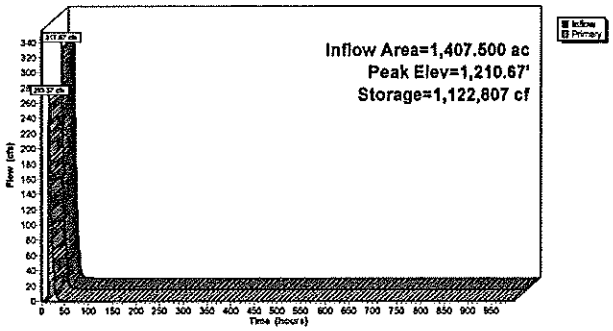
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,207.00' | 2,933,772 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,207.00 | 34,962 | 0 | 0 |
| 1,210.00 | 491,135 | 789,148 | 789,148 |
| 1,214.00 | 581,178 | 2,144,626 | 2,933,772 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,207.10' | **72.0" x 25.0' long Culvert X 4.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,207.00' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,214.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=263.38 cfs@ 15.68 hrs HW=1,210.67' TW=1,209.00' (Fixed TW Elev= 1,209.00')
1=Culvert (Barrel Controls 263.36 cfs @ 5.40 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond 11P:**






**Pond 17P: Marsh Lake**

Inflow Area = 176.300 ac, Inflow Depth = 2.46" for 10-YR event
Inflow = 444.98 cfs @ 12.16 hrs, Volume= 36.133 af
Outflow = 1.34 cfs @ 24.48 hrs, Volume= 1.168 af, Atten= 100%, Lag= 739.3 min
Primary = 1.34 cfs @ 24.48 hrs, Volume= 1.168 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.08' @ 24.48 hrs Surf.Area= 543,842 sf Storage= 1,568,258 cf

Plug-Flow detention time= 1,483.7 min calculated for 1.168 af (3% of inflow)
Center-of-Mass det. time= 1,234.8 min ( 2,066.0 - 831.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 3,205,992 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

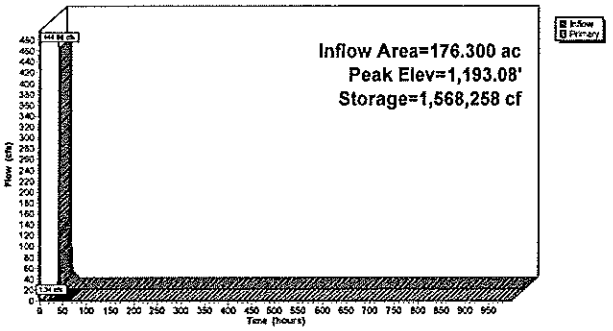
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 473,448 | 0 | 0 |
| 1,194.00 | 564,774 | 2,076,444 | 2,076,444 |
| 1,196.00 | 564,774 | 1,129,548 | 3,205,992 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,193.00' | 20.0' long x 20.0' breadth Broad-Crested Rectangular Weir<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=1.29 cfs @ 24.48 hrs HW=1,193.08' (Free Discharge)
↳1=Broad-Crested Rectangular Weir (Weir Controls 1.29 cfs @ 0.77 fps)



**Pond 17P: Marsh Lake**





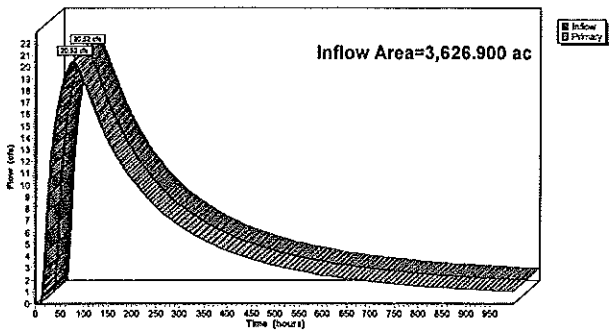

**Pond EXIT:**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,626.900 ac, Inflow Depth > 1.49" for 10-YR event
Inflow = 20.52 cfs @ 78.35 hrs, Volume= 450.688 af
Primary = 20.52 cfs @ 78.35 hrs, Volume= 450.688 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs

**Pond EXIT:**



Time span=0.00-999.00 hrs, dt=0.02 hrs, 49951 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment A:** Runoff Area=250.400 ac Runoff Depth=2.56"
Flow Length=3,259' Slope=0.0086 '/' Tc=120.9 min CN=69 Runoff=195.91 cfs 53.363 af

**Subcatchment A1: Lake Magnor** Runoff Area=217.500 ac Runoff Depth=5.68"
Flow Length=4,425' Tc=4.1 min CN=99 Runoff=1,906.06 cfs 102.959 af

**Subcatchment B:** Runoff Area=300.300 ac Runoff Depth=3.50"
Flow Length=3,727' Slope=0.0100 '/' Tc=93.9 min CN=79 Runoff=402.46 cfs 87.627 af

**Subcatchment B1: Barbo Lake** Runoff Area=43.100 ac Runoff Depth=5.68"
Flow Length=2,070' Tc=2.7 min CN=99 Runoff=392.11 cfs 20.403 af

**Subcatchment C:** Runoff Area=51.000 ac Runoff Depth=3.80"
Flow Length=1,186' Slope=0.0051 '/' Tc=47.8 min CN=82 Runoff=122.40 cfs 16.165 af

**Subcatchment D:** Runoff Area=176.300 ac Runoff Depth=4.01"
Flow Length=1,465' Slope=0.0280 '/' Tc=22.9 min CN=84 Runoff=719.03 cfs 58.909 af

**Subcatchment E:** Runoff Area=178.000 ac Runoff Depth=2.56"
Flow Length=4,714' Slope=0.0051 '/' Tc=210.9 min CN=69 Runoff=91.03 cfs 37.934 af

**Subcatchment F:** Runoff Area=124.900 ac Runoff Depth=3.91"
Flow Length=5,559' Slope=0.0022 '/' Tc=242.6 min CN=83 Runoff=89.28 cfs 40.656 af

**Subcatchment G:** Runoff Area=375.200 ac Runoff Depth=3.50"
Flow Length=8,822' Slope=0.0030 '/' Tc=341.5 min CN=79 Runoff=184.55 cfs 109.483 af

**Subcatchment H:** Runoff Area=96.100 ac Runoff Depth=3.70"
Flow Length=2,080' Slope=0.0180 '/' Tc=41.2 min CN=81 Runoff=248.90 cfs 29.646 af

**Subcatchment I:** Runoff Area=111.500 ac Runoff Depth=3.80"
Flow Length=2,381' Slope=0.0130 '/' Tc=52.3 min CN=82 Runoff=251.34 cfs 35.341 af

**Subcatchment J:** Runoff Area=315.200 ac Runoff Depth=3.40"
Flow Length=5,288' Slope=0.0053 '/' Tc=175.9 min CN=78 Runoff=253.63 cfs 89.381 af

**Subcatchment K:** Runoff Area=252.300 ac Runoff Depth=3.60"
Flow Length=4,154' Slope=0.0096 '/' Tc=101.3 min CN=80 Runoff=328.86 cfs 75.717 af

**Subcatchment L:** Runoff Area=158.400 ac Runoff Depth=2.21"
Flow Length=3,591' Slope=0.0200 '/' Tc=95.2 min CN=65 Runoff=124.95 cfs 29.132 af

**Subcatchment M:** Runoff Area=469.100 ac Runoff Depth=3.21"
Flow Length=6,454' Slope=0.0120 '/' Tc=145.5 min CN=76 Runoff=410.17 cfs 125.414 af



**Subcatchment N:** Runoff Area=133.700 ac Runoff Depth=2.21"
Flow Length=5,467' Slope=0.0172 '/' Tc=143.6 min CN=65 Runoff=77.40 cfs 24.589 af

**Subcatchment O:** Runoff Area=105.700 ac Runoff Depth=2.56"
Flow Length=3,627' Slope=0.0193 '/' Tc=87.9 min CN=69 Runoff=105.53 cfs 22.526 af

**Subcatchment P:** Runoff Area=121.200 ac Runoff Depth=2.74"
Flow Length=3,452' Slope=0.0075 '/' Tc=128.4 min CN=71 Runoff=98.07 cfs 27.658 af

**Subcatchment Q:** Runoff Area=176.800 ac Runoff Depth=3.40"
Flow Length=4,105' Slope=0.0100 '/' Tc=104.6 min CN=78 Runoff=211.00 cfs 50.135 af

**Subcatchment R:** Runoff Area=242.600 ac Runoff Depth=2.47"
Flow Length=5,862' Slope=0.0078 '/' Tc=208.5 min CN=68 Runoff=119.42 cfs 49.900 af

**Reach 8R:** Avg. Depth=1.25' Max Vel=0.68 fps Inflow=140.89 cfs 517.770 af
n=0.050 L=5,615.0' S=0.0004 '/' Capacity=622.17 cfs Outflow=137.00 cfs 517.768 af

**Reach 10R:** Avg. Depth=0.45' Max Vel=1.01 fps Inflow=94.33 cfs 393.048 af
n=0.050 L=2,510.0' S=0.0034 '/' Capacity=2,289.12 cfs Outflow=94.29 cfs 393.048 af

**Reach 12R:** Avg. Depth=1.84' Max Vel=1.20 fps Inflow=517.06 cfs 317.332 af
n=0.050 L=3,585.0' S=0.0008 '/' Capacity=1,117.13 cfs Outflow=482.49 cfs 317.331 af

**Reach 13R:** Avg. Depth=1.26' Max Vel=2.19 fps Inflow=589.21 cfs 296.786 af
n=0.050 L=1,570.0' S=0.0043 '/' Capacity=2,584.96 cfs Outflow=585.55 cfs 296.786 af

**Reach 14R:** Avg. Depth=0.70' Max Vel=1.49 fps Inflow=215.70 cfs 146.783 af
n=0.050 L=2,200.0' S=0.0043 '/' Capacity=2,567.45 cfs Outflow=214.98 cfs 146.783 af

**Reach 15R:** Avg. Depth=0.26' Max Vel=1.01 fps Inflow=54.97 cfs 24.501 af
n=0.050 L=1,122.0' S=0.0070 '/' Capacity=3,295.84 cfs Outflow=53.53 cfs 24.501 af

**Reach 16R:** Avg. Depth=0.64' Max Vel=1.19 fps Inflow=157.91 cfs 100.035 af
n=0.050 L=1,610.0' S=0.0030 '/' Capacity=2,166.87 cfs Outflow=157.61 cfs 100.035 af

**Reach 21R:** Avg. Depth=1.85' Max Vel=0.71 fps Inflow=313.29 cfs 667.907 af
n=0.070 L=1,342.0' S=0.0006 '/' Capacity=732.00 cfs Outflow=310.02 cfs 667.907 af

**Pond 1P:** Peak Elev=1,191.73' Storage=30,309,654 cf Inflow=2,375.26 cfs 948.424 af
90.0" x 20.0' Culvert Outflow=45.14 cfs 841.259 af

**Pond 4P:** Peak Elev=1,196.10' Storage=1,652,395 cf Inflow=91.03 cfs 37.934 af
Outflow=0.00 cfs 0.000 af

**Pond 5P: Greley Lake** Peak Elev=1,193.68' Storage=1,291,380 cf Inflow=248.90 cfs 29.646 af
Outflow=0.00 cfs 0.000 af

**Pond 6P:** Peak Elev=1,201.72' Storage=2,125,533 cf Inflow=313.22 cfs 517.770 af
Outflow=140.89 cfs 517.770 af



**Pond 7P:** Peak Elev=1,260.91' Storage=488,301 cf Inflow=98.07 cfs 27.658 af
Outflow=54.97 cfs 24.501 af

**Pond 8P:** Peak Elev=1,258.93' Storage=820,415 cf Inflow=271.13 cfs 100.035 af
Outflow=157.91 cfs 100.035 af

**Pond 9P:** Peak Elev=1,211.96' Storage=12,058,579 cf Inflow=523.30 cfs 393.048 af
Outflow=94.33 cfs 393.048 af

**Pond 10P:** Peak Elev=1,229.83' Storage=444,805 cf Inflow=229.31 cfs 147.062 af
Outflow=215.70 cfs 146.783 af

**Pond 11P:** Peak Elev=1,212.36' Storage=2,010,905 cf Inflow=643.02 cfs 325.918 af
Outflow=517.06 cfs 317.332 af

**Pond 17P: Marsh Lake** Peak Elev=1,193.63' Storage=1,859,893 cf Inflow=719.03 cfs 58.909 af
Outflow=27.02 cfs 23.944 af

**Pond EXIT:** Inflow=45.14 cfs 841.259 af
Primary=45.14 cfs 841.259 af

**Total Runoff Area = 3,899.300 ac Runoff Volume = 1,085.940 af Average Runoff Depth = 3.35"**
**93.32% Pervious Area = 3,638.700 ac 6.68% Impervious Area = 260.600 ac**



## Subcatchment A:

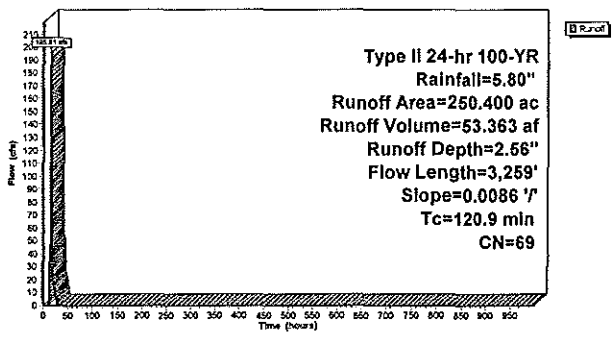
Runoff = 195.91 cfs @ 13.55 hrs, Volume= 53.363 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 250.400 | 69 | |
| 250.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 120.9 | 3,259 | 0.0086 | 0.45 | | Lag/CN Method, |

## Subcatchment A:



### Subcatchment A1: Lake Magnor

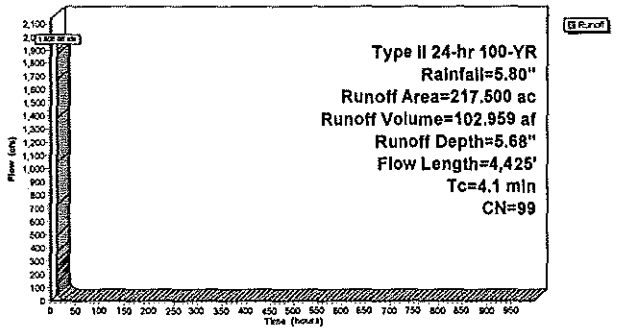
Runoff = 1,906.06 cfs @ 11.94 hrs, Volume= 102.959 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 217.500 | 99 | LAKE MAGNOR |
| 217.500 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.1 | 4,425 | | 17.94 | | Lake or Reservoir, Mean Depth= 10.00' |

### Subcatchment A1: Lake Magnor






### Subcatchment B:

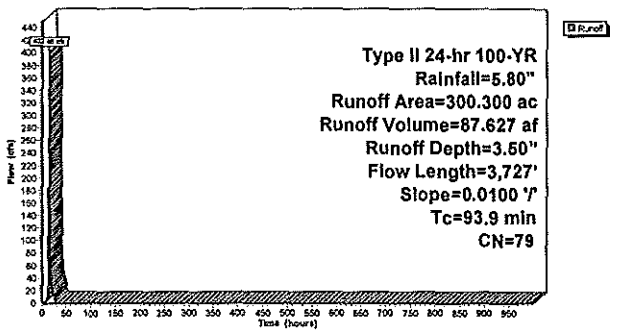
Runoff = 402.46 cfs @ 13.05 hrs, Volume= 87.627 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 300.300 | 79 | |
| 300.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 93.9 | 3,727 | 0.0100 | 0.66 | | Lag/CN Method, |

### Subcatchment B:






### Subcatchment B1: Barbo Lake

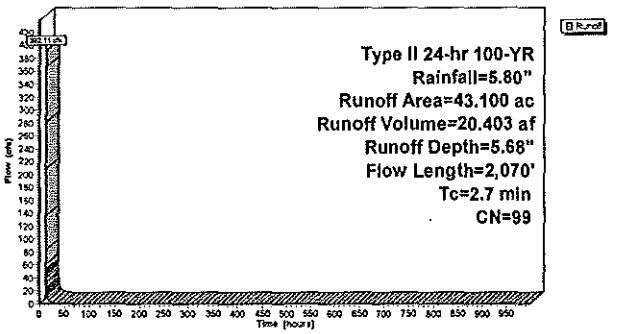
Runoff = 392.11 cfs @ 11.93 hrs, Volume= 20.403 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 43.100 | 99 | BARBO LAKE |
| 43.100 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.7 | 2,070 | | 12.69 | | Lake or Reservoir, Mean Depth= 5.00' |

### Subcatchment B1: Barbo Lake






### Subcatchment C:

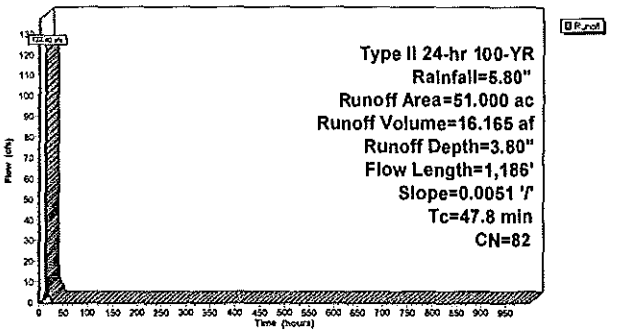
Runoff = 122.40 cfs @ 12.47 hrs, Volume= 16.165 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 51.000 | 82 | |
| 51.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.8 | 1,186 | 0.0051 | 0.41 | | Lag/CN Method, |

### Subcatchment C:



## Subcatchment D:

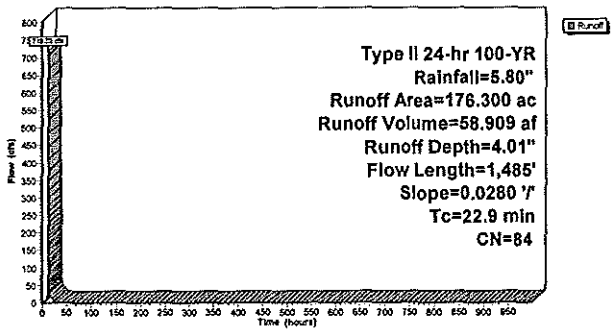
Runoff = 719.03 cfs @ 12.15 hrs, Volume= 58.909 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 176.300 | 84 | |
| 176.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 22.9 | 1,485 | 0.0280 | 1.08 | | Lag/CN Method, |

## Subcatchment D:






## Subcatchment E:

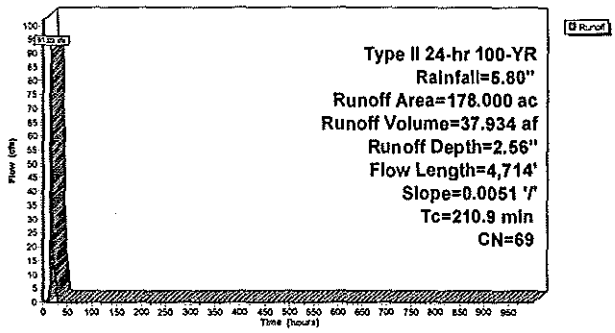
Runoff = 91.03 cfs @ 14.78 hrs, Volume= 37.934 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 178.000 | 69 | |
| 178.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 210.9 | 4,714 | 0.0051 | 0.37 | | Lag/CN Method, |

## Subcatchment E:






## Subcatchment F:

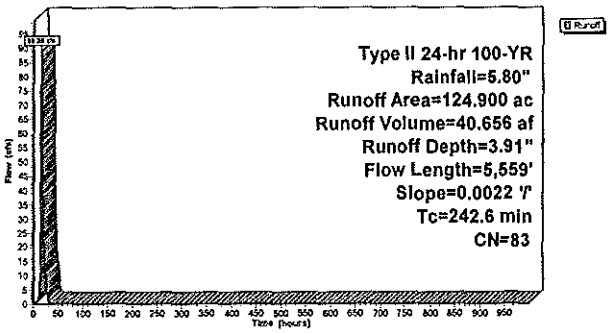
Runoff = 89.28 cfs @ 14.84 hrs, Volume= 40.656 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 124.900 | 83 | |
| 124.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 242.6 | 5,559 | 0.0022 | 0.38 | | Lag/CN Method, |

## Subcatchment F:






## Subcatchment G:

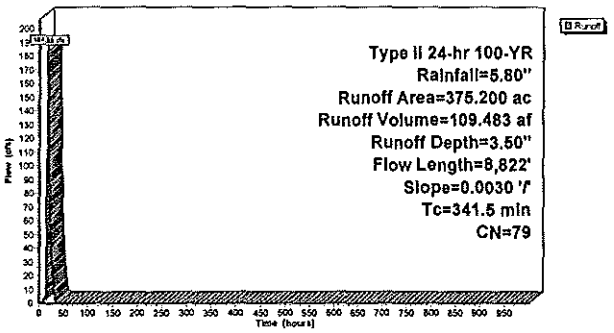
Runoff = 184.55 cfs @ 16.32 hrs, Volume= 109.483 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 375.200 | 79 | |
| 375.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 341.5 | 8,822 | 0.0030 | 0.43 | | Lag/CN Method, |

## Subcatchment G:



## Subcatchment H:

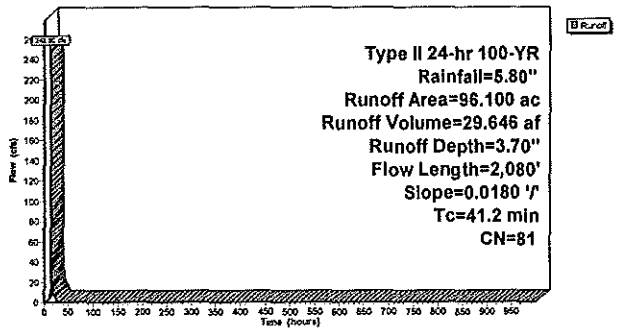
Runoff = 248.90 cfs @ 12.38 hrs, Volume= 29.646 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 96.100 | 81 | |
| 96.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 41.2 | 2,080 | 0.0180 | 0.84 | | Lag/CN Method, |

## Subcatchment H:






## Subcatchment I:

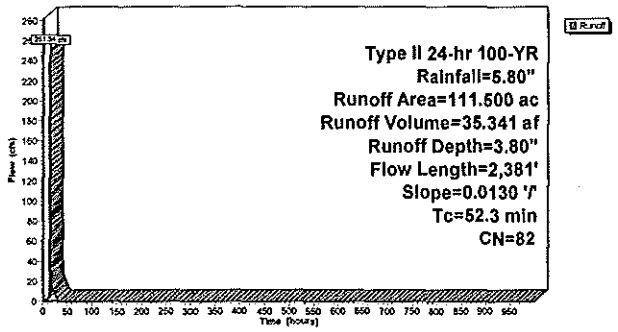
Runoff = 251.34 cfs @ 12.50 hrs, Volume= 35.341 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 111.500 | 82 | |
| 111.500 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 52.3 | 2,381 | 0.0130 | 0.76 | | Lag/CN Method, |

## Subcatchment I:






## Subcatchment J:

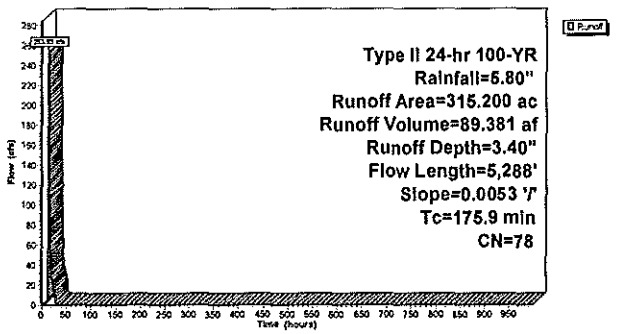
Runoff = 253.63 cfs @ 14.25 hrs, Volume= 89.381 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 315.200 | 78 | |
| 315.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 175.9 | 5,288 | 0.0053 | 0.50 | | Lag/CN Method, |

## Subcatchment J:






## Subcatchment K:

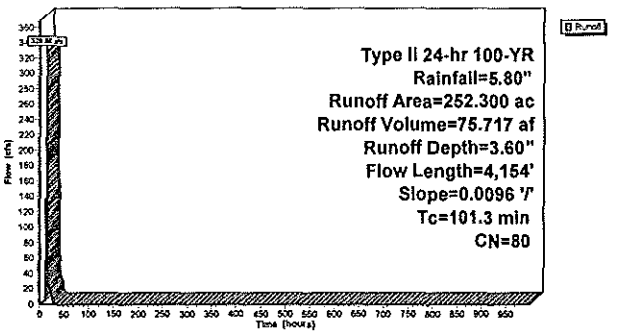
Runoff = 328.86 cfs @ 13.16 hrs, Volume= 75.717 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 252.300 | 80 | |
| 252.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 101.3 | 4,154 | 0.0096 | 0.68 | | Lag/CN Method, |

## Subcatchment K:



### Subcatchment L:

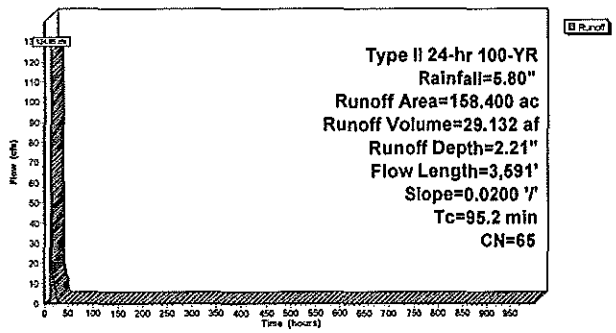
Runoff = 124.95 cfs @ 13.14 hrs, Volume= 29.132 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 158.400 | 65 | |
| 158.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 95.2 | 3,591 | 0.0200 | 0.63 | | Lag/CN Method, |

### Subcatchment L:






### Subcatchment M:

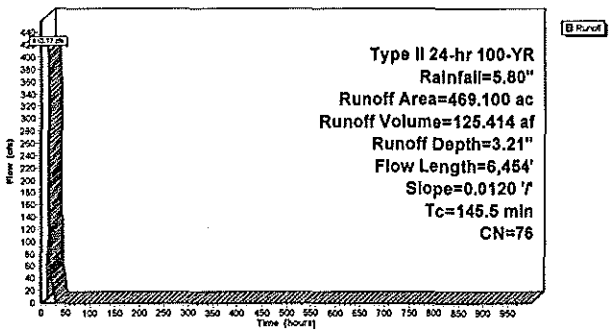
Runoff = 410.17 cfs @ 13.74 hrs, Volume= 125.414 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 469.100 | 76 | |
| 469.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 145.5 | 6,454 | 0.0120 | 0.74 | | Lag/CN Method, |

### Subcatchment M:






### Subcatchment N:

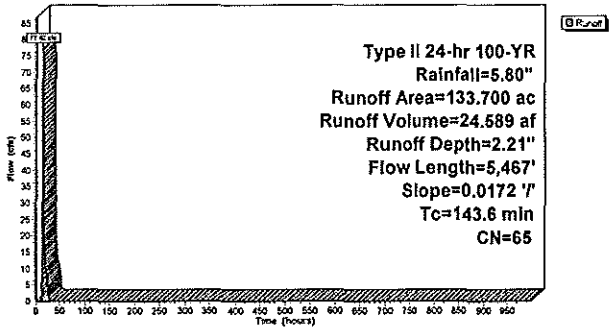
Runoff = 77.40 cfs @ 13.88 hrs, Volume= 24.589 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 133.700 | 65 | |
| 133.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 143.6 | 5,467 | 0.0172 | 0.63 | | Lag/CN Method, |

### Subcatchment N:






### Subcatchment O:

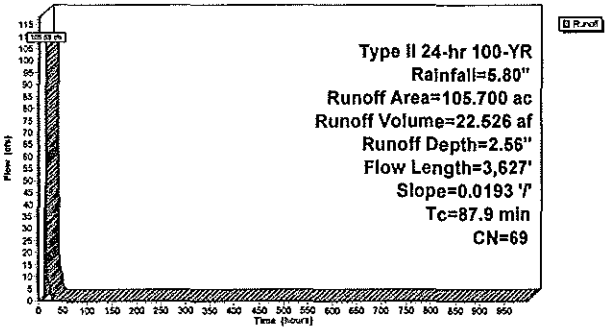
Runoff = 105.53 cfs @ 13.00 hrs, Volume= 22.526 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 105.700 | 69 | |
| 105.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 87.9 | 3,627 | 0.0193 | 0.69 | | Lag/CN Method, |

### Subcatchment O:



### Subcatchment P:

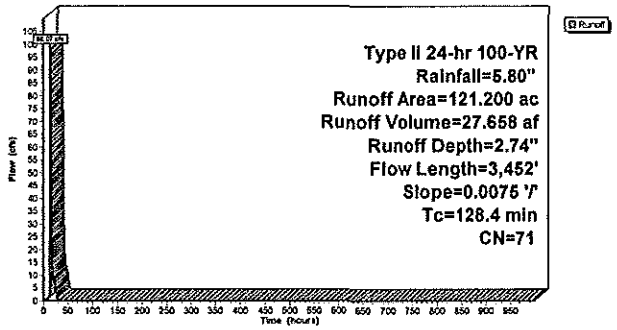
Runoff = 98.07 cfs @ 13.55 hrs, Volume= 27.658 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 121.200 | 71 | |
| 121.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 128.4 | 3,452 | 0.0075 | 0.45 | | Lag/CN Method, |

### Subcatchment P:






### Subcatchment Q:

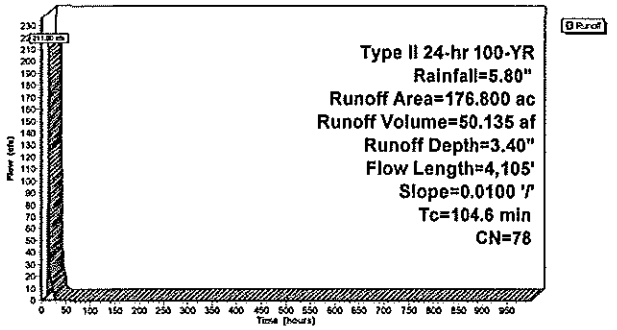
Runoff = 211.00 cfs @ 13.18 hrs, Volume= 50.135 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 176.800 | 78 | |
| 176.800 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 104.6 | 4,105 | 0.0100 | 0.65 | | Lag/CN Method, |

### Subcatchment Q:






### Subcatchment R:

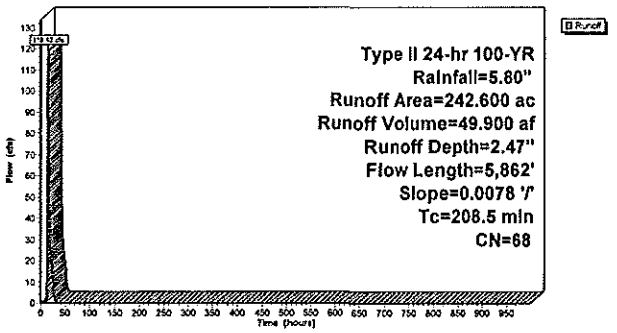
Runoff = 119.42 cfs @ 14.60 hrs, Volume= 49.900 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 242.600 | 68 | |
| 242.600 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 208.5 | 5,862 | 0.0078 | 0.47 | | Lag/CN Method, |

### Subcatchment R:






### Reach 8R:

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 1.05'

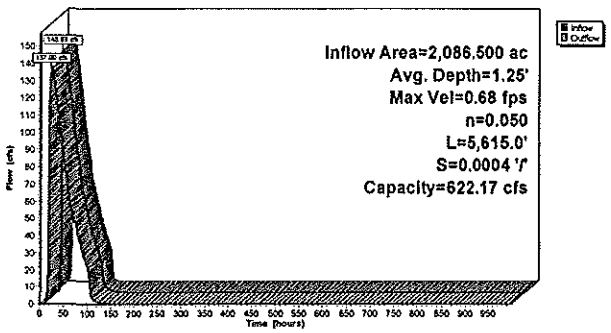
Inflow Area = 2,086.500 ac, Inflow Depth = 2.98" for 100-YR event
Inflow = 140.89 cfs @ 16.86 hrs, Volume= 517.770 af
Outflow = 137.00 cfs @ 22.43 hrs, Volume= 517.768 af, Atten= 3%, Lag= 333.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.68 fps, Min. Travel Time= 138.2 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 923.8 min

Peak Storage= 1,136,373 cf @ 20.12 hrs, Average Depth at Peak Storage= 1.25'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 622.17 cfs

150.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 210.00'
Length= 5,615.0' Slope= 0.0004 '/'
Inlet Invert= 1,196.90', Outlet Invert= 1,194.50'

### Reach 8R:



## Reach 10R:

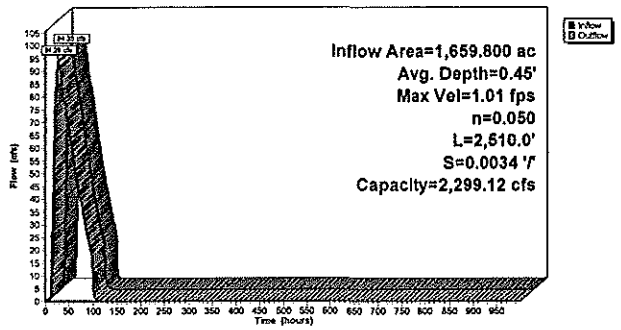
Inflow Area = 1,659.800 ac, Inflow Depth = 2.84" for 100-YR event
Inflow = 94.33 cfs @ 26.80 hrs, Volume= 393.048 af
Outflow = 94.29 cfs @ 27.93 hrs, Volume= 393.048 af, Atten= 0%, Lag= 67.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.01 fps, Min. Travel Time= 41.3 min
Avg. Velocity = 0.22 fps, Avg. Travel Time= 187.6 min

Peak Storage= 233,441 cf @ 27.24 hrs, Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,299.12 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,510.0' Slope= 0.0034 '/'
Inlet Invert= 1,205.80', Outlet Invert= 1,197.20'

## Reach 10R:






## Reach 12R:

[81] Warning: Exceeded Pond 11P by 2.00' @ 0.00 hrs

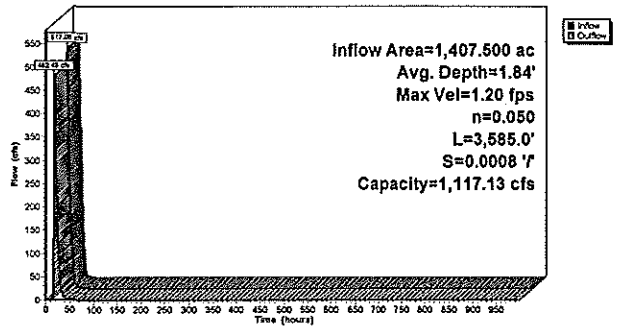
Inflow Area = 1,407.500 ac, Inflow Depth = 2.71" for 100-YR event
Inflow = 517.06 cfs @ 15.10 hrs, Volume= 317.332 af
Outflow = 482.49 cfs @ 16.73 hrs, Volume= 317.331 af, Atten= 7%, Lag= 97.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 49.7 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 614.3 min

Peak Storage= 1,439,606 cf @ 15.90 hrs, Average Depth at Peak Storage= 1.84'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,117.13 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 3,585.0' Slope= 0.0008 '/'
Inlet Invert= 1,209.00', Outlet Invert= 1,206.10'

## Reach 12R:






## Reach 13R:

[81] Hint: Submerged 12% of Reach 14R bottom

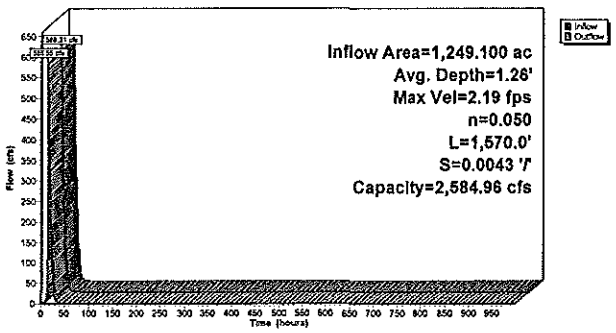
Inflow Area = 1,249.100 ac, Inflow Depth = 2.85" for 100-YR event
Inflow = 589.21 cfs @ 14.02 hrs, Volume= 296.786 af
Outflow = 585.55 cfs @ 14.32 hrs, Volume= 296.786 af, Atten= 1%, Lag= 17.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 124.2 min

Peak Storage= 419,467 cf @ 14.12 hrs, Average Depth at Peak Storage= 1.26'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,584.96 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,570.0' Slope= 0.0043 '/'
Inlet Invert= 1,214.00', Outlet Invert= 1,207.20'

## Reach 13R:






## Reach 14R:

[81] Warning: Exceeded Pond 10P by 0.50' @ 0.00 hrs

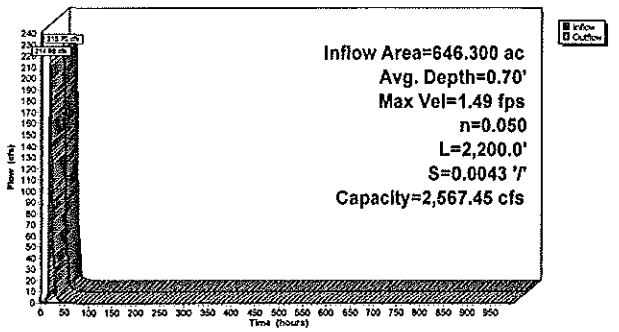
Inflow Area = 646.300 ac, Inflow Depth = 2.73" for 100-YR event
Inflow = 215.70 cfs @ 16.16 hrs, Volume= 146.783 af
Outflow = 214.98 cfs @ 16.84 hrs, Volume= 146.783 af, Atten= 0%, Lag= 41.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 24.6 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 180.6 min

Peak Storage= 318,909 cf @ 16.43 hrs, Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,567.45 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,200.0' Slope= 0.0043 '/'
Inlet Invert= 1,223.50', Outlet Invert= 1,214.10'

## Reach 14R:



## Reach 16R:

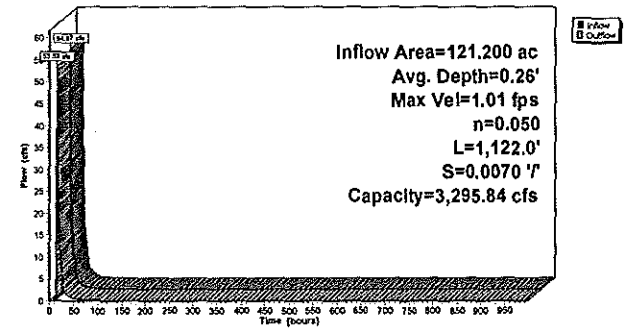
Inflow Area = 121.200 ac, Inflow Depth = 2.43" for 100-YR event
Inflow = 54.97 cfs @ 14.68 hrs, Volume= 24.501 af
Outflow = 53.53 cfs @ 15.25 hrs, Volume= 24.501 af, Atten= 3%, Lag= 34.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.01 fps, Min. Travel Time= 18.5 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 76.0 min

Peak Storage= 59,371 cf @ 14.94 hrs, Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 3,295.84 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,122.0' Slope= 0.0070 '/'
Inlet Invert= 1,258.00', Outlet Invert= 1,250.10'

## Reach 15R:






## Reach 16R:

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 2.64'

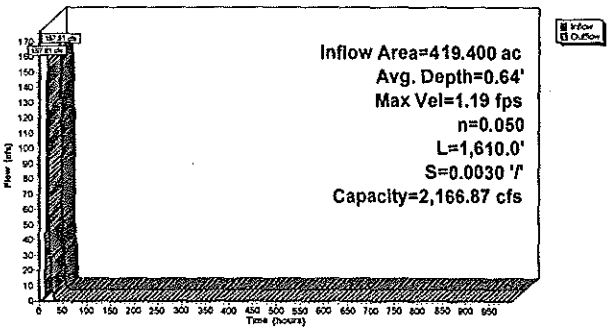
Inflow Area = 419.400 ac, Inflow Depth = 2.86" for 100-YR event
Inflow = 157.91 cfs @ 15.34 hrs, Volume= 100.035 af
Outflow = 157.61 cfs @ 15.95 hrs, Volume= 100.035 af, Atten= 0%, Lag= 36.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.19 fps, Min. Travel Time= 22.5 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 75.2 min

Peak Storage= 212,670 cf @ 15.58 hrs, Average Depth at Peak Storage= 0.64'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,166.87 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,610.0' Slope= 0.0030 '/'
Inlet Invert= 1,255.00', Outlet Invert= 1,250.10'

## Reach 16R:






## Reach 21R:

[61] Hint: Submerged 98% of Reach 8R bottom

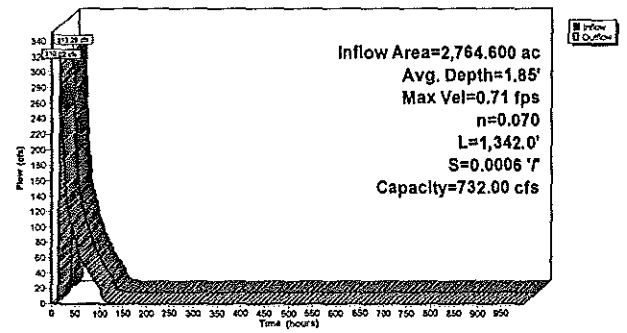
Inflow Area = 2,764.600 ac, Inflow Depth = 2.90" for 100-YR event
Inflow = 313.29 cfs @ 16.33 hrs, Volume= 667.907 af
Outflow = 310.02 cfs @ 17.41 hrs, Volume= 667.907 af, Atten= 1%, Lag= 65.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.71 fps, Min. Travel Time= 31.6 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 259.4 min

Peak Storage= 587,359 cf @ 16.88 hrs, Average Depth at Peak Storage= 1.85'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 732.00 cfs

200.00' x 3.00' deep channel, n= 0.070 Sluggish weedy reaches w/pools
Side Slope Z-value= 20.0 '/' Top Width= 320.00'
Length= 1,342.0' Slope= 0.0006 '/'
Inlet Invert= 1,195.00', Outlet Invert= 1,194.20'

## Reach 21R:






## Pond 1P:

Inflow Area = 3,626.900 ac, Inflow Depth = 3.14" for 100-YR event
Inflow = 2,375.26 cfs @ 11.94 hrs, Volume= 948.424 af
Outflow = 45.14 cfs @ 74.34 hrs, Volume= 841.259 af, Atten= 98%, Lag= 3,743.8 min
Primary = 45.14 cfs @ 74.34 hrs, Volume= 841.259 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,191.73' @ 74.34 hrs Surf.Area= 18,134,647 sf Storage= 30,309,654 cf

Plug-Flow detention time= 12,223.5 min calculated for 841.259 af (89% of Inflow)
Center-of-Mass det. time= 11,818.2 min ( 13,845.5 - 2,027.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 39,292,918 cf | Lake Magnor (Prismatic)Listed below (Recalc) |
| #2 | 1,190.00' | 24,221,898 cf | Barbo Lake (Prismatic)Listed below (Recalc) |
| #3 | 1,190.00' | 19,504,098 cf | Mud Lake (Prismatic)Listed below (Recalc) |
| | | 83,018,913 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 9,474,713 | 0 | 0 |
| 1,192.00 | 9,822,178 | 19,296,891 | 19,296,891 |
| 1,194.00 | 10,173,849 | 19,996,027 | 39,292,918 |

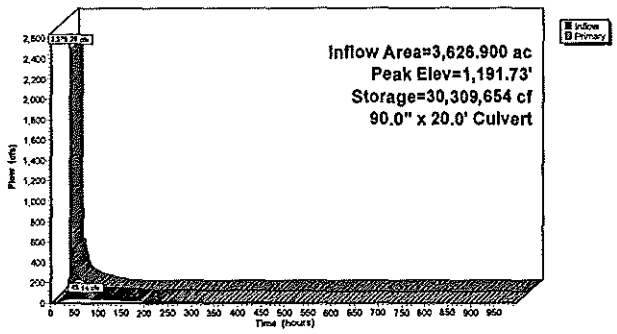
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,912,341 | 0 | 0 |
| 1,195.00 | 5,776,418 | 24,221,898 | 24,221,898 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,587,635 | 0 | 0 |
| 1,195.00 | 4,214,004 | 19,504,098 | 19,504,098 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,190.00' | 90.0" x 20.0' long Culvert X 2.00<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,189.70' S= 0.0150 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |

Primary OutFlow Max=45.14 cfs @ 74.34 hrs HW=1,191.73' (Free Discharge)
└1=Culvert (Barrel Controls 45.14 cfs @ 4.43 fps)

## Pond 1P:






## Pond 4P:

Inflow Area = 178.000 ac, Inflow Depth = 2.56" for 100-YR event
Inflow = 91.03 cfs @ 14.76 hrs, Volume= 37,934 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

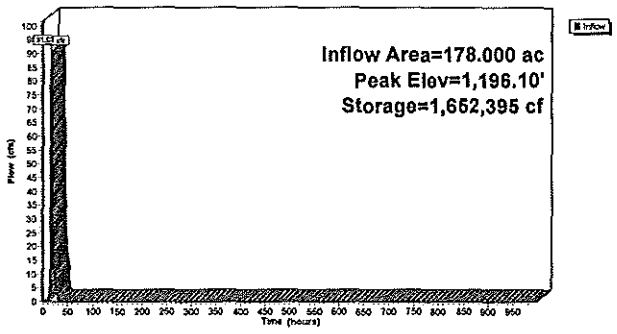
Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,196.10' @ 36.10 hrs Surf.Area= 1,283,147 sf Storage= 1,652,395 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,194.50' | 2,879,843 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,194.50 | 279,331 | 0 | 0 |
| 1,195.00 | 1,101,921 | 345,313 | 345,313 |
| 1,197.00 | 1,432,609 | 2,534,530 | 2,879,843 |

## Pond 4P:






## Pond 5P: Greley Lake

Inflow Area = 96.100 ac, Inflow Depth = 3.70" for 100-YR event
Inflow = 248.90 cfs @ 12.38 hrs, Volume= 29.646 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.88' @ 26.38 hrs Surf.Area= 704,690 sf Storage= 1,291,380 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,192.00' | 6,458,361 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

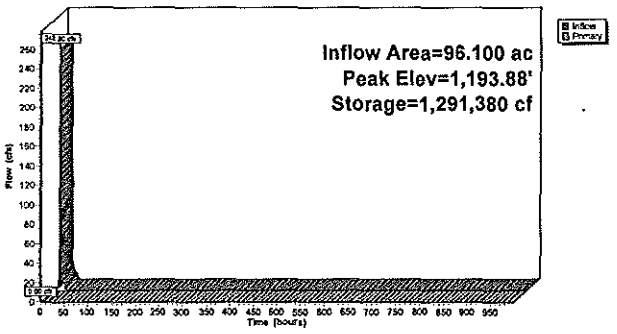
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,192.00 | 656,399 | 0 | 0 |
| 1,194.00 | 707,054 | 1,373,453 | 1,373,453 |
| 1,196.00 | 748,224 | 1,455,278 | 2,828,731 |
| 1,198.00 | 789,737 | 1,537,961 | 4,366,692 |
| 1,200.00 | 1,301,932 | 2,091,669 | 6,458,361 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,199.00' | 20.0' long x 20.0' breadth Broad-Crested Rectangular Weir<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,192.00' (Free Discharge)
└1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 5P: Greley Lake



## Pond 6P:

[61] Hint: Submerged 53% of Reach 10R bottom

Inflow Area = 2,086.500 ac, Inflow Depth = 2.98" for 100-YR event
Inflow = 313.22 cfs @ 12.60 hrs, Volume= 517.770 af
Outflow = 140.89 cfs @ 16.86 hrs, Volume= 517.770 af, Atten= 55%, Lag= 256.0 min
Primary = 140.89 cfs @ 16.86 hrs, Volume= 517.770 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,201.72' @ 16.86 hrs Surf.Area= 2,008,995 sf Storage= 2,125,533 cf

Plug-Flow detention time= 104.1 min calculated for 517.770 af (100% of inflow)
Center-of-Mass det. time= 104.1 min ( 2,523.8 - 2,419.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,200.00' | 5,388,561 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

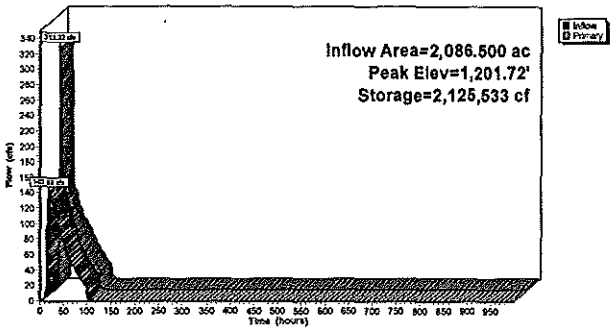
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,200.00 | 404,702 | 0 | 0 |
| 1,201.00 | 1,385,892 | 895,297 | 895,297 |
| 1,203.00 | 3,105,372 | 4,491,264 | 5,386,561 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,197.10' | **48.0" x 20.0' long Culvert X 2.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,197.00' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,202.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=140.89 cfs @ 16.86 hrs HW=1,201.72' (Free Discharge)
1=Culvert (Barrel Controls 140.89 cfs @ 6.09 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 6P:






## Pond 7P:

Inflow Area = 121.200 ac, Inflow Depth = 2.74" for 100-YR event
Inflow = 98.07 cfs @ 13.55 hrs, Volume= 27.658 af
Outflow = 54.97 cfs @ 14.68 hrs, Volume= 24.501 af, Atten= 44%, Lag= 67.9 min
Primary = 54.97 cfs @ 14.68 hrs, Volume= 24.501 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,260.91' @ 14.68 hrs Surf.Area= 195,715 sf Storage= 488,301 cf

Plug-Flow detention time= 758.4 min calculated for 24.501 af (89% of inflow)
Center-of-Mass det. time= 700.7 min ( 1,648.0 - 947.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,258.00' | 505,511 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

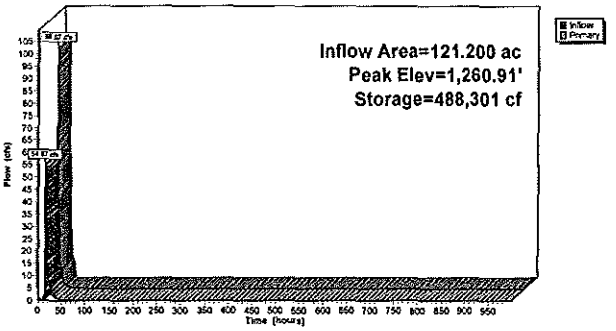
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,258.00 | 114,081 | 0 | 0 |
| 1,260.00 | 195,715 | 309,796 | 309,796 |
| 1,261.00 | 195,715 | 195,715 | 505,511 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,259.00' | **24.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,258.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=54.96 cfs @ 14.68 hrs HW=1,260.91' (Free Discharge)
1=Culvert (Barrel Controls 9.07 cfs @ 3.76 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 45.89 cfs @ 2.52 fps)



## Pond 7P:



## Pond 8P:

Inflow Area = 419.400 ac, Inflow Depth = 2.86" for 100-YR event
Inflow = 271.13 cfs @ 13.43 hrs, Volume= 100.035 af
Outflow = 157.91 cfs @ 15.34 hrs, Volume= 100.035 af, Atten= 42%, Lag= 114.4 min
Primary = 157.91 cfs @ 15.34 hrs, Volume= 100.035 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,258.93' @ 15.34 hrs Surf.Area= 780,876 sf Storage= 820,415 cf

Plug-Flow detention time= 47.2 min calculated for 100.033 af (100% of inflow)
Center-of-Mass det. time= 47.2 min ( 1,015.9 - 968.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,257.00' | 3,038,942 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

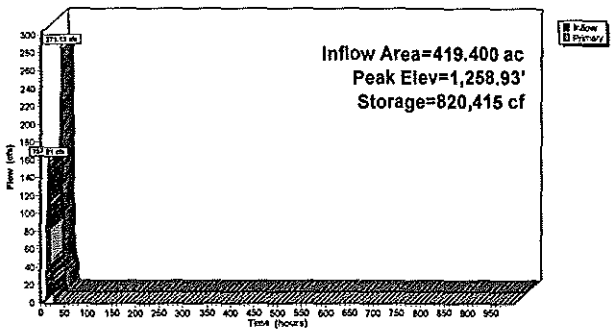
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,257.00 | 68,271 | 0 | 0 |
| 1,260.00 | 1,174,614 | 1,864,328 | 1,864,328 |
| 1,261.00 | 1,174,614 | 1,174,614 | 3,038,942 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,253.00' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,252.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=157.91 cfs @ 15.34 hrs HW=1,258.93' TW=1,255.00' (Fixed TW Elev= 1,255.00')
1=Culvert (Barrel Controls 157.91 cfs @ 7.02 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 8P:






## Pond 9P:

[63] Warning: Exceeded Reach 12R inflow depth by 2.54' @ 30.92 hrs

Inflow Area = 1,659.800 ac, Inflow Depth = 2.84" for 100-YR event
Inflow = 523.30 cfs @ 16.62 hrs, Volume= 393.048 af
Outflow = 94.33 cfs @ 26.80 hrs, Volume= 393.048 af, Atten= 82%, Lag= 610.4 min
Primary = 94.33 cfs @ 26.80 hrs, Volume= 393.048 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,211.96' @ 26.80 hrs Surf.Area= 3,872,838 sf Storage= 12,058,579 cf

Plug-Flow detention time= 1,583.8 min calculated for 393.040 af (100% of inflow)
Center-of-Mass det. time= 1,583.8 min ( 2,797.3 - 1,213.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,208.00' | 16,083,958 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

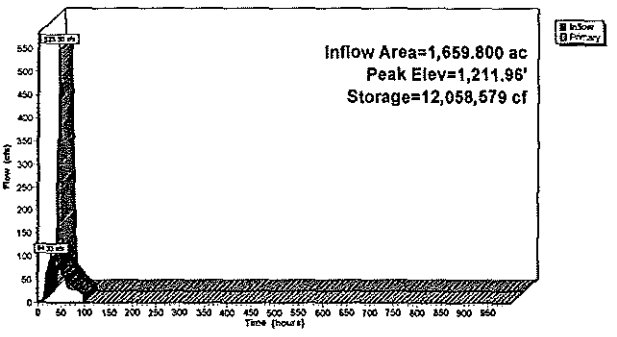
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,208.00 | 1,411,294 | 0 | 0 |
| 1,210.00 | 3,455,564 | 4,866,858 | 4,866,858 |
| 1,212.00 | 3,880,768 | 7,336,332 | 12,203,190 |
| 1,213.00 | 3,880,768 | 3,880,768 | 16,083,958 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,206.00' | **48.0" x 25.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,205.90' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,212.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=94.33 cfs @ 26.80 hrs HW=1,211.96' TW=1,207.00' (Fixed TW Elev= 1,207.00')
1=Culvert (Barrel Controls 94.33 cfs @ 7.51 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 9P:



## Pond 10P:

Inflow Area = 646.300 ac, Inflow Depth = 2.73" for 100-YR event
Inflow = 229.31 cfs @ 15.22 hrs, Volume= 147.062 af
Outflow = 215.70 cfs @ 16.16 hrs, Volume= 146.783 af, Atten= 6%, Lag= 56.3 min
Primary = 215.70 cfs @ 16.16 hrs, Volume= 146.783 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,229.83' @ 16.16 hrs Surf.Area= 125,349 sf Storage= 444,805 cf

Plug-Flow detention time= 72.4 min calculated for 146.783 af (100% of inflow)
Center-of-Mass det. time= 29.7 min ( 1,179.5 - 1,149.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,223.00' | 596,246 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

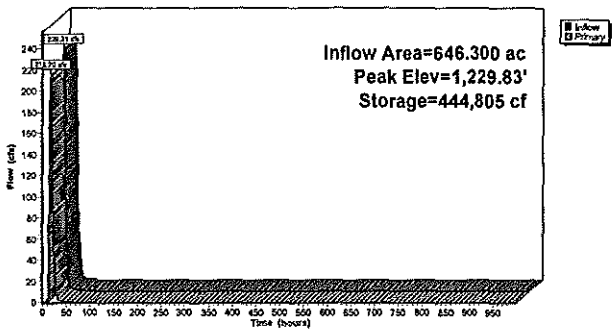
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,223.00 | 21,295 | 0 | 0 |
| 1,228.00 | 81,139 | 256,085 | 256,085 |
| 1,230.00 | 129,511 | 210,650 | 466,735 |
| 1,231.00 | 129,511 | 129,511 | 596,246 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,222.50' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,222.30' S= 0.0100 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,230.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=215.71 cfs @ 16.16 hrs HW=1,229.83' TW=1,223.50' (Fixed TW Elev= 1,223.50')**
**↑1=Culvert (Barrel Controls 215.71 cfs @ 7.95 fps)**
**└2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**



## Pond 10P:






## Pond 11P:

[61] Hint: Submerged 76% of Reach 13R bottom

Inflow Area = 1,407.500 ac, Inflow Depth = 2.78" for 100-YR event
Inflow = 643.02 cfs @ 14.24 hrs, Volume= 325.918 af
Outflow = 517.06 cfs @ 15.10 hrs, Volume= 317.332 af, Atten= 20%, Lag= 51.9 min
Primary = 517.06 cfs @ 15.10 hrs, Volume= 317.332 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,212.36' @ 15.10 hrs Surf.Area= 544,260 sf Storage= 2,010,905 cf

Plug-Flow detention time= 115.4 min calculated for 317.325 af (97% of inflow)
Center-of-Mass det. time= 55.3 min ( 1,164.5 - 1,109.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,207.00' | 2,933,772 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

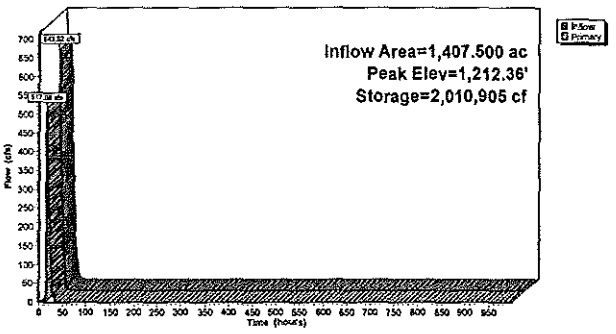
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,207.00 | 34,962 | 0 | 0 |
| 1,210.00 | 491,135 | 789,148 | 789,146 |
| 1,214.00 | 581,178 | 2,144,626 | 2,933,772 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,207.10' | **72.0" x 25.0' long Culvert X 4.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,207.00' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,214.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=517.05 cfs @ 15.10 hrs HW=1,212.36' TW=1,209.00' (Fixed TW Elev= 1,209.00')**
**↑1=Culvert (Barrel Controls 517.05 cfs @ 6.56 fps)**
**└2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**



## Pond 11P:



## Pond 17P: Marsh Lake

Inflow Area = 176.300 ac, Inflow Depth = 4.01" for 100-YR event
Inflow = 719.03 cfs @ 12.15 hrs, Volume= 58.909 af
Outflow = 27.02 cfs @ 15.54 hrs, Volume= 23.944 af, Atten= 96%, Lag= 203.6 min
Primary = 27.02 cfs @ 15.54 hrs, Volume= 23.944 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.63' @ 15.54 hrs Surf.Area= 556,361 sf Storage= 1,869,893 cf

Plug-Flow detention time= 554.5 min calculated for 23.943 af (41% of inflow)
Center-of-Mass det. time= 431.8 min ( 1,249.2 - 817.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 3,205,992 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

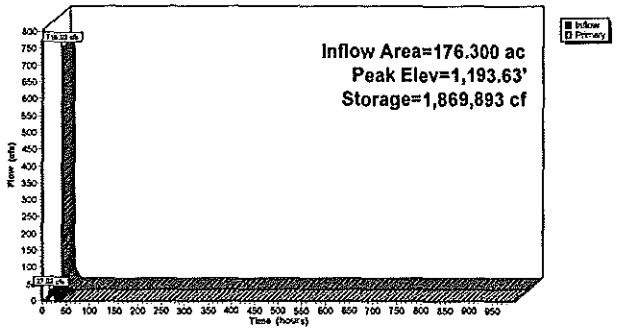
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 473,448 | 0 | 0 |
| 1,194.00 | 564,774 | 2,076,444 | 2,076,444 |
| 1,196.00 | 564,774 | 1,129,548 | 3,205,992 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,193.00' | 20.0' long x 20.0' breadth Broad-Crested Rectangular Weir<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=27.01 cfs @ 15.54 hrs HW=1,193.63' (Free Discharge)
└1=Broad-Crested Rectangular Weir (Weir Controls 27.01 cfs @ 2.14 fps)



## Pond 17P: Marsh Lake





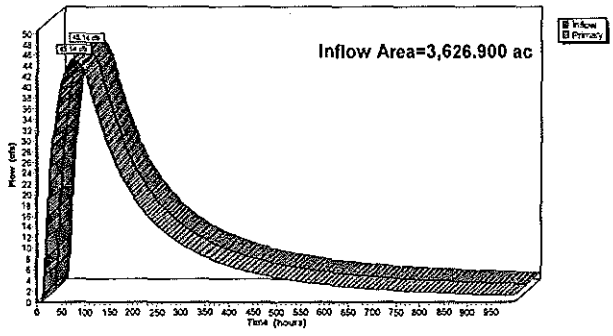

## Pond EXIT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,626.900 ac, Inflow Depth > 2.78" for 100-YR event
Inflow = 45.14 cfs @ 74.34 hrs, Volume= 841.259 af
Primary = 45.14 cfs @ 74.34 hrs, Volume= 841.259 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs

## Pond EXIT:

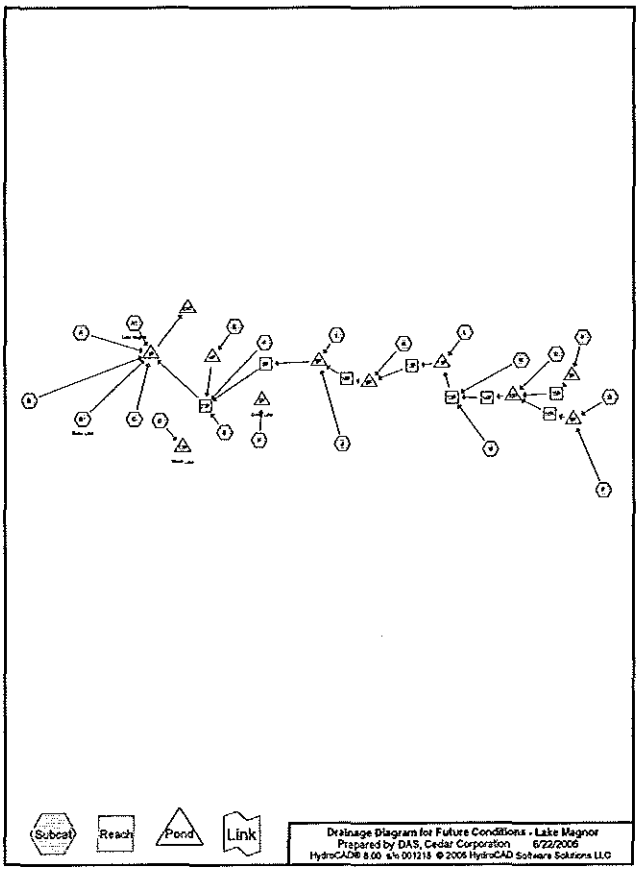


# APPENDIX B-2

## STORM WATER QUANTITY – HYDROCAD SHEETS

## FUTURE CONDITIONS

FUTURE COND.






## Area Listing (all nodes)

| Area (acres) | CN | Description (subcats) |
|---|---|---|
| 292.100 | 65 | (L,N) |
| 242.600 | 68 | (R) |
| 250.400 | 69 | (A) |
| 283.700 | 70 | (E,O) |
| 121.200 | 71 | (P) |
| 469.100 | 76 | (M) |
| 492.000 | 78 | (J,Q) |
| 675.500 | 79 | (B,G) |
| 252.300 | 80 | (K) |
| 96.100 | 81 | (H) |
| 162.500 | 82 | (C,I) |
| 124.900 | 83 | (F) |
| 176.300 | 84 | (D) |
| 43.100 | 99 | BARBO LAKE (B1) |
| 217.500 | 99 | LAKE MAGNOR (A1) |
| 3,899.300 | | |



Time span=0.00-999.00 hrs, dt=0.02 hrs, 49951 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment A:** Runoff Area=250.400 ac Runoff Depth=0.52"
Flow Length=3,259' Slope=0.0086 '/' Tc=120.9 min CN=69 Runoff=31.69 cfs 10.759 af

**Subcatchment A1: Lake Magnor** Runoff Area=217.500 ac Runoff Depth=2.58"
Flow Length=4,425' Tc=4.1 min CN=99 Runoff=884.34 cfs 46.807 af

**Subcatchment B:** Runoff Area=300.300 ac Runoff Depth=0.97"
Flow Length=3,727' Slope=0.0100 '/' Tc=93.9 min CN=79 Runoff=104.16 cfs 24.378 af

**Subcatchment B1: Barbo Lake** Runoff Area=43.100 ac Runoff Depth=2.58"
Flow Length=2,070' Tc=2.7 min CN=99 Runoff=161.94 cfs 9.275 af

**Subcatchment C:** Runoff Area=51.000 ac Runoff Depth=1.15"
Flow Length=1,186' Slope=0.0051 '/' Tc=47.8 min CN=82 Runoff=35.87 cfs 4.876 af

**Subcatchment D:** Runoff Area=176.300 ac Runoff Depth=1.27"
Flow Length=1,485' Slope=0.0280 '/' Tc=22.9 min CN=84 Runoff=228.76 cfs 18.706 af

**Subcatchment E:** Runoff Area=178.000 ac Runoff Depth=0.55"
Flow Length=4,714' Slope=0.0051 '/' Tc=205.3 min CN=70 Runoff=16.99 cfs 8.220 af

**Subcatchment F:** Runoff Area=124.900 ac Runoff Depth=1.21"
Flow Length=5,559' Slope=0.0022 '/' Tc=242.6 min CN=83 Runoff=26.73 cfs 12.585 af

**Subcatchment G:** Runoff Area=375.200 ac Runoff Depth=0.97"
Flow Length=8,622' Slope=0.0030 '/' Tc=341.5 min CN=79 Runoff=47.88 cfs 30.458 af

**Subcatchment H:** Runoff Area=96.100 ac Runoff Depth=1.09"
Flow Length=2,080' Slope=0.0180 '/' Tc=41.2 min CN=81 Runoff=70.68 cfs 8.709 af

**Subcatchment I:** Runoff Area=111.500 ac Runoff Depth=1.15"
Flow Length=2,381' Slope=0.0130 '/' Tc=52.3 min CN=82 Runoff=73.19 cfs 10.659 af

**Subcatchment J:** Runoff Area=315.200 ac Runoff Depth=0.92"
Flow Length=5,288' Slope=0.0053 '/' Tc=175.9 min CN=78 Runoff=63.73 cfs 24.177 af

**Subcatchment K:** Runoff Area=252.300 ac Runoff Depth=1.03"
Flow Length=4,154' Slope=0.0096 '/' Tc=101.3 min CN=80 Runoff=88.57 cfs 21.651 af

**Subcatchment L:** Runoff Area=158.400 ac Runoff Depth=0.38"
Flow Length=3,591' Slope=0.0200 '/' Tc=95.2 min CN=65 Runoff=15.12 cfs 4.962 af

**Subcatchment M:** Runoff Area=469.100 ac Runoff Depth=0.82"
Flow Length=6,454' Slope=0.0120 '/' Tc=145.5 min CN=76 Runoff=93.29 cfs 32.001 af



**Subcatchment N:** Runoff Area=133.700 ac Runoff Depth=0.38"
Flow Length=5,467' Slope=0.0172 '/' Tc=143.6 min CN=65 Runoff=9.77 cfs 4.188 af

**Subcatchment O:** Runoff Area=105.700 ac Runoff Depth=0.55"
Flow Length=3,627' Slope=0.0193 '/' Tc=85.6 min CN=70 Runoff=18.81 cfs 4.881 af

**Subcatchment P:** Runoff Area=121.200 ac Runoff Depth=0.59"
Flow Length=3,452' Slope=0.0075 '/' Tc=128.4 min CN=71 Runoff=17.49 cfs 6.002 af

**Subcatchment Q:** Runoff Area=176.800 ac Runoff Depth=0.92"
Flow Length=4,105' Slope=0.0100 '/' Tc=104.6 min CN=78 Runoff=52.91 cfs 13.561 af

**Subcatchment R:** Runoff Area=242.600 ac Runoff Depth=0.48"
Flow Length=5,862' Slope=0.0078 '/' Tc=208.5 min CN=68 Runoff=18.63 cfs 9.674 af

**Reach 8R:** Avg. Depth=0.74' Max Vel=0.49 fps Inflow=72.62 cfs 119.733 af
n=0.050 L=5,615.0' S=0.0004 '/' Capacity=622.17 cfs Outflow=56.22 cfs 119.731 af

**Reach 10R:** Avg. Depth=0.24' Max Vel=0.67 fps Inflow=33.00 cfs 84.897 af
n=0.050 L=2,510.0' S=0.0034 '/' Capacity=2,299.12 cfs Outflow=32.96 cfs 84.897 af

**Reach 12R:** Avg. Depth=0.67' Max Vel=0.63 fps Inflow=99.94 cfs 63.247 af
n=0.050 L=3,585.0' S=0.0008 '/' Capacity=1,117.13 cfs Outflow=86.92 cfs 63.246 af

**Reach 13R:** Avg. Depth=0.45' Max Vel=1.13 fps Inflow=104.86 cfs 66.871 af
n=0.050 L=1,570.0' S=0.0043 '/' Capacity=2,584.96 cfs Outflow=102.54 cfs 66.871 af

**Reach 14R:** Avg. Depth=0.30' Max Vel=0.86 fps Inflow=56.78 cfs 30.682 af
n=0.050 L=2,200.0' S=0.0043 '/' Capacity=2,567.45 cfs Outflow=52.77 cfs 30.682 af

**Reach 16R:** Avg. Depth=0.02' Max Vel=0.24 fps Inflow=1.08 cfs 2.845 af
n=0.050 L=1,122.0' S=0.0070 '/' Capacity=3,295.84 cfs Outflow=1.04 cfs 2.845 af

**Reach 16R:** Avg. Depth=0.34' Max Vel=0.79 fps Inflow=60.73 cfs 23.235 af
n=0.050 L=1,610.0' S=0.0030 '/' Capacity=2,166.87 cfs Outflow=54.29 cfs 23.235 af

**Reach 21R:** Avg. Depth=0.91' Max Vel=0.46 fps Inflow=92.54 cfs 162.774 af
n=0.070 L=1,342.0' S=0.0006 '/' Capacity=732.00 cfs Outflow=92.19 cfs 162.773 af

**Pond 1P:** Peak Elev=1,190.60' Storage=10,269,969 cf Inflow=1,071.87 cfs 258.868 af
90.0" x 20.0' Culvert Outflow=5.95 cfs 178.411 af

**Pond 4P:** Peak Elev=1,195.01' Storage=358,043 cf Inflow=16.99 cfs 8.220 af
Outflow=0.00 cfs 0.000 af

**Pond 5P: Greley Lake** Peak Elev=1,192.55' Storage=379,345 cf Inflow=70.68 cfs 8.709 af
Outflow=0.00 cfs 0.000 af

**Pond 6P:** Peak Elev=1,200.11' Storage=51,833 cf Inflow=81.74 cfs 119.733 af
Outflow=72.62 cfs 119.733 af

| | | |
|---|---|---|
| **Pond 7P:** | Peak Elev=1,259.60' Storage=235,568 cf | Inflow=17.49 cfs 6.002 af<br>Outflow=1.08 cfs 2.845 af |
| **Pond 8P:** | Peak Elev=1,257.03' Storage=2,148 cf | Inflow=60.75 cfs 23.235 af<br>Outflow=60.73 cfs 23.235 af |
| **Pond 9P:** | Peak Elev=1,208.88' Storage=1,641,990 cf | Inflow=95.53 cfs 84.897 af<br>Outflow=33.00 cfs 84.897 af |
| **Pond 10P:** | Peak Elev=1,225.67' Storage=99,691 cf | Inflow=62.43 cfs 30.961 af<br>Outflow=56.78 cfs 30.682 af |
| **Pond 11P:** | Peak Elev=1,209.47' Storage=548,405 cf | Inflow=110.61 cfs 71.833 af<br>Outflow=99.94 cfs 63.247 af |
| **Pond 17P: Marsh Lake** | Peak Elev=1,191.66' Storage=814,833 cf | Inflow=228.76 cfs 18.706 af<br>Outflow=0.00 cfs 0.000 af |
| **Pond EXIT:** | | Inflow=5.95 cfs 178.411 af<br>Primary=5.95 cfs 178.411 af |

**Total Runoff Area = 3,899.300 ac Runoff Volume = 306.629 af Average Runoff Depth = 0.94"**
**93.32% Pervious Area = 3,638.700 ac 6.68% Impervious Area = 260.600 ac**



## Subcatchment A:

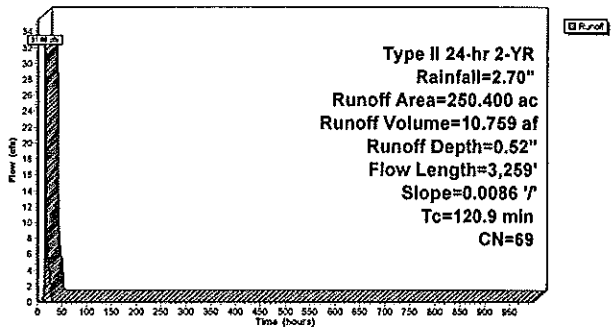
Runoff = 31.69 cfs @ 13.59 hrs, Volume= 10.759 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 250.400 | 69 | |
| 250.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 120.9 | 3,259 | 0.0086 | 0.45 | | Lag/CN Method, |

## Subcatchment A:






## Subcatchment A1: Lake Magnor

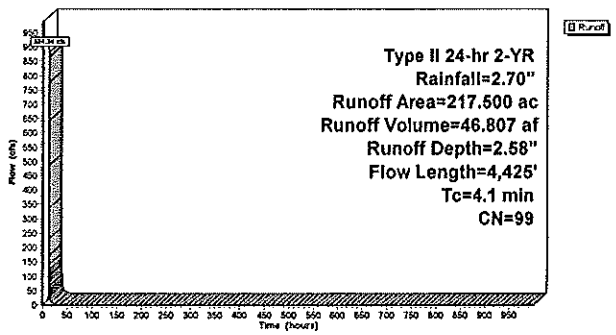
Runoff = 884.34 cfs @ 11.94 hrs, Volume= 46.807 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 217.500 | 99 | LAKE MAGNOR |
| 217.500 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.1 | 4,425 | | 17.94 | | Lake or Reservoir, Mean Depth= 10.00' |

## Subcatchment A1: Lake Magnor






## Subcatchment B:

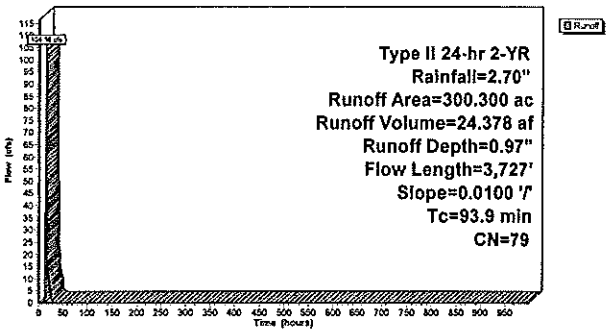
Runoff = 104.16 cfs @ 13.14 hrs, Volume= 24.378 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 300.300 | 79 | |
| 300.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 93.9 | 3,727 | 0.0100 | 0.66 | | Lag/CN Method, |

## Subcatchment B:



### Subcatchment B1: Barbo Lake

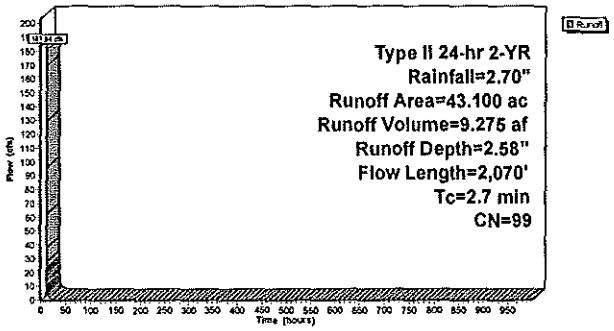
Runoff = 181.94 cfs @ 11.93 hrs, Volume= 9.275 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 43.100 | 99 | BARBO LAKE |
| 43.100 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.7 | 2,070 | | 12.69 | | Lake or Reservoir, Mean Depth= 5.00' |

### Subcatchment B1: Barbo Lake






### Subcatchment C:

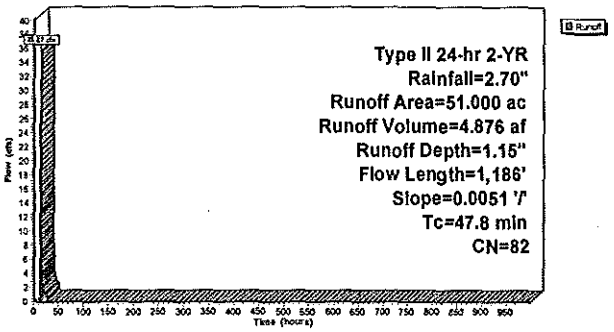
Runoff = 35.87 cfs @ 12.48 hrs, Volume= 4.876 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 51.000 | 82 | |
| 51.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.8 | 1,186 | 0.0051 | 0.41 | | Lag/CN Method, |

### Subcatchment C:






### Subcatchment D:

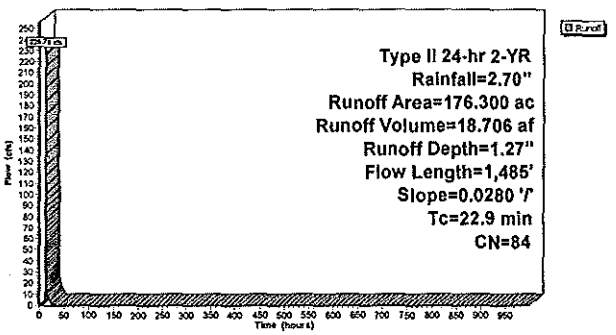
Runoff = 228.76 cfs @ 12.16 hrs, Volume= 18.706 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 176.300 | 84 | |
| 176.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 22.9 | 1,485 | 0.0280 | 1.08 | | Lag/CN Method, |

### Subcatchment D:






### Subcatchment E:

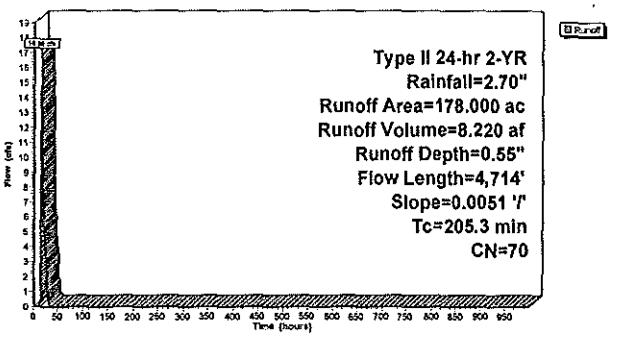
Runoff = 16.99 cfs @ 14.84 hrs, Volume= 8.220 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 178.000 | 70 | |
| 178.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 205.3 | 4,714 | 0.0051 | 0.38 | | Lag/CN Method, |

### Subcatchment E:



### Subcatchment F:

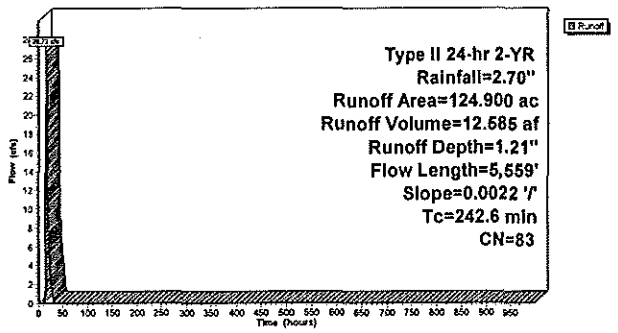
Runoff = 26.73 cfs @ 15.11 hrs, Volume= 12.585 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 124.900 | 83 | |
| 124.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 242.6 | 5,559 | 0.0022 | 0.38 | | Lag/CN Method, |

### Subcatchment F:






### Subcatchment G:

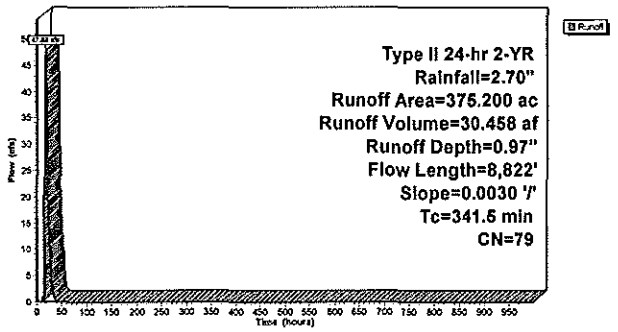
Runoff = 47.88 cfs @ 16.33 hrs, Volume= 30.458 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 375.200 | 79 | |
| 375.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 341.5 | 8,822 | 0.0030 | 0.43 | | Lag/CN Method, |

### Subcatchment G:






### Subcatchment H:

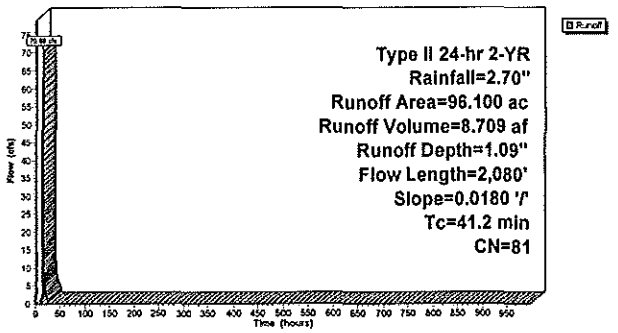
Runoff = 70.68 cfs @ 12.40 hrs, Volume= 8.709 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 96.100 | 81 | |
| 96.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 41.2 | 2,080 | 0.0180 | 0.84 | | Lag/CN Method, |

### Subcatchment H:






### Subcatchment I:

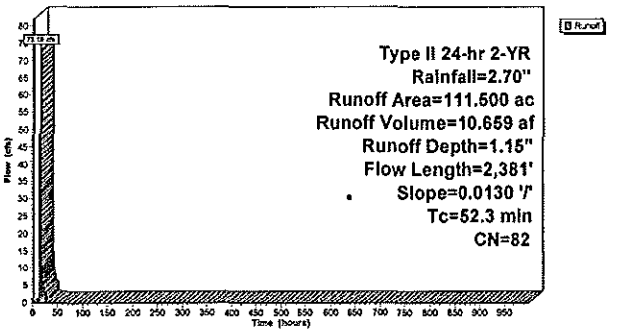
Runoff = 73.19 cfs @ 12.54 hrs, Volume= 10.659 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 111.500 | 82 | |
| 111.500 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 52.3 | 2,381 | 0.0130 | 0.76 | | Lag/CN Method, |

### Subcatchment I:



### Subcatchment J:

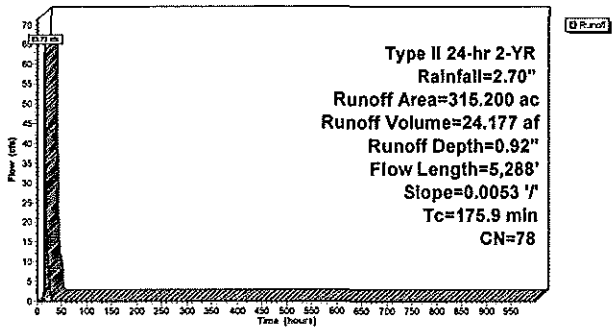
Runoff = 63.73 cfs @ 14.27 hrs, Volume= 24.177 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 315.200 | 78 | |
| 315.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 175.9 | 5,288 | 0.0053 | 0.50 | | Lag/CN Method, |

### Subcatchment J:






### Subcatchment K:

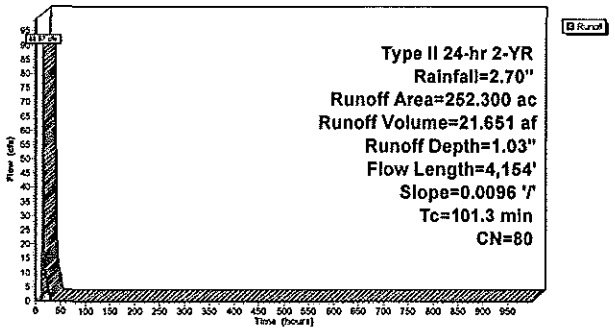
Runoff = 88.57 cfs @ 13.18 hrs, Volume= 21.651 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 252.300 | 80 | |
| 252.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 101.3 | 4,154 | 0.0096 | 0.68 | | Lag/CN Method, |

### Subcatchment K:






### Subcatchment L:

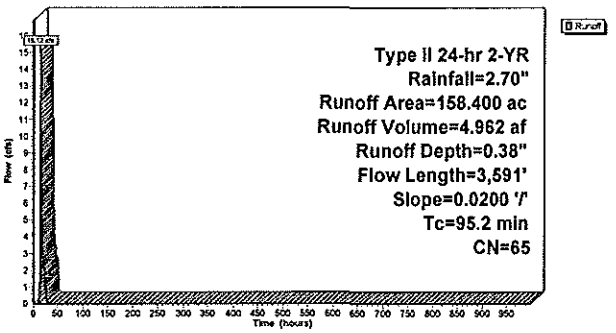
Runoff = 15.12 cfs @ 13.33 hrs, Volume= 4.962 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 158.400 | 65 | |
| 158.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 95.2 | 3,591 | 0.0200 | 0.63 | | Lag/CN Method, |

### Subcatchment L:






### Subcatchment M:

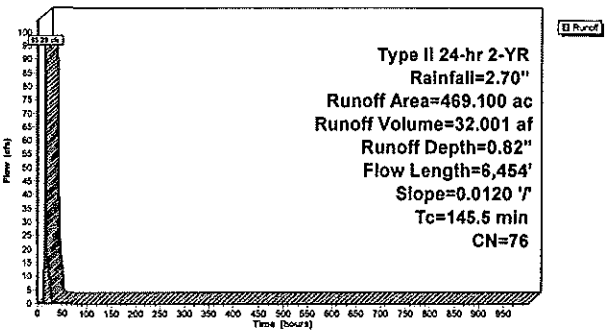
Runoff = 93.29 cfs @ 13.76 hrs, Volume= 32.001 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 469.100 | 76 | |
| 469.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 145.5 | 6,454 | 0.0120 | 0.74 | | Lag/CN Method, |

### Subcatchment M:



### Subcatchment N:

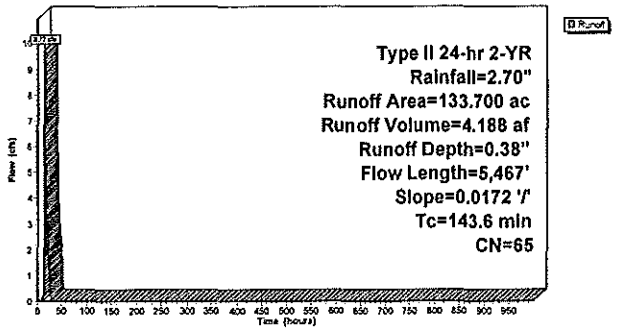
Runoff = 9.77 cfs @ 14.18 hrs, Volume= 4.188 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 133.700 | 65 | |
| 133.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 143.6 | 5,467 | 0.0172 | 0.63 | | Lag/CN Method, |

### Subcatchment N:






### Subcatchment O:

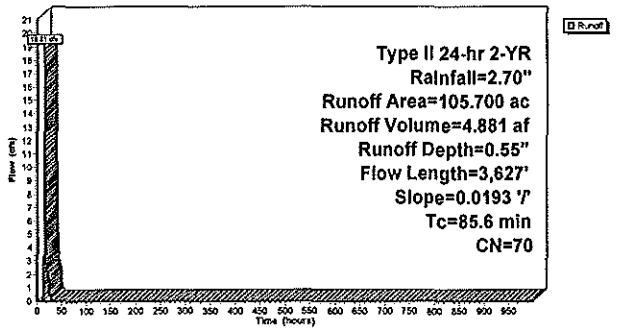
Runoff = 18.81 cfs @ 13.05 hrs, Volume= 4.881 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 105.700 | 70 | |
| 105.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 85.6 | 3,627 | 0.0193 | 0.71 | | Lag/CN Method, |

### Subcatchment O:






### Subcatchment P:

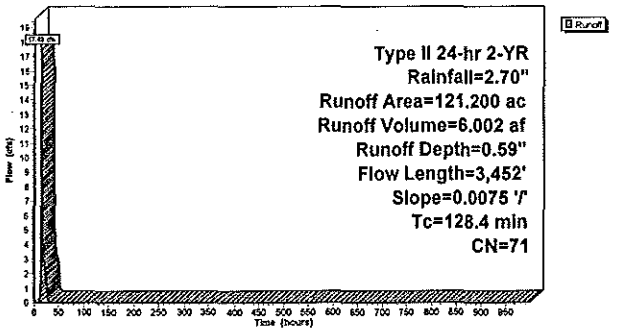
Runoff = 17.49 cfs @ 13.69 hrs, Volume= 6.002 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 121.200 | 71 | |
| 121.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 128.4 | 3,452 | 0.0075 | 0.45 | | Lag/CN Method, |

### Subcatchment P:






### Subcatchment Q:

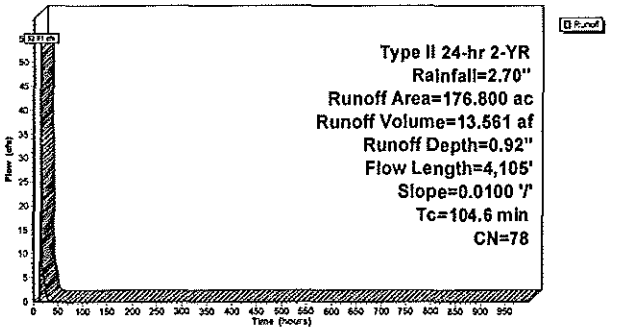
Runoff = 52.91 cfs @ 13.35 hrs, Volume= 13.561 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 176.800 | 78 | |
| 176.800 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 104.6 | 4,105 | 0.0100 | 0.65 | | Lag/CN Method, |

### Subcatchment Q:



## Subcatchment R:

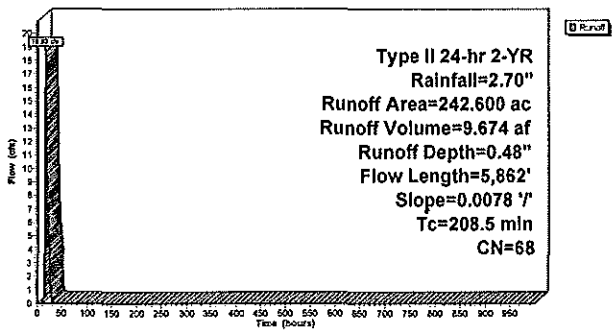
Runoff = 18.63 cfs @ 15.05 hrs, Volume= 9.674 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-YR Rainfall=2.70"

| Area (ac) | CN | Description |
|---|---|---|
| 242.600 | 68 | |
| 242.600 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 208.5 | 5,862 | 0.0078 | 0.47 | | Lag/CN Method, |

## Subcatchment R:






## Reach 8R:

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 0.54'

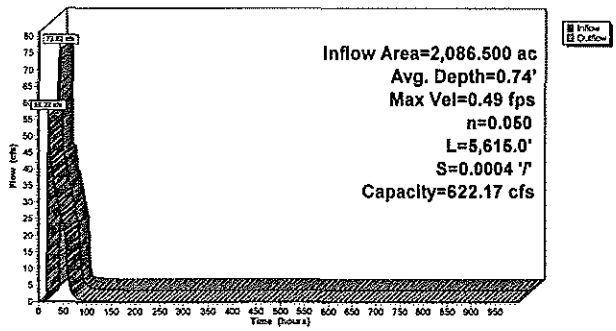
Inflow Area = 2,086.500 ac, Inflow Depth = 0.69" for 2-YR event
Inflow = 72.62 cfs @ 15.18 hrs, Volume= 119.733 af
Outflow = 58.22 cfs @ 19.76 hrs, Volume= 119.731 af, Atten= 23%, Lag= 275.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.49 fps, Min. Travel Time= 192.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 1,235.5 min

Peak Storage= 650,006 cf @ 16.55 hrs, Average Depth at Peak Storage= 0.74'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 622.17 cfs

150.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 210.00'
Length= 5,615.0' Slope= 0.0004 '/'
Inlet Invert= 1,196.90', Outlet Invert= 1,194.50'

## Reach 8R:






## Reach 10R:

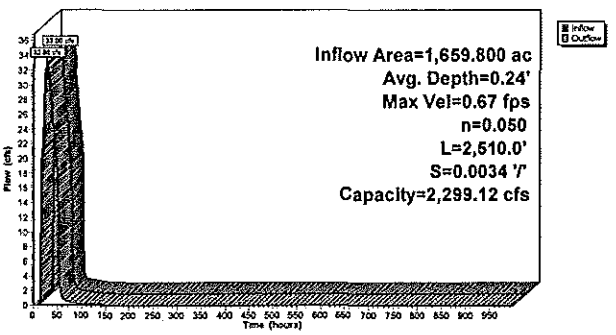
Inflow Area = 1,659.800 ac, Inflow Depth = 0.61" for 2-YR event
Inflow = 33.00 cfs @ 26.38 hrs, Volume= 84.897 af
Outflow = 32.96 cfs @ 28.12 hrs, Volume= 84.897 af, Atten= 0%, Lag= 106.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.67 fps, Min. Travel Time= 62.3 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 225.7 min

Peak Storage= 123,208 cf @ 27.09 hrs, Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,299.12 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,510.0' Slope= 0.0034 '/'
Inlet Invert= 1,205.80', Outlet Invert= 1,197.20'

## Reach 10R:






## Reach 12R:

[81] Warning: Exceeded Pond 11P by 2.00' @ 0.00 hrs

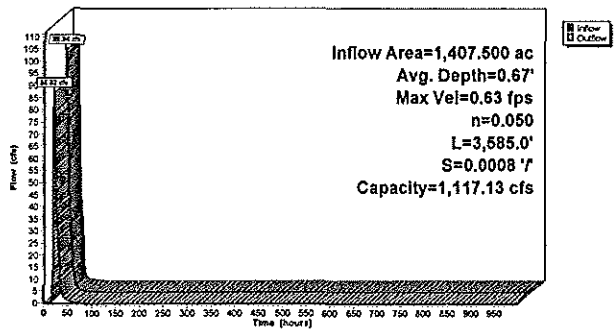
Inflow Area = 1,407.500 ac, Inflow Depth = 0.54" for 2-YR event
Inflow = 99.94 cfs @ 16.63 hrs, Volume= 63.247 af
Outflow = 86.92 cfs @ 19.55 hrs, Volume= 63.246 af, Atten= 13%, Lag= 175.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.63 fps, Min. Travel Time= 94.6 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 669.3 min

Peak Storage= 493,627 cf @ 17.97 hrs, Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,117.13 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 3,585.0' Slope= 0.0008 '/'
Inlet Invert= 1,209.00', Outlet Invert= 1,206.10'

## Reach 12R:



## Reach 13R:

[61] Hint: Submerged 4% of Reach 14R bottom

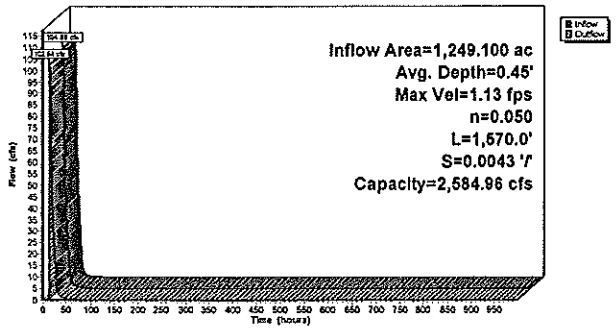
Inflow Area = 1,249.100 ac, Inflow Depth = 0.64" for 2-YR event
Inflow = 104.86 cfs @ 14.05 hrs, Volume= 66.871 af
Outflow = 102.54 cfs @ 14.69 hrs, Volume= 66.871 af, Atten= 2%, Lag= 38.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.13 fps, Min. Travel Time= 23.3 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 131.4 min

Peak Storage= 143,084 cf @ 14.30 hrs, Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,584.96 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,570.0' Slope= 0.0043 '/'
Inlet Invert= 1,214.00', Outlet Invert= 1,207.20'

## Reach 13R:






## Reach 14R:

[81] Warning: Exceeded Pond 10P by 0.50' @ 0.00 hrs

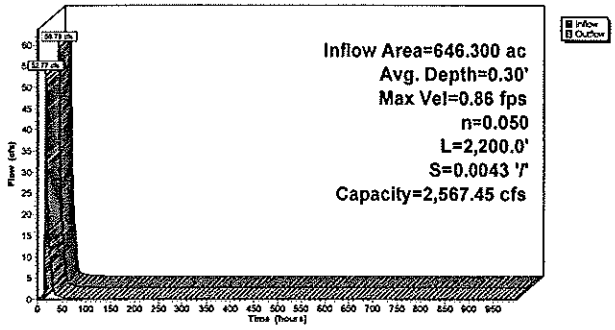
Inflow Area = 646.300 ac, Inflow Depth = 0.57" for 2-YR event
Inflow = 56.78 cfs @ 14.89 hrs, Volume= 30.682 af
Outflow = 52.77 cfs @ 16.19 hrs, Volume= 30.682 af, Atten= 7%, Lag= 78.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 42.4 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 189.1 min

Peak Storage= 134,384 cf @ 15.48 hrs, Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,567.45 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,200.0' Slope= 0.0043 '/'
Inlet Invert= 1,223.50', Outlet Invert= 1,214.10'

## Reach 14R:





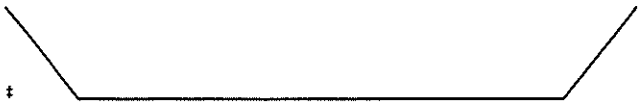

## Reach 15R:

Inflow Area = 121.200 ac, Inflow Depth > 0.28" for 2-YR event
Inflow = 1.08 cfs @ 25.73 hrs, Volume= 2.845 af
Outflow = 1.04 cfs @ 28.21 hrs, Volume= 2.845 af, Atten= 4%, Lag= 148.4 min

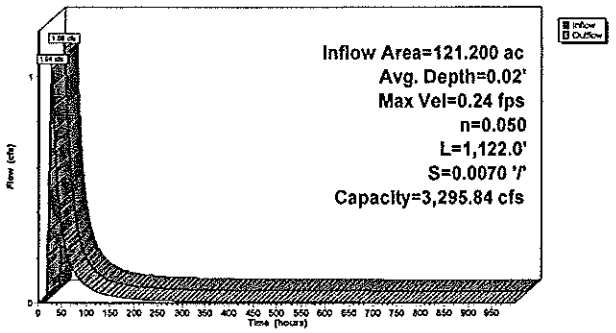
Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.24 fps, Min. Travel Time= 77.7 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 77.7 min

Peak Storage= 4,834 cf @ 26.91 hrs, Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 3,295.84 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,122.0' Slope= 0.0070 '/'
Inlet Invert= 1,258.00', Outlet Invert= 1,250.10'



## Reach 15R:






## Reach 16R:

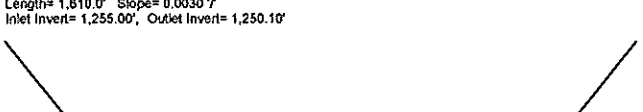
[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 2.34'

Inflow Area = 419.400 ac, Inflow Depth = 0.66" for 2-YR event
Inflow = 60.73 cfs @ 13.40 hrs, Volume= 23.235 af
Outflow = 54.29 cfs @ 14.45 hrs, Volume= 23.235 af, Atten= 11%, Lag= 63.4 min

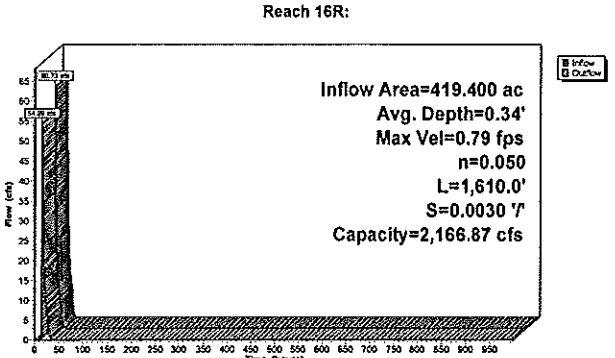
Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 34.0 min
Avg. Velocity = 0.26 fps, Avg. Travel Time= 104.8 min

Peak Storage= 110,877 cf @ 13.89 hrs, Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,166.87 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,610.0' Slope= 0.0030 '/'
Inlet Invert= 1,255.00', Outlet Invert= 1,250.10'



## Reach 16R:



## Reach 21R:

[61] Hint: Submerged 59% of Reach 8R bottom

Inflow Area = 2,764.600 ac, Inflow Depth = 0.71" for 2-YR event
Inflow = 92.54 cfs @ 19.22 hrs, Volume= 162.774 af
Outflow = 92.19 cfs @ 20.49 hrs, Volume= 162.773 af, Atten= 0%, Lag= 76.6 min

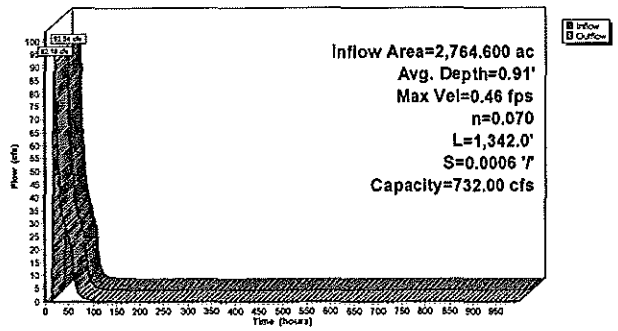
Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.46 fps, Min. Travel Time= 48.4 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 344.0 min

Peak Storage= 267,530 cf @ 19.69 hrs, Average Depth at Peak Storage= 0.91'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 732.00 cfs

200.00' x 3.00' deep channel, n= 0.070 Sluggish weedy reaches w/pools
Side Slope Z-value= 20.0 '/' Top Width= 320.00'
Length= 1,342.0' Slope= 0.0006 '/'
Inlet Invert= 1,195.00', Outlet Invert= 1,194.20'

‡

## Reach 21R:






## Pond 1P:

Inflow Area = 3,626.900 ac, Inflow Depth = 0.86" for 2-YR event
Inflow = 1,071.87 cfs @ 11.94 hrs, Volume= 258.868 af
Outflow = 5.95 cfs @ 63.99 hrs, Volume= 178.411 af, Atten= 99%, Lag= 3,122.9 min
Primary = 5.95 cfs @ 63.99 hrs, Volume= 178.411 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,190.60' @ 63.99 hrs Surf.Area= 17,378,399 sf Storage= 10,269,969 cf

Plug-Flow detention time= 19,150.2 min calculated for 178.411 af (69% of inflow)
Center-of-Mass det. time= 18,576.8 min ( 20,203.2 - 1,626.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 39,292,918 cf | **Lake Magnor (Prismatic)**Listed below (Recalc) |
| #2 | 1,190.00' | 24,221,898 cf | **Barbo Lake (Prismatic)**Listed below (Recalc) |
| #3 | 1,190.00' | 19,504,098 cf | **Mud Lake (Prismatic)**Listed below (Recalc) |
| | | 83,018,913 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 9,474,713 | 0 | 0 |
| 1,192.00 | 9,822,178 | 19,296,891 | 19,296,891 |
| 1,194.00 | 10,173,849 | 19,996,027 | 39,292,918 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,912,341 | 0 | 0 |
| 1,195.00 | 5,776,418 | 24,221,898 | 24,221,898 |

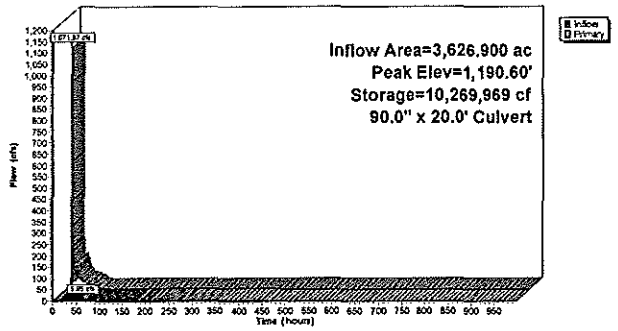
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,587,635 | 0 | 0 |
| 1,195.00 | 4,214,004 | 19,504,098 | 19,504,098 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,190.00' | **90.0" x 20.0' long Culvert X 2.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,189.70' S= 0.0150 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |

Primary OutFlow Max=5.94 cfs @ 63.99 hrs HW=1,190.60' (Free Discharge)
↑—1=Culvert (Barrel Controls 5.94 cfs @ 2.76 fps)



## Pond 1P:






## Pond 4P:

Inflow Area = 178.000 ac, Inflow Depth = 0.55" for 2-YR event
Inflow = 16.99 cfs @ 14.84 hrs, Volume= 8.220 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

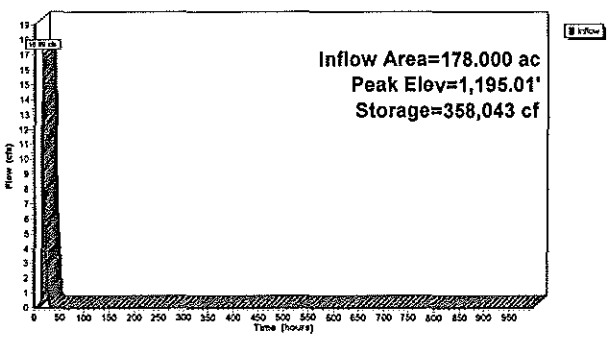
Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,195.01' @ 35.60 hrs Surf.Area= 1,103,829 sf Storage= 358,043 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,194.50' | 2,879,843 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,194.50 | 279,331 | 0 | 0 |
| 1,195.00 | 1,101,921 | 345,313 | 345,313 |
| 1,197.00 | 1,432,609 | 2,534,530 | 2,879,843 |

## Pond 4P:



## Pond 5P: Greley Lake

Inflow Area = 96.100 ac, Inflow Depth = 1.09" for 2-YR event
Inflow = 70.68 cfs @ 12.40 hrs, Volume= 8.709 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,192.56' @ 26.38 hrs Surf.Area= 677,872 sf Storage= 379,345 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,192.00' | 6,458,361 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

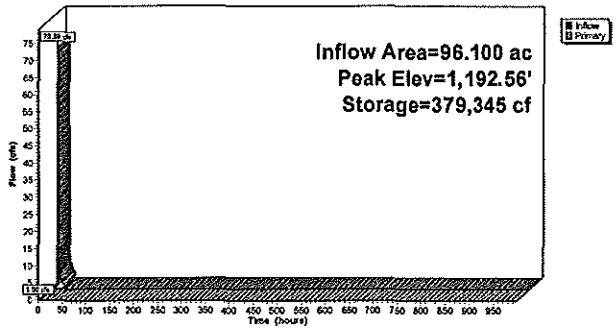
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,192.00 | 666,399 | 0 | 0 |
| 1,194.00 | 707,054 | 1,373,453 | 1,373,453 |
| 1,196.00 | 748,224 | 1,455,278 | 2,828,731 |
| 1,198.00 | 789,737 | 1,537,961 | 4,366,692 |
| 1,200.00 | 1,301,932 | 2,091,669 | 6,458,361 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,199.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,192.00' (Free Discharge)
└1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 5P: Greley Lake






## Pond 6P:

[61] Hint: Submerged 34% of Reach 10R bottom

Inflow Area = 2,086.500 ac, Inflow Depth = 0.69" for 2-YR event
Inflow = 81.74 cfs @ 12.60 hrs, Volume= 119.733 af
Outflow = 72.62 cfs @ 15.18 hrs, Volume= 119.733 af, Atten= 11%, Lag= 154.5 min
Primary = 72.62 cfs @ 15.18 hrs, Volume= 119.733 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,200.11' @ 15.18 hrs Surf.Area= 515,268 sf Storage= 51,833 cf

Plug-Flow detention time= 3.9 min calculated for 119.731 af (100% of inflow)
Center-of-Mass det. time= 3.9 min ( 1,814.3 - 1,810.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,200.00' | 5,386,561 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

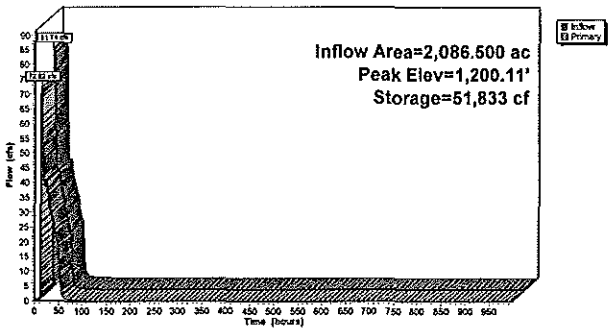
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,200.00 | 404,702 | 0 | 0 |
| 1,201.00 | 1,385,892 | 895,297 | 895,297 |
| 1,203.00 | 3,105,372 | 4,491,264 | 5,386,561 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,197.10' | **48.0" x 20.0' long Culvert X 2.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,197.00' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,202.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=72.62 cfs @ 15.18 hrs HW=1,200.11' (Free Discharge)
├1=Culvert (Barrel Controls 72.62 cfs @ 4.96 fps)
└2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 6P:



## Pond 7P:

Inflow Area = 121.200 ac, Inflow Depth = 0.59" for 2-YR event
Inflow = 17.49 cfs @ 13.69 hrs, Volume= 6.002 af
Outflow = 1.08 cfs @ 25.73 hrs, Volume= 2.845 af, Atten= 94%, Lag= 722.4 min
Primary = 1.08 cfs @ 25.73 hrs, Volume= 2.845 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,259.60' @ 25.73 hrs Surf.Area= 179,568 sf Storage= 235,568 cf

Plug-Flow detention time= 4,145.3 min calculated for 2.845 af (47% of inflow)
Center-of-Mass det. time= 3,979.4 min ( 4,975.1 - 995.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,258.00' | 505,511 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

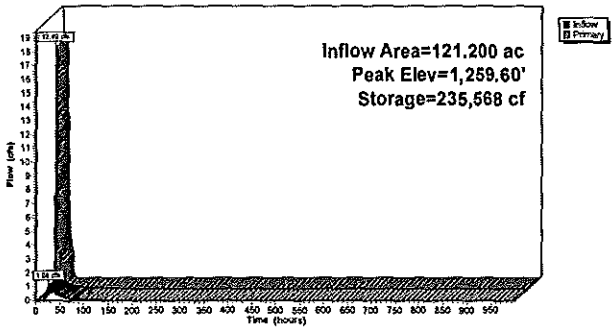
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,258.00 | 114,081 | 0 | 0 |
| 1,260.00 | 195,715 | 309,796 | 309,796 |
| 1,261.00 | 195,715 | 195,715 | 505,511 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,259.00' | **24.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,258.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=1.07 cfs @ 25.73 hrs HW=1,259.60' (Free Discharge)**
**1=Culvert (Barrel Controls 1.07 cfs @ 2.01 fps)**
**2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**



## Pond 7P:






## Pond 8P:

Inflow Area = 419.400 ac, Inflow Depth = 0.66" for 2-YR event
Inflow = 60.75 cfs @ 13.38 hrs, Volume= 23.235 af
Outflow = 60.73 cfs @ 13.40 hrs, Volume= 23.235 af, Atten= 0%, Lag= 0.8 min
Primary = 60.73 cfs @ 13.40 hrs, Volume= 23.235 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,257.03' @ 13.40 hrs Surf.Area= 79,025 sf Storage= 2,148 cf

Plug-Flow detention time= 0.6 min calculated for 23.235 af (100% of inflow)
Center-of-Mass det. time= 0.6 min ( 1,004.6 - 1,004.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,257.00' | 3,038,942 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

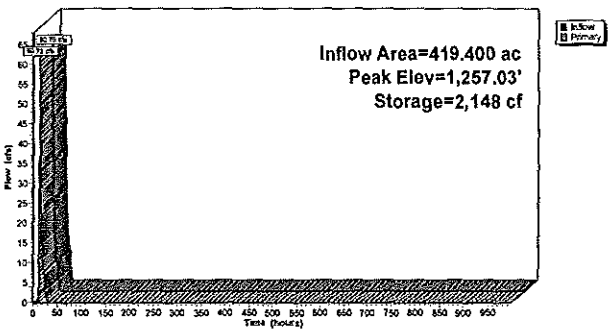
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,257.00 | 68,271 | 0 | 0 |
| 1,260.00 | 1,174,614 | 1,864,328 | 1,864,328 |
| 1,261.00 | 1,174,614 | 1,174,614 | 3,038,942 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,253.00' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,252.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=82.91 cfs @ 13.40 hrs HW=1,257.03' TW=1,255.00' (Fixed TW Elev= 1,255.00')**
**1=Culvert (Barrel Controls 82.91 cfs @ 5.81 fps)**
**2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**



## Pond 8P:



## Pond 9P:

[81] Hint: Submerged 96% of Reach 12R bottom

Inflow Area = 1,659.800 ac, Inflow Depth = 0.61" for 2-YR event
Inflow = 95.53 cfs @ 19.48 hrs, Volume= 84.897 af
Outflow = 33.00 cfs @ 26.36 hrs, Volume= 84.897 af, Atten= 65%, Lag= 412.9 min
Primary = 33.00 cfs @ 26.36 hrs, Volume= 84.897 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,208.88' @ 26.36 hrs Surf.Area= 2,312,665 sf Storage= 1,641,990 cf

Plug-Flow detention time= 558.4 min calculated for 84.897 af (100% of inflow)
Center-of-Mass det. time= 558.3 min ( 2,016.6 - 1,458.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,208.00' | 16,083,958 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

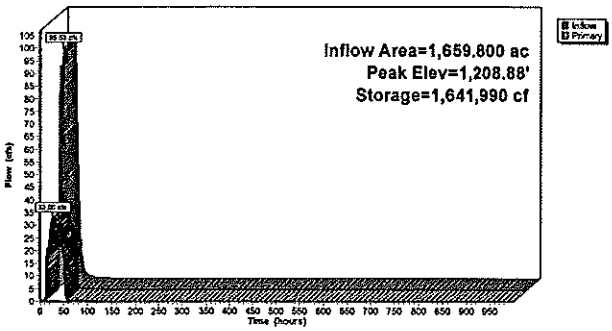
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,208.00 | 1,411,294 | 0 | 0 |
| 1,210.00 | 3,455,564 | 4,866,858 | 4,866,858 |
| 1,212.00 | 3,880,768 | 7,336,332 | 12,203,190 |
| 1,213.00 | 3,880,768 | 3,880,768 | 16,083,958 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,205.00' | **48.0" x 25.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,205.90' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,212.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=33.00 cfs @ 26.36 hrs HW=1,208.88' TW=1,207.00' (Fixed TW Elev= 1,207.00')
1=Culvert (Barrel Controls 33.00 cfs @ 4.78 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 9P:






## Pond 10P:

Inflow Area = 646.300 ac, Inflow Depth = 0.57" for 2-YR event
Inflow = 62.43 cfs @ 14.38 hrs, Volume= 30.961 af
Outflow = 56.78 cfs @ 14.89 hrs, Volume= 30.682 af, Atten= 9%, Lag= 30.2 min
Primary = 56.78 cfs @ 14.89 hrs, Volume= 30.682 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,225.67' @ 14.89 hrs Surf.Area= 53,290 sf Storage= 99,691 cf

Plug-Flow detention time= 223.3 min calculated for 30.681 af (99% of inflow)
Center-of-Mass det. time= 27.9 min ( 1,468.6 - 1,440.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,223.00' | 596,246 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

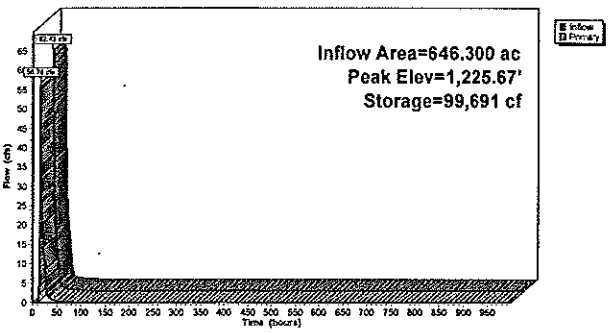
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,223.00 | 21,295 | 0 | 0 |
| 1,228.00 | 81,139 | 256,085 | 256,085 |
| 1,230.00 | 129,511 | 210,650 | 466,735 |
| 1,231.00 | 129,511 | 129,511 | 596,246 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,222.50' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,222.30' S= 0.0100 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,230.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=56.78 cfs @ 14.89 hrs HW=1,225.67' TW=1,223.50' (Fixed TW Elev= 1,223.50')
1=Culvert (Barrel Controls 56.78 cfs @ 5.44 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 10P:



## Pond 11P:

[61] Hint: Submerged 33% of Reach 13R bottom

Inflow Area = 1,407.500 ac, Inflow Depth = 0.61" for 2-YR event
Inflow = 110.61 cfs @ 14.64 hrs, Volume= 71.833 af
Outflow = 99.94 cfs @ 16.63 hrs, Volume= 63.247 af, Atten= 10%, Lag= 119.2 min
Primary = 99.94 cfs @ 16.63 hrs, Volume= 63.247 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,209.47' @ 16.63 hrs Surf.Area= 409,879 sf Storage= 548,405 cf

Plug-Flow detention time= 314.4 min calculated for 63.245 af (88% of inflow)
Center-of-Mass det. time= 85.6 min ( 1,387.2 - 1,301.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,207.00' | 2,933,772 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

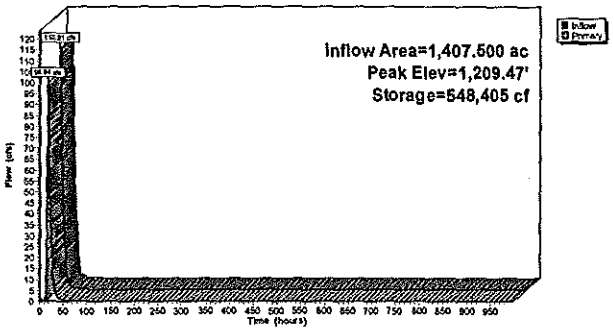
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,207.00 | 34,962 | 0 | 0 |
| 1,210.00 | 491,135 | 789,146 | 789,146 |
| 1,214.00 | 581,178 | 2,144,626 | 2,933,772 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,207.10' | **72.0" x 25.0' long Culvert X 4.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,207.00' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,214.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=99.93 cfs @ 16.63 hrs HW=1,209.47' TW=1,209.00' (Fixed TW Elev= 1,209.00')
↑1=Culvert (Outlet Controls 99.93 cfs @ 3.57 fps)
└2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 11P:






## Pond 17P: Marsh Lake

Inflow Area = 176.300 ac, Inflow Depth = 1.27" for 2-YR event
Inflow = 228.76 cfs @ 12.16 hrs, Volume= 18.706 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,191.66' @ 25.32 hrs Surf.Area= 511,235 sf Storage= 814,833 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 3,205,992 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

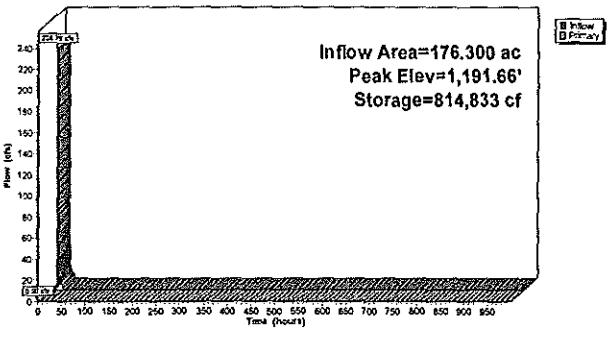
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 473,448 | 0 | 0 |
| 1,194.00 | 564,774 | 2,076,444 | 2,076,444 |
| 1,196.00 | 564,774 | 1,129,548 | 3,205,992 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,193.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,190.00' (Free Discharge)
↑1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 17P: Marsh Lake



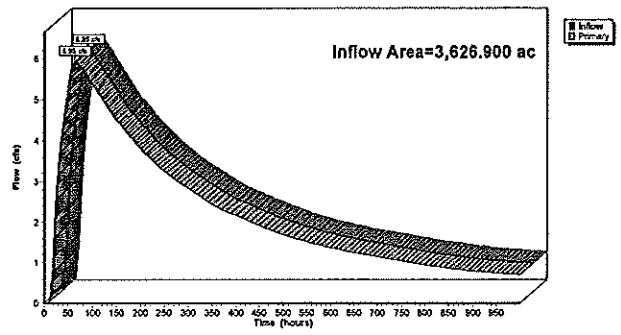
## Pond EXIT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,626.900 ac, Inflow Depth > 0.59" for 2-YR event
Inflow = 5.95 cfs @ 63.99 hrs, Volume= 178.411 af
Primary = 5.95 cfs @ 63.99 hrs, Volume= 178.411 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs

## Pond EXIT:






Time span=0.00-999.00 hrs, dt=0.02 hrs, 49951 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment A:** Runoff Area=250.400 ac Runoff Depth=1.33"
Flow Length=3,259' Slope=0.0086 '/' Tc=120.9 min CN=69 Runoff=96.52 cfs 27.796 af

**Subcatchment A1: Lake Magnor** Runoff Area=217.500 ac Runoff Depth=3.98"
Flow Length=4,425' Tc=4.1 min CN=99 Runoff=1,346.10 cfs 72.160 af

**Subcatchment B:** Runoff Area=300.300 ac Runoff Depth=2.04"
Flow Length=3,727' Slope=0.0100 '/' Tc=93.9 min CN=79 Runoff=231.37 cfs 51.175 af

**Subcatchment B1: Barbo Lake** Runoff Area=43.100 ac Runoff Depth=3.98"
Flow Length=2,070' Tc=2.7 min CN=99 Runoff=276.92 cfs 14.299 af

**Subcatchment C:** Runoff Area=51.000 ac Runoff Depth=2.29"
Flow Length=1,186' Slope=0.0051 '/' Tc=47.8 min CN=82 Runoff=73.56 cfs 9.727 af

**Subcatchment D:** Runoff Area=176.300 ac Runoff Depth=2.46"
Flow Length=1,485' Slope=0.0280 '/' Tc=22.9 min CN=84 Runoff=444.98 cfs 36.133 af

**Subcatchment E:** Runoff Area=178.000 ac Runoff Depth=1.40"
Flow Length=4,714' Slope=0.0051 '/' Tc=205.3 min CN=70 Runoff=48.08 cfs 20.720 af

**Subcatchment F:** Runoff Area=124.900 ac Runoff Depth=2.37"
Flow Length=5,559' Slope=0.0022 '/' Tc=242.6 min CN=83 Runoff=53.90 cfs 24.701 af

**Subcatchment G:** Runoff Area=375.200 ac Runoff Depth=2.04"
Flow Length=8,822' Slope=0.0030 '/' Tc=341.5 min CN=79 Runoff=105.79 cfs 63.939 af

**Subcatchment H:** Runoff Area=96.100 ac Runoff Depth=2.21"
Flow Length=2,080' Slope=0.0180 '/' Tc=41.2 min CN=81 Runoff=148.03 cfs 17.665 af

**Subcatchment I:** Runoff Area=111.500 ac Runoff Depth=2.29"
Flow Length=2,381' Slope=0.0130 '/' Tc=52.3 min CN=82 Runoff=150.66 cfs 21.266 af

**Subcatchment J:** Runoff Area=315.200 ac Runoff Depth=1.97"
Flow Length=5,288' Slope=0.0053 '/' Tc=175.9 min CN=78 Runoff=144.23 cfs 51.665 af

**Subcatchment K:** Runoff Area=252.300 ac Runoff Depth=2.12"
Flow Length=4,154' Slope=0.0096 '/' Tc=101.3 min CN=80 Runoff=191.79 cfs 44.670 af

**Subcatchment L:** Runoff Area=158.400 ac Runoff Depth=1.09"
Flow Length=3,591' Slope=0.0200 '/' Tc=95.2 min CN=65 Runoff=56.40 cfs 14.348 af

**Subcatchment M:** Runoff Area=469.100 ac Runoff Depth=1.82"
Flow Length=6,454' Slope=0.0120 '/' Tc=145.5 min CN=76 Runoff=225.67 cfs 70.970 af



**Subcatchment N:** Runoff Area=133.700 ac Runoff Depth=1.09"
Flow Length=5,467' Slope=0.0172 '/' Tc=143.6 min CN=65 Runoff=35.05 cfs 12.111 af

**Subcatchment O:** Runoff Area=105.700 ac Runoff Depth=1.40"
Flow Length=3,627' Slope=0.0193 '/' Tc=85.6 min CN=70 Runoff=56.18 cfs 12.304 af

**Subcatchment P:** Runoff Area=121.200 ac Runoff Depth=1.46"
Flow Length=3,452' Slope=0.0075 '/' Tc=128.4 min CN=71 Runoff=49.79 cfs 14.776 af

**Subcatchment Q:** Runoff Area=176.800 ac Runoff Depth=1.97"
Flow Length=4,105' Slope=0.0100 '/' Tc=104.6 min CN=78 Runoff=119.94 cfs 28.979 af

**Subcatchment R:** Runoff Area=242.600 ac Runoff Depth=1.27"
Flow Length=5,862' Slope=0.0078 '/' Tc=208.5 min CN=68 Runoff=57.34 cfs 25.649 af

**Reach 8R:** Avg. Depth=1.04' Max Vel=0.60 fps Inflow=108.46 cfs 284.713 af
n=0.050 L=5,615.0' S=0.0004 '/' Capacity=622.17 cfs Outflow=100.41 cfs 284.711 af

**Reach 10R:** Avg. Depth=0.35' Max Vel=0.86 fps Inflow=61.72 cfs 211.783 af
n=0.050 L=2,510.0' S=0.0034 '/' Capacity=2,299.12 cfs Outflow=61.69 cfs 211.783 af

**Reach 12R:** Avg. Depth=1.24' Max Vel=0.94 fps Inflow=265.45 cfs 167.114 af
n=0.050 L=3,585.0' S=0.0008 '/' Capacity=1,117.13 cfs Outflow=247.21 cfs 167.113 af

**Reach 13R:** Avg. Depth=0.84' Max Vel=1.70 fps Inflow=300.71 cfs 161.353 af
n=0.050 L=1,570.0' S=0.0043 '/' Capacity=2,584.96 cfs Outflow=298.05 cfs 161.353 af

**Reach 14R:** Avg. Depth=0.50' Max Vel=1.20 fps Inflow=123.79 cfs 78.272 af
n=0.050 L=2,200.0' S=0.0043 '/' Capacity=2,567.45 cfs Outflow=123.20 cfs 78.272 af

**Reach 15R:** Avg. Depth=0.11' Max Vel=0.58 fps Inflow=13.50 cfs 11.619 af
n=0.050 L=1,122.0' S=0.0070 '/' Capacity=3,295.84 cfs Outflow=13.10 cfs 11.619 af

**Reach 16R:** Avg. Depth=0.52' Max Vel=1.04 fps Inflow=111.99 cfs 54.629 af
n=0.050 L=1,610.0' S=0.0030 '/' Capacity=2,166.87 cfs Outflow=111.41 cfs 54.629 af

**Reach 21R:** Avg. Depth=1.37' Max Vel=0.59 fps Inflow=185.66 cfs 373.351 af
n=0.070 L=1,342.0' S=0.0006 '/' Capacity=732.00 cfs Outflow=184.57 cfs 373.351 af

**Pond 1P:** Peak Elev=1,191.14' Storage=19,711,115 cf Inflow=1,653.01 cfs 548.508 af
90.0" x 20.0' Culvert Outflow=20.55 cfs 451.235 af

**Pond 4P:** Peak Elev=1,195.49' Storage=902,534 cf Inflow=46.08 cfs 20.720 af
Outflow=0.00 cfs 0.000 af

**Pond 5P: Greley Lake** Peak Elev=1,193.14' Storage=769,475 cf Inflow=148.03 cfs 17.665 af
Outflow=0.00 cfs 0.000 af

**Pond 6P:** Peak Elev=1,200.95' Storage=822,074 cf Inflow=178.40 cfs 284.713 af
Outflow=108.46 cfs 284.713 af



**Pond 7P:** Peak Elev=1,260.30' Storage=368,254 cf Inflow=49.79 cfs 14.776 af
Outflow=13.50 cfs 11.619 af

**Pond 8P:** Peak Elev=1,257.79' Storage=170,366 cf Inflow=146.63 cfs 54.629 af
Outflow=111.99 cfs 54.629 af

**Pond 9P:** Peak Elev=1,210.24' Storage=5,706,139 cf Inflow=267.07 cfs 211.783 af
Outflow=61.72 cfs 211.783 af

**Pond 10P:** Peak Elev=1,227.48' Storage=215,624 cf Inflow=126.18 cfs 78.551 af
Outflow=123.79 cfs 78.272 af

**Pond 11P:** Peak Elev=1,210.68' Storage=1,130,615 cf Inflow=321.63 cfs 175.701 af
Outflow=265.45 cfs 167.114 af

**Pond 17P: Marsh Lake** Peak Elev=1,193.08' Storage=1,568,258 cf Inflow=444.98 cfs 36.133 af
Outflow=1.34 cfs 1.158 af

**Pond EXIT:** Inflow=20.55 cfs 451.235 af
Primary=20.55 cfs 451.235 af

Total Runoff Area = 3,899.300 ac Runoff Volume = 635.053 af Average Runoff Depth = 1.95"
93.32% Pervious Area = 3,638.700 ac 6.68% Impervious Area = 260.600 ac

### Subcatchment A:

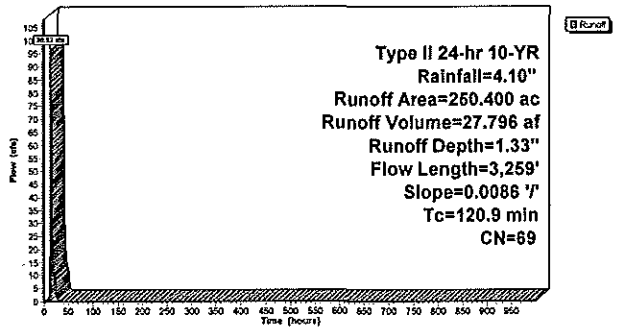
Runoff = 96.52 cfs @ 13.58 hrs, Volume= 27.796 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 250.400 | 69 | |
| 250.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 120.9 | 3,259 | 0.0086 | 0.45 | | Lag/CN Method, |

### Subcatchment A:






### Subcatchment A1: Lake Magnor

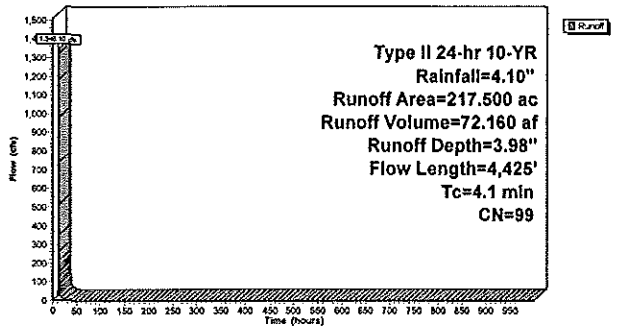
Runoff = 1,346.10 cfs @ 11.94 hrs, Volume= 72.160 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 217.500 | 99 | LAKE MAGNOR |
| 217.500 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.1 | 4,425 | | 17.94 | | Lake or Reservoir, Mean Depth= 10.00' |

### Subcatchment A1: Lake Magnor






### Subcatchment B:

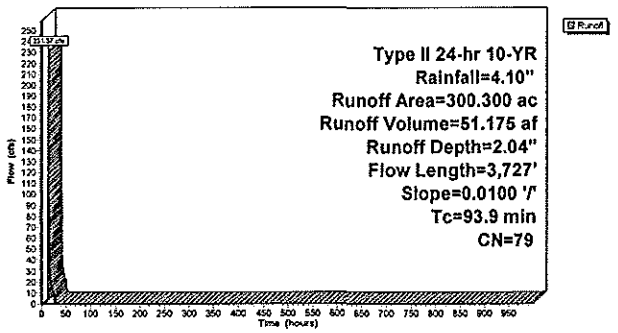
Runoff = 231.37 cfs @ 13.05 hrs, Volume= 51.175 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 300.300 | 79 | |
| 300.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 93.9 | 3,727 | 0.0100 | 0.66 | | Lag/CN Method, |

### Subcatchment B:






### Subcatchment B1: Barbo Lake

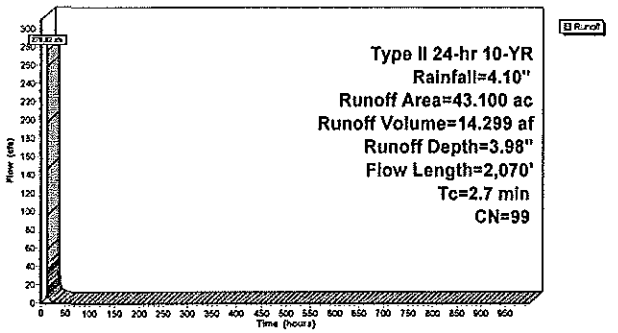
Runoff = 276.92 cfs @ 11.93 hrs, Volume= 14.299 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 43.100 | 99 | BARBO LAKE |
| 43.100 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.7 | 2,070 | | 12.69 | | Lake or Reservoir, Mean Depth= 5.00' |

### Subcatchment B1: Barbo Lake



### Subcatchment C:

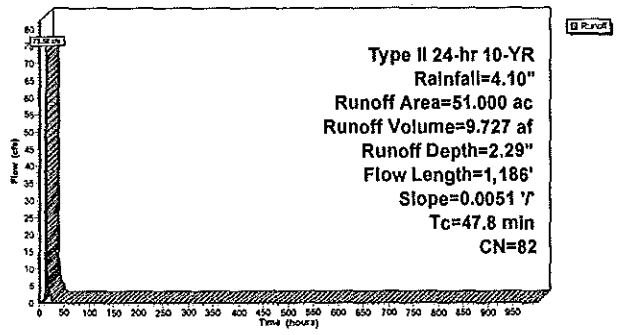
Runoff = 73.56 cfs @ 12.48 hrs, Volume= 9.727 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 51.000 | 82 | |
| 51.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.8 | 1,186 | 0.0051 | 0.41 | | Lag/CN Method, |

### Subcatchment C:






### Subcatchment D:

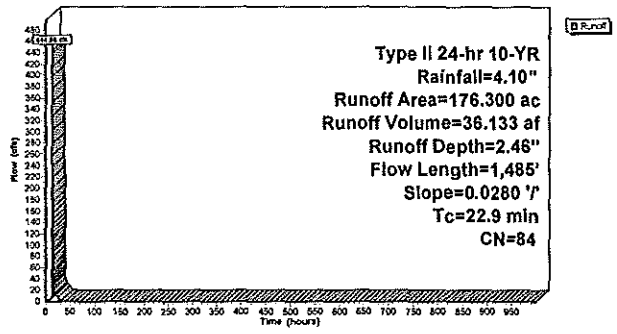
Runoff = 444.98 cfs @ 12.16 hrs, Volume= 36.133 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 176.300 | 84 | |
| 176.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 22.9 | 1,485 | 0.0280 | 1.08 | | Lag/CN Method, |

### Subcatchment D:






### Subcatchment E:

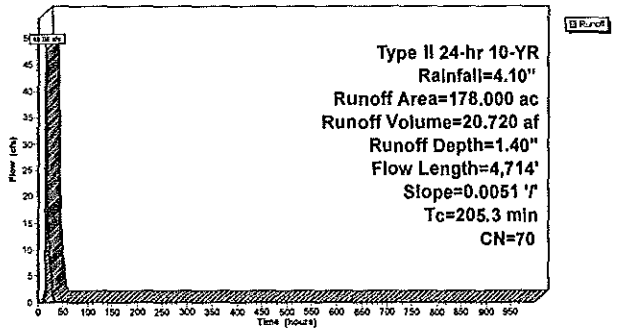
Runoff = 48.08 cfs @ 14.82 hrs, Volume= 20.720 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 178.000 | 70 | |
| 178.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 205.3 | 4,714 | 0.0051 | 0.38 | | Lag/CN Method, |

### Subcatchment E:






### Subcatchment F:

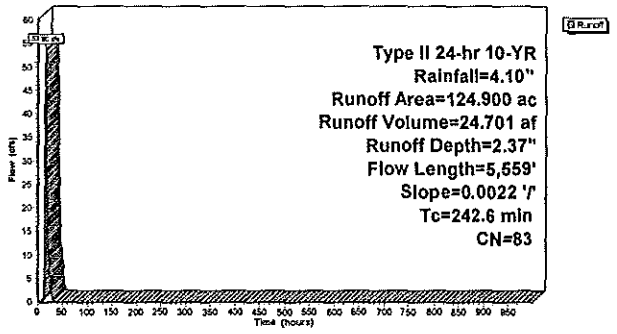
Runoff = 53.90 cfs @ 15.09 hrs, Volume= 24.701 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 124.900 | 83 | |
| 124.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 242.6 | 5,559 | 0.0022 | 0.38 | | Lag/CN Method, |

### Subcatchment F:



### Subcatchment G:

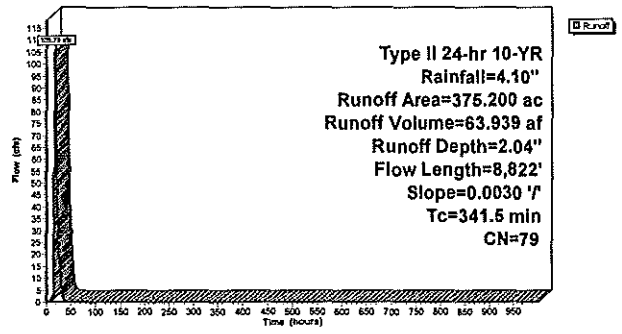
Runoff = 105.79 cfs @ 16.32 hrs, Volume= 63.939 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 375.200 | 79 | |
| 375.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 341.5 | 8,822 | 0.0030 | 0.43 | | Lag/CN Method, |

### Subcatchment G:






### Subcatchment H:

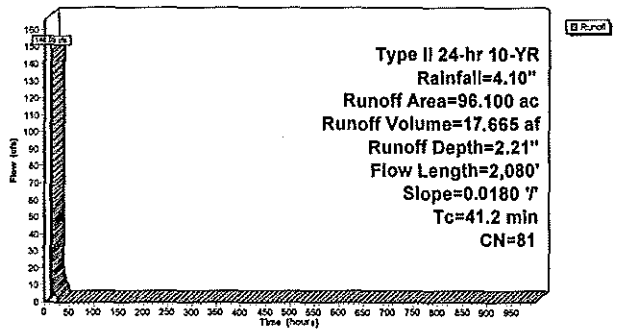
Runoff = 148.03 cfs @ 12.39 hrs, Volume= 17.665 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 96.100 | 81 | |
| 96.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 41.2 | 2,080 | 0.0180 | 0.84 | | Lag/CN Method, |

### Subcatchment H:






### Subcatchment I:

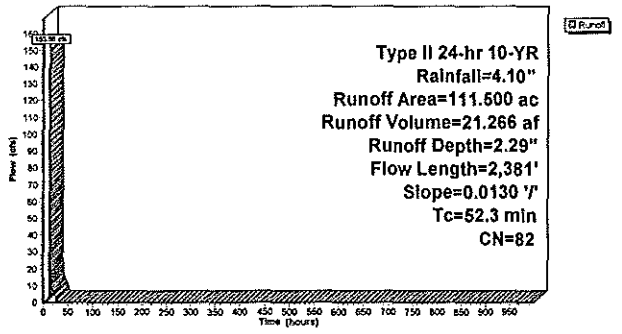
Runoff = 150.66 cfs @ 12.51 hrs, Volume= 21.266 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 111.500 | 82 | |
| 111.500 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 52.3 | 2,381 | 0.0130 | 0.76 | | Lag/CN Method, |

### Subcatchment I:






### Subcatchment J:

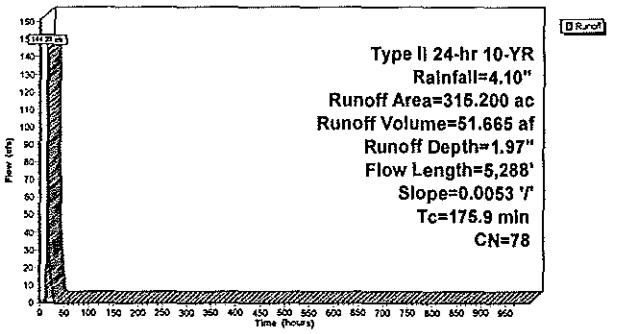
Runoff = 144.23 cfs @ 14.26 hrs, Volume= 51.665 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 315.200 | 78 | |
| 315.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 175.9 | 5,288 | 0.0053 | 0.50 | | Lag/CN Method, |

### Subcatchment J:



## Subcatchment K:

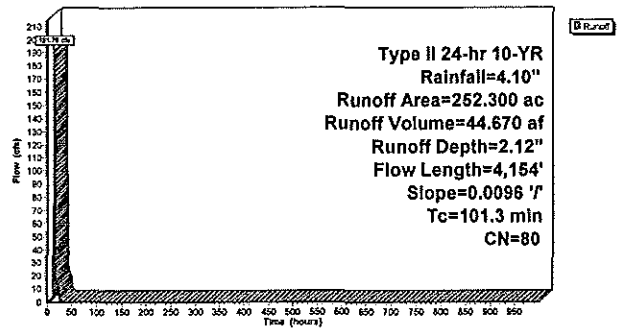
Runoff = 191.79 cfs @ 13.17 hrs, Volume= 44.670 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 252.300 | 80 | |
| 252.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 101.3 | 4,154 | 0.0096 | 0.68 | | Lag/CN Method, |

## Subcatchment K:






## Subcatchment L:

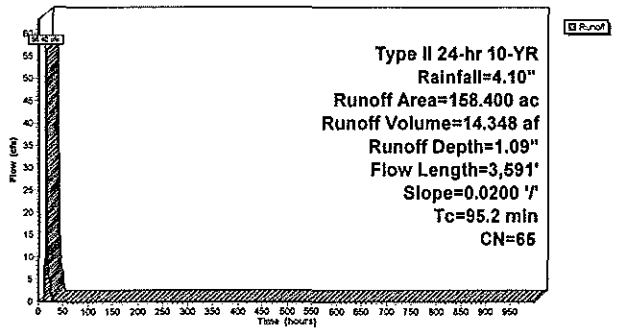
Runoff = 56.40 cfs @ 13.22 hrs, Volume= 14.348 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 158.400 | 65 | |
| 158.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 95.2 | 3,591 | 0.0200 | 0.63 | | Lag/CN Method, |

## Subcatchment L:






## Subcatchment M:

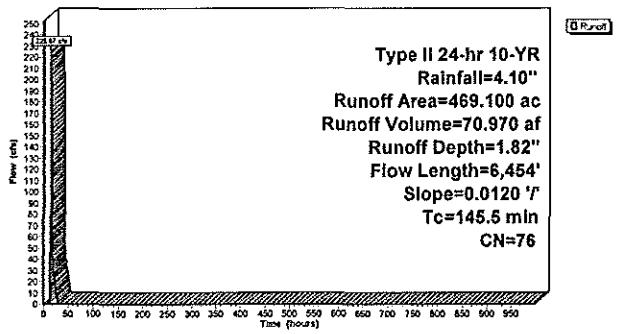
Runoff = 225.67 cfs @ 13.74 hrs, Volume= 70.970 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 469.100 | 76 | |
| 469.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 145.5 | 6,454 | 0.0120 | 0.74 | | Lag/CN Method, |

## Subcatchment M:






## Subcatchment N:

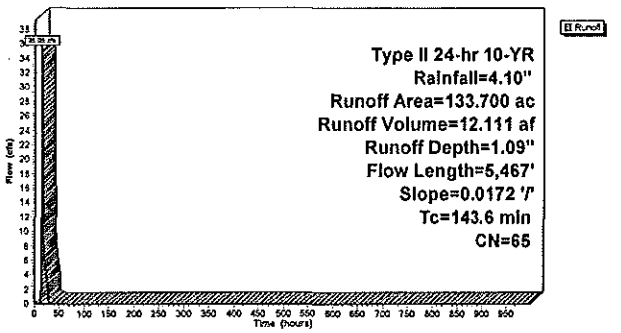
Runoff = 35.05 cfs @ 13.89 hrs, Volume= 12.111 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 133.700 | 65 | |
| 133.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 143.6 | 5,467 | 0.0172 | 0.63 | | Lag/CN Method, |

## Subcatchment N:



## Subcatchment O:

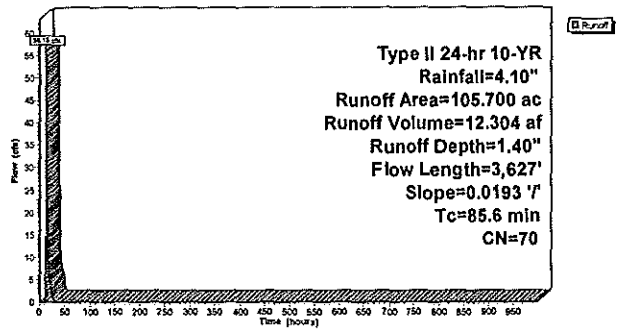
Runoff = 56.18 cfs @ 13.03 hrs, Volume= 12.304 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 105.700 | 70 | |
| 105.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 85.6 | 3,627 | 0.0193 | 0.71 | | Lag/CN Method, |

## Subcatchment O:






## Subcatchment P:

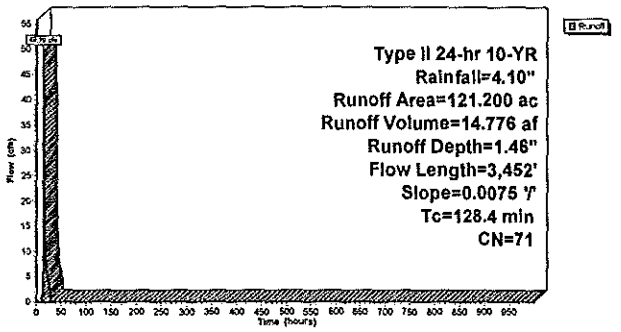
Runoff = 49.79 cfs @ 13.56 hrs, Volume= 14.776 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 121.200 | 71 | |
| 121.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 128.4 | 3,452 | 0.0075 | 0.45 | | Lag/CN Method, |

## Subcatchment P:






## Subcatchment Q:

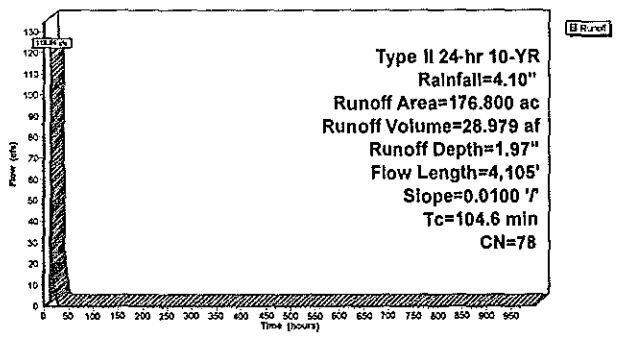
Runoff = 119.94 cfs @ 13.25 hrs, Volume= 28.979 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 176.800 | 78 | |
| 176.800 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 104.6 | 4,105 | 0.0100 | 0.65 | | Lag/CN Method, |

## Subcatchment Q:






## Subcatchment R:

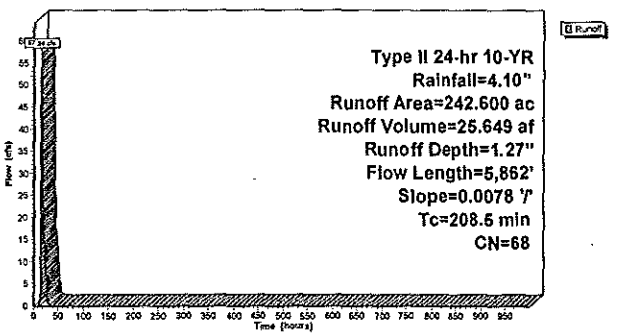
Runoff = 57.34 cfs @ 14.61 hrs, Volume= 25.649 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-YR Rainfall=4.10"

| Area (ac) | CN | Description |
|---|---|---|
| 242.600 | 68 | |
| 242.600 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 208.5 | 5,862 | 0.0078 | 0.47 | | Lag/CN Method, |

## Subcatchment R:



## Reach 8R:

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 0.84'

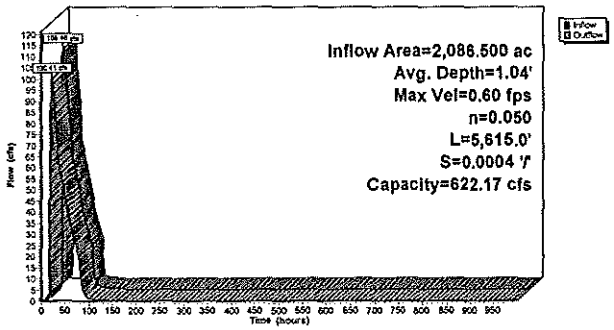
Inflow Area = 2,088.500 ac, Inflow Depth = 1.64" for 10-YR event
Inflow = 108.46 cfs @ 16.03 hrs, Volume= 284.713 af
Outflow = 100.41 cfs @ 21.55 hrs, Volume= 284.711 af, Atten= 7%, Lag= 330.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.60 fps, Min. Travel Time= 155.0 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 1,066.0 min

Peak Storage= 934,024 cf @ 18.96 hrs, Average Depth at Peak Storage= 1.04'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 622.17 cfs

150.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 210.00'
Length= 5,615.0' Slope= 0.0004 '/'
Inlet Invert= 1,196.90', Outlet Invert= 1,194.50'

## Reach 8R:






## Reach 10R:

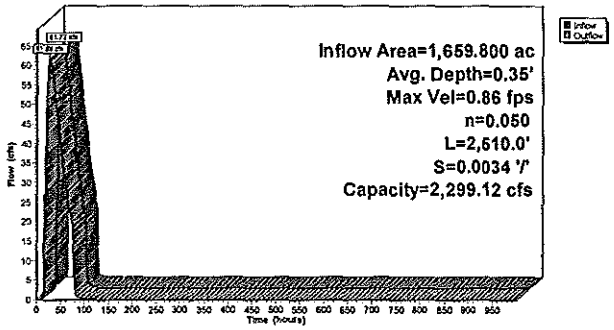
Inflow Area = 1,659.800 ac, Inflow Depth = 1.53" for 10-YR event
Inflow = 61.72 cfs @ 26.60 hrs, Volume= 211.783 af
Outflow = 61.69 cfs @ 27.95 hrs, Volume= 211.783 af, Atten= 0%, Lag= 81.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 48.7 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 206.2 min

Peak Storage= 180,224 cf @ 27.14 hrs, Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,299.12 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,510.0' Slope= 0.0034 '/'
Inlet Invert= 1,205.80', Outlet Invert= 1,197.20'

## Reach 10R:






## Reach 12R:

[81] Warning: Exceeded Pond 11P by 2.00' @ 0.00 hrs

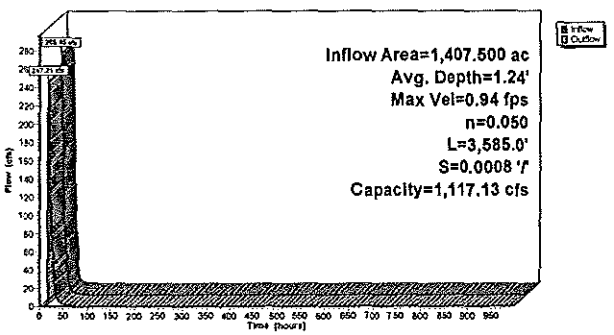
Inflow Area = 1,407.500 ac, Inflow Depth = 1.42" for 10-YR event
Inflow = 265.45 cfs @ 15.66 hrs, Volume= 167.114 af
Outflow = 247.21 cfs @ 17.78 hrs, Volume= 167.113 af, Atten= 7%, Lag= 127.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 63.6 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 637.3 min

Peak Storage= 943,890 cf @ 16.72 hrs, Average Depth at Peak Storage= 1.24'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,117.13 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 3,585.0' Slope= 0.0008 '/'
Inlet Invert= 1,209.00', Outlet Invert= 1,206.10'

## Reach 12R:






## Reach 13R:

[61] Hint: Submerged 8% of Reach 14R bottom

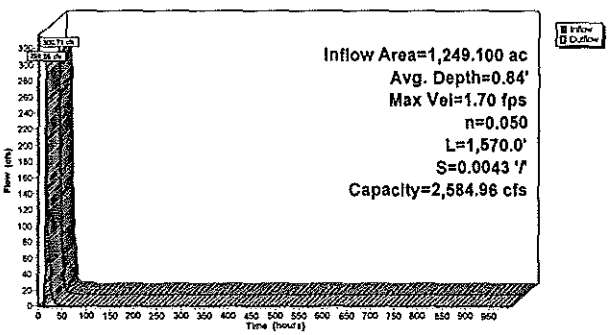
Inflow Area = 1,249.100 ac, Inflow Depth = 1.55" for 10-YR event
Inflow = 300.71 cfs @ 14.22 hrs, Volume= 161.353 af
Outflow = 298.05 cfs @ 14.63 hrs, Volume= 161.353 af, Atten= 1%, Lag= 24.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.70 fps, Min. Travel Time= 15.4 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 127.5 min

Peak Storage= 275,538 cf @ 14.37 hrs, Average Depth at Peak Storage= 0.84'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,584.96 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,570.0' Slope= 0.0043 '/'
Inlet Invert= 1,214.00', Outlet Invert= 1,207.20'

## Reach 13R:



## Reach 14R:

[81] Warning: Exceeded Pond 10P by 0.50' @ 0.00 hrs

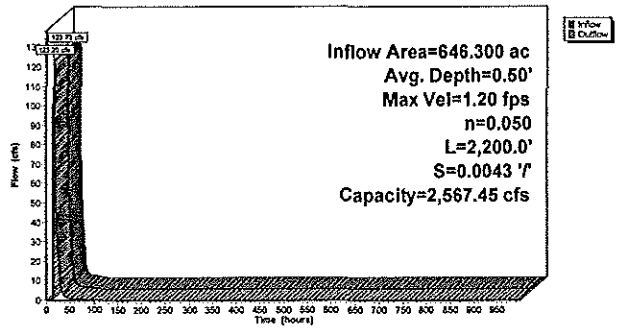
Inflow Area = 646.300 ac, Inflow Depth = 1.45" for 10-YR event
Inflow = 123.79 cfs @ 15.38 hrs, Volume= 78.272 af
Outflow = 123.20 cfs @ 16.41 hrs, Volume= 78.272 af, Atten= 0%, Lag= 62.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 30.5 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 184.4 min

Peak Storage= 225,194 cf @ 15.90 hrs, Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,567.45 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,200.0' Slope= 0.0043 '/'
Inlet Invert= 1,223.50', Outlet Invert= 1,214.10'

## Reach 14R:





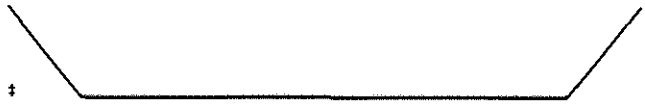

## Reach 15R:

Inflow Area = 121.200 ac, Inflow Depth = 1.15" for 10-YR event
Inflow = 13.50 cfs @ 16.32 hrs, Volume= 11.619 af
Outflow = 13.10 cfs @ 17.32 hrs, Volume= 11.619 af, Atten= 3%, Lag= 60.4 min

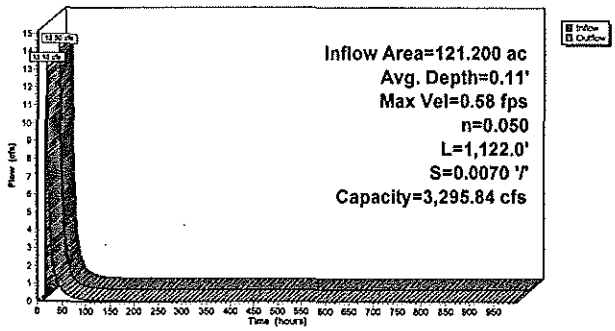
Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.58 fps, Min. Travel Time= 32.1 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 76.8 min

Peak Storage= 25,269 cf @ 16.79 hrs, Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 3,295.84 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,122.0' Slope= 0.0070 '/'
Inlet Invert= 1,258.00', Outlet Invert= 1,250.10'



## Reach 15R:






## Reach 16R:

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 2.52'

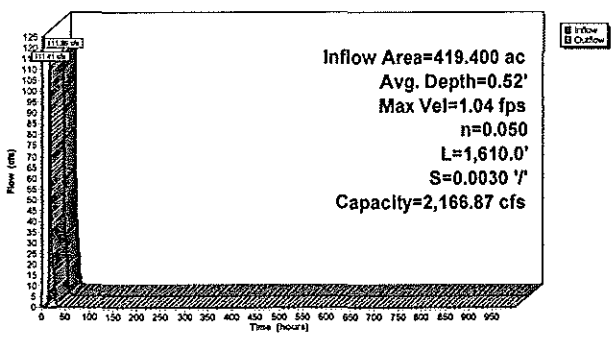
Inflow Area = 419.400 ac, Inflow Depth = 1.56" for 10-YR event
Inflow = 111.99 cfs @ 14.41 hrs, Volume= 54.629 af
Outflow = 111.41 cfs @ 15.16 hrs, Volume= 54.629 af, Atten= 1%, Lag= 44.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.04 fps, Min. Travel Time= 25.7 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 87.6 min

Peak Storage= 171,911 cf @ 14.73 hrs, Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,166.87 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,610.0' Slope= 0.0030 '/'
Inlet Invert= 1,255.00', Outlet Invert= 1,250.10'

## Reach 16R:






## Reach 21R:

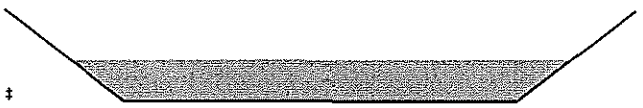
[61] Hint: Submerged 78% of Reach 8R bottom

Inflow Area = 2,764.600 ac, Inflow Depth = 1.62" for 10-YR event
Inflow = 185.66 cfs @ 17.44 hrs, Volume= 373.351 af
Outflow = 184.57 cfs @ 18.34 hrs, Volume= 373.351 af, Atten= 1%, Lag= 54.3 min

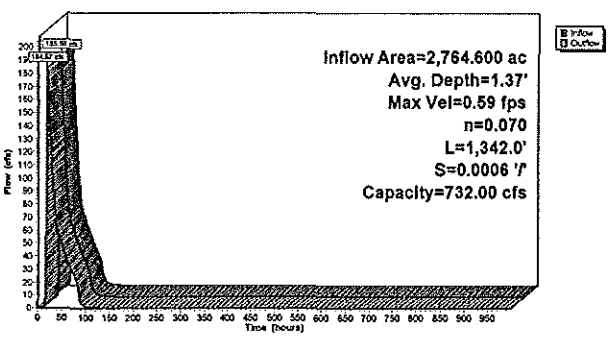
Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.59 fps, Min. Travel Time= 37.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 298.1 min

Peak Storage= 418,033 cf @ 17.71 hrs, Average Depth at Peak Storage= 1.37'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 732.00 cfs

200.00' x 3.00' deep channel, n= 0.070 Sluggish weedy reaches w/pools
Side Slope Z-value= 20.0 '/' Top Width= 320.00'
Length= 1,342.0' Slope= 0.0006 '/'
Inlet Invert= 1,195.00', Outlet Invert= 1,194.20'



## Reach 21R:



## Pond 1P:

Inflow Area = 3,626.900 ac, Inflow Depth = 1.61" for 10-YR event
Inflow = 1,653.01 cfs @ 11.94 hrs, Volume= 548.508 af
Outflow = 20.55 cfs @ 78.40 hrs, Volume= 451.235 af, Atten= 99%, Lag= 3,987.3 min
Primary = 20.55 cfs @ 78.40 hrs, Volume= 451.235 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,191.14' @ 78.40 hrs Surf.Area= 17,737,685 sf Storage= 19,711,115 cf

Plug-Flow detention time= 15,001.6 min calculated for 451.226 af (82% of inflow)
Center-of-Mass det. time= 14,524.4 min ( 16,340.6 - 1,816.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 39,292,918 cf | Lake Magnor (Prismatic)Listed below (Recalc) |
| #2 | 1,190.00' | 24,221,898 cf | Barbo Lake (Prismatic)Listed below (Recalc) |
| #3 | 1,190.00' | 19,504,098 cf | Mud Lake (Prismatic)Listed below (Recalc) |
| | | 83,018,913 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 9,474,713 | 0 | 0 |
| 1,192.00 | 9,822,178 | 19,296,891 | 19,296,891 |
| 1,194.00 | 10,173,849 | 19,996,027 | 39,292,918 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,912,341 | 0 | 0 |
| 1,195.00 | 5,776,418 | 24,221,898 | 24,221,898 |

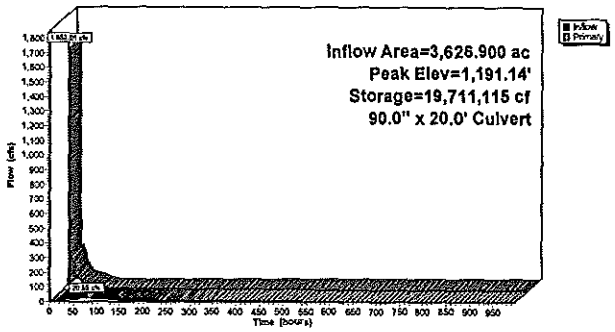
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,587,635 | 0 | 0 |
| 1,195.00 | 4,214,004 | 19,504,098 | 19,504,098 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,190.00' | 90.0" x 20.0' long Culvert X 2.00<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,189.70' S= 0.0150 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |

Primary OutFlow Max=20.54 cfs @ 78.40 hrs HW=1,191.14' (Free Discharge)
└1=Culvert (Barrel Controls 20.54 cfs @ 3.71 fps)



## Pond 1P:






## Pond 4P:

Inflow Area = 178.000 ac, Inflow Depth = 1.40" for 10-YR event
Inflow = 48.08 cfs @ 14.82 hrs, Volume= 20.720 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

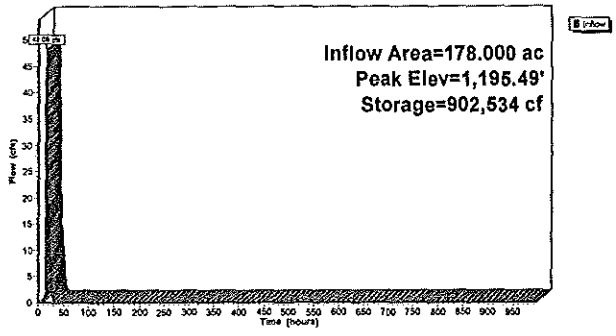
Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,195.49' @ 35.60 hrs Surf.Area= 1,182,580 sf Storage= 902,534 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,194.50' | 2,879,843 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,194.50 | 279,331 | 0 | 0 |
| 1,195.00 | 1,101,921 | 345,313 | 345,313 |
| 1,197.00 | 1,432,609 | 2,534,530 | 2,879,843 |

## Pond 4P:






## Pond 5P: Greley Lake

Inflow Area = 96.100 ac, Inflow Depth = 2.21" for 10-YR event
Inflow = 148.03 cfs @ 12.39 hrs, Volume= 17.665 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.14' @ 26.38 hrs Surf.Area= 689,471 sf Storage= 769,475 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

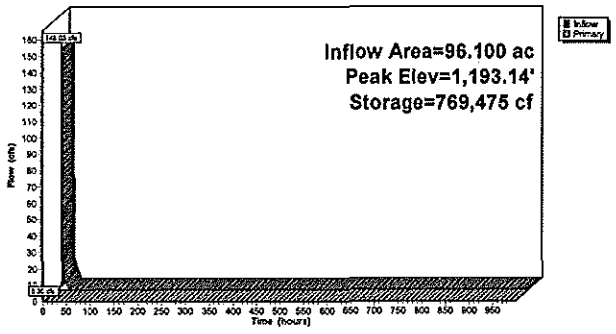
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,192.00' | 6,458,361 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,192.00 | 666,399 | 0 | 0 |
| 1,194.00 | 707,054 | 1,373,453 | 1,373,453 |
| 1,196.00 | 748,224 | 1,455,278 | 2,828,731 |
| 1,198.00 | 789,737 | 1,537,961 | 4,366,692 |
| 1,200.00 | 1,301,932 | 2,091,669 | 6,458,361 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,199.00' | 20.0' long x 20.0' breadth Broad-Crested Rectangular Weir<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,192.00' (Free Discharge)
└1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

## Pond 5P: Greley Lake






## Pond 6P:

[61] Hint: Submerged 44% of Reach 10R bottom

Inflow Area = 2,088.500 ac, Inflow Depth = 1.64" for 10-YR event
Inflow = 178.40 cfs @ 14.26 hrs, Volume= 284.713 af
Outflow = 108.46 cfs @ 16.03 hrs, Volume= 284.713 af, Atten= 39%, Lag= 106.7 min
Primary = 108.46 cfs @ 16.03 hrs, Volume= 284.713 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,200.95' @ 16.03 hrs Surf.Area= 1,333,044 sf Storage= 822,074 cf

Plug-Flow detention time= 35.3 min calculated for 284.713 af (100% of inflow)
Center-of-Mass det. time= 35.3 min ( 2,152.4 - 2,117.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,200.00' | 5,386,561 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

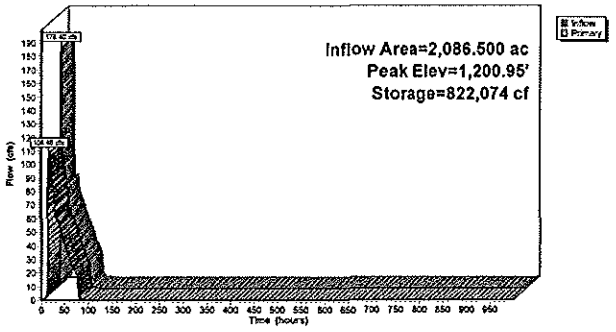
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,200.00 | 404,702 | 0 | 0 |
| 1,201.00 | 1,385,892 | 895,297 | 895,297 |
| 1,203.00 | 3,105,372 | 4,491,264 | 5,386,561 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,197.10' | **48.0" x 20.0' long Culvert X 2.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,197.00' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,202.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=108.46 cfs @ 16.03 hrs HW=1,200.95' (Free Discharge)
└1=Culvert (Barrel Controls 108.46 cfs @ 5.59 fps)
└2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 6P:






## Pond 7P:

Inflow Area = 121.200 ac, Inflow Depth = 1.46" for 10-YR event
Inflow = 49.79 cfs @ 13.56 hrs, Volume= 14.776 af
Outflow = 13.50 cfs @ 16.32 hrs, Volume= 11.619 af, Atten= 73%, Lag= 165.4 min
Primary = 13.50 cfs @ 16.32 hrs, Volume= 11.619 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,260.30' @ 16.32 hrs Surf.Area= 195,715 sf Storage= 368,254 cf

Plug-Flow detention time= 1,466.0 min calculated for 11.618 af (79% of inflow)
Center-of-Mass det. time= 1,374.5 min ( 2,340.2 - 965.7 )

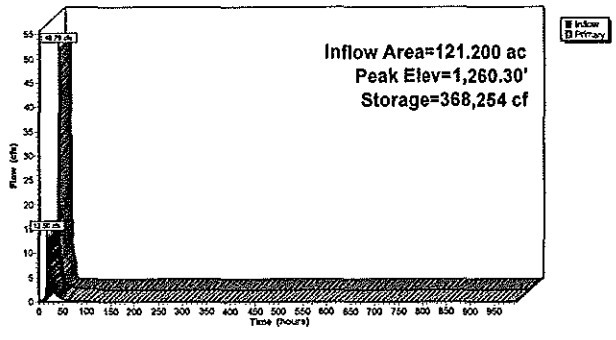
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,258.00' | 505,511 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,258.00 | 114,081 | 0 | 0 |
| 1,260.00 | 195,715 | 309,796 | 309,796 |
| 1,261.00 | 195,715 | 195,715 | 505,511 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,259.00' | **24.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,258.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=13.49 cfs @ 16.32 hrs HW=1,260.30' (Free Discharge)
└1=Culvert (Barrel Controls 4.71 cfs @ 3.10 fps)
└2=Broad-Crested Rectangular Weir (Weir Controls 8.78 cfs @ 1.47 fps)

**Pond 7P:**






**Pond 8P:**

Inflow Area = 419.400 ac, Inflow Depth = 1.56" for 10-YR event
Inflow = 146.63 cfs @ 13.39 hrs, Volume= 54.629 af
Outflow = 111.99 cfs @ 14.41 hrs, Volume= 54.629 af, Atten= 24%, Lag= 61.3 min
Primary = 111.99 cfs @ 14.41 hrs, Volume= 54.629 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,257.79' @ 14.41 hrs Surf.Area= 360,993 sf Storage= 170,366 cf

Plug-Flow detention time= 10.3 min calculated for 54.629 af (100% of inflow)
Center-of-Mass det. time= 10.3 min ( 993.2 - 982.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,257.00' | 3,038,942 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

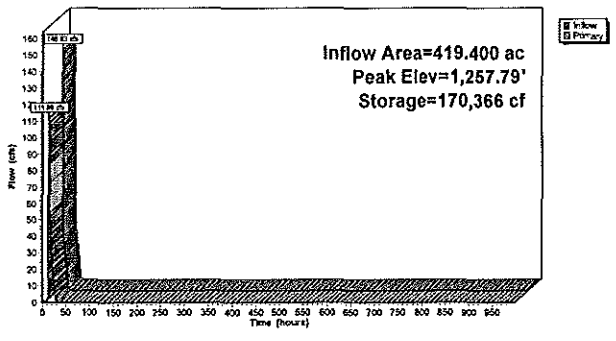
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,257.00 | 68,271 | 0 | 0 |
| 1,260.00 | 1,174,614 | 1,884,328 | 1,884,328 |
| 1,261.00 | 1,174,614 | 1,174,614 | 3,038,942 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,253.00' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,252.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=111.99 cfs@ 14.41 hrs HW=1,257.79' TW=1,255.00' (Fixed TW Elev= 1,255.00')
↑**1=Culvert** (Barrel Controls 111.99 cfs @ 6.33 fps)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)



**Pond 8P:**






**Pond 9P:**

[63] Warning: Exceeded Reach 12R inflow depth by 0.91' @ 31.06 hrs

Inflow Area = 1,659.800 ac, Inflow Depth = 1.53" for 10-YR event
Inflow = 267.07 cfs @ 17.69 hrs, Volume= 211.783 af
Outflow = 61.72 cfs @ 26.60 hrs, Volume= 211.783 af, Atten= 77%, Lag= 534.4 min
Primary = 61.72 cfs @ 26.60 hrs, Volume= 211.783 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,210.24' @ 26.60 hrs Surf.Area= 3,506,820 sf Storage= 5,706,139 cf

Plug-Flow detention time= 1,118.2 min calculated for 211.779 af (100% of inflow)
Center-of-Mass det. time= 1,118.2 min ( 2,410.0 - 1,291.8 )

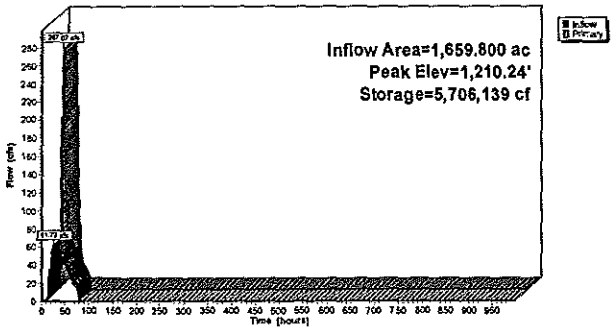
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,208.00' | 16,083,958 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,208.00 | 1,411,294 | 0 | 0 |
| 1,210.00 | 3,455,564 | 4,866,858 | 4,866,858 |
| 1,212.00 | 3,880,768 | 7,336,332 | 12,203,190 |
| 1,213.00 | 3,880,768 | 3,880,768 | 16,083,958 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,206.00' | **48.0" x 25.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,205.90' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,212.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=61.72 cfs@ 26.60 hrs HW=1,210.24' TW=1,207.00' (Fixed TW Elev= 1,207.00')
↑**1=Culvert** (Barrel Controls 61.72 cfs @ 5.76 fps)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Pond 9P:**






**Pond 10P:**

Inflow Area = 646.300 ac, Inflow Depth = 1.46" for 10-YR event
Inflow = 126.18 cfs @ 14.59 hrs, Volume= 78.551 af
Outflow = 123.79 cfs @ 15.36 hrs, Volume= 78.272 af, Atten= 2%, Lag= 45.9 min
Primary = 123.79 cfs @ 15.36 hrs, Volume= 78.272 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,227.48' @ 15.36 hrs Surf.Area= 74,933 sf Storage= 215,624 cf

Plug-Flow detention time= 105.6 min calculated for 78.271 af (100% of inflow)
Center-of-Mass det. time= 26.9 min ( 1,264.9 - 1,238.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,223.00' | 596,246 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

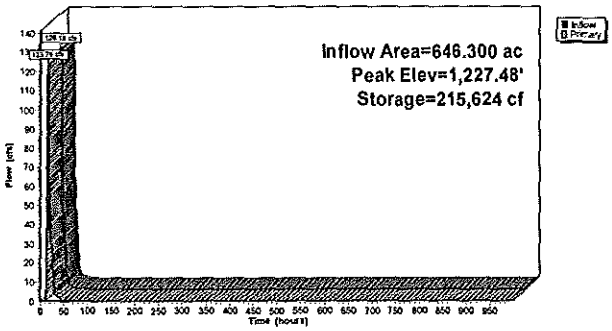
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,223.00 | 21,295 | 0 | 0 |
| 1,228.00 | 81,139 | 256,085 | 256,085 |
| 1,230.00 | 129,511 | 210,650 | 466,735 |
| 1,231.00 | 129,511 | 129,511 | 596,246 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,222.50' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,222.30' S= 0.0100 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,230.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=123.79 cfs @ 15.36 hrs HW=1,227.48' TW=1,223.50' (Fixed TW Elev= 1,223.50')
1=Culvert (Barrel Controls 123.79 cfs @ 6.69 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



**Pond 10P:**






**Pond 11P:**

[61] Hint: Submerged 51% of Reach 13R bottom

Inflow Area = 1,407.500 ac, Inflow Depth = 1.50" for 10-YR event
Inflow = 321.63 cfs @ 14.54 hrs, Volume= 175.701 af
Outflow = 265.45 cfs @ 15.66 hrs, Volume= 167.114 af, Atten= 17%, Lag= 67.2 min
Primary = 265.45 cfs @ 15.66 hrs, Volume= 167.114 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,210.68' @ 15.66 hrs Surf.Area= 506,544 sf Storage= 1,130,615 cf

Plug-Flow detention time= 167.8 min calculated for 167.114 af (95% of inflow)
Center-of-Mass det. time= 56.4 min ( 1,228.9 - 1,172.5 )

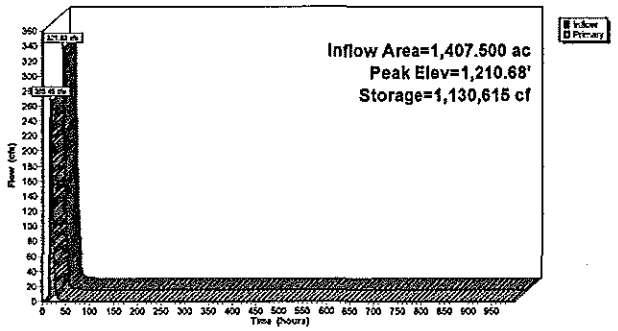
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,207.00' | 2,933,772 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,207.00 | 34,962 | 0 | 0 |
| 1,210.00 | 491,135 | 789,146 | 789,146 |
| 1,214.00 | 581,178 | 2,144,626 | 2,933,772 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,207.10' | **72.0" x 25.0' long Culvert X 4.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,207.00' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,214.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=265.43 cfs @ 15.66 hrs HW=1,210.68' TW=1,209.00' (Fixed TW Elev= 1,209.00')
1=Culvert (Barrel Controls 265.43 cfs @ 5.41 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond 11P:**






**Pond 17P: Marsh Lake**

Inflow Area = 176.300 ac, Inflow Depth = 2.46" for 10-YR event
Inflow = 444.98 cfs @ 12.16 hrs, Volume= 36.133 af
Outflow = 1.34 cfs @ 24.48 hrs, Volume= 1.168 af, Atten= 100%, Lag= 739.3 min
Primary = 1.34 cfs @ 24.48 hrs, Volume= 1.168 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.08' @ 24.48 hrs Surf.Area= 543,842 sf Storage= 1,568,258 cf

Plug-Flow detention time= 1,483.7 min calculated for 1.168 af (3% of inflow)
Center-of-Mass det. time= 1,234.8 min ( 2,068.0 - 831.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 3,205,992 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

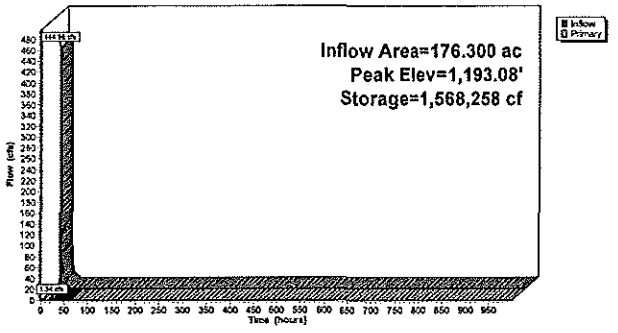
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 473,448 | 0 | 0 |
| 1,194.00 | 564,774 | 2,076,444 | 2,076,444 |
| 1,196.00 | 564,774 | 1,129,548 | 3,205,992 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,193.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=1.29 cfs @ 24.48 hrs HW=1,193.08' (Free Discharge)
└1=Broad-Crested Rectangular Weir (Weir Controls 1.29 cfs @ 0.77 fps)



**Pond 17P: Marsh Lake**





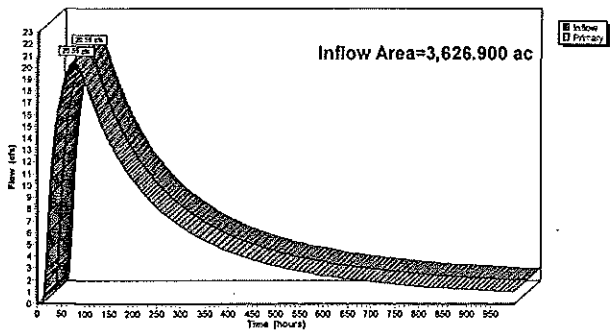

**Pond EXIT:**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,626.900 ac, Inflow Depth > 1.49" for 10-YR event
Inflow = 20.55 cfs @ 78.40 hrs, Volume= 451.235 af
Primary = 20.55 cfs @ 78.40 hrs, Volume= 451.235 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs

**Pond EXIT:**



Time span=0.00-999.00 hrs, dt=0.02 hrs, 49951 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment A:** Runoff Area=250.400 ac Runoff Depth=2.56"
Flow Length=3,259' Slope=0.0088 '/' Tc=120.9 min CN=69 Runoff=195.91 cfs 53.363 af

**Subcatchment A1: Lake Magnor** Runoff Area=217.500 ac Runoff Depth=5.68"
Flow Length=4,425' Tc=4.1 min CN=99 Runoff=1,906.06 cfs 102.959 af

**Subcatchment B:** Runoff Area=300.300 ac Runoff Depth=3.50"
Flow Length=3,727' Slope=0.0100 '/' Tc=93.9 min CN=79 Runoff=402.46 cfs 87.627 af

**Subcatchment B1: Barbo Lake** Runoff Area=43.100 ac Runoff Depth=5.68"
Flow Length=2,070' Tc=2.7 min CN=99 Runoff=392.11 cfs 20.403 af

**Subcatchment C:** Runoff Area=51.000 ac Runoff Depth=3.80"
Flow Length=1,186' Slope=0.0051 '/' Tc=47.8 min CN=82 Runoff=122.40 cfs 16.165 af

**Subcatchment D:** Runoff Area=176.300 ac Runoff Depth=4.01"
Flow Length=1,485' Slope=0.0280 '/' Tc=22.9 min CN=84 Runoff=719.03 cfs 58.909 af

**Subcatchment E:** Runoff Area=178.000 ac Runoff Depth=2.65"
Flow Length=4,714' Slope=0.0051 '/' Tc=205.3 min CN=70 Runoff=95.37 cfs 39.270 af

**Subcatchment F:** Runoff Area=124.900 ac Runoff Depth=3.91"
Flow Length=5,559' Slope=0.0022 '/' Tc=242.6 min CN=83 Runoff=89.28 cfs 40.656 af

**Subcatchment G:** Runoff Area=375.200 ac Runoff Depth=3.50"
Flow Length=8,822' Slope=0.0030 '/' Tc=341.5 min CN=79 Runoff=184.55 cfs 109.483 af

**Subcatchment H:** Runoff Area=96.100 ac Runoff Depth=3.70"
Flow Length=2,080' Slope=0.0180 '/' Tc=41.2 min CN=81 Runoff=248.90 cfs 29.646 af

**Subcatchment I:** Runoff Area=111.500 ac Runoff Depth=3.80"
Flow Length=2,381' Slope=0.0130 '/' Tc=52.3 min CN=82 Runoff=251.34 cfs 35.341 af

**Subcatchment J:** Runoff Area=315.200 ac Runoff Depth=3.40"
Flow Length=5,288' Slope=0.0053 '/' Tc=175.9 min CN=78 Runoff=253.63 cfs 89.381 af

**Subcatchment K:** Runoff Area=252.300 ac Runoff Depth=3.60"
Flow Length=4,154' Slope=0.0096 '/' Tc=101.3 min CN=80 Runoff=328.66 cfs 75.717 af

**Subcatchment L:** Runoff Area=158.400 ac Runoff Depth=2.21"
Flow Length=3,591' Slope=0.0200 '/' Tc=95.2 min CN=65 Runoff=124.95 cfs 29.132 af

**Subcatchment M:** Runoff Area=469.100 ac Runoff Depth=3.21"
Flow Length=6,454' Slope=0.0120 '/' Tc=145.5 min CN=76 Runoff=410.17 cfs 125.414 af



**Subcatchment N:** Runoff Area=133.700 ac Runoff Depth=2.21"
Flow Length=5,467' Slope=0.0172 '/' Tc=143.6 min CN=65 Runoff=77.40 cfs 24.589 af

**Subcatchment O:** Runoff Area=105.700 ac Runoff Depth=2.65"
Flow Length=3,627' Slope=0.0193 '/' Tc=85.6 min CN=70 Runoff=112.29 cfs 23.319 af

**Subcatchment P:** Runoff Area=121.200 ac Runoff Depth=2.74"
Flow Length=3,452' Slope=0.0075 '/' Tc=128.4 min CN=71 Runoff=98.07 cfs 27.658 af

**Subcatchment Q:** Runoff Area=176.800 ac Runoff Depth=3.40"
Flow Length=4,105' Slope=0.0100 '/' Tc=104.6 min CN=78 Runoff=211.00 cfs 50.135 af

**Subcatchment R:** Runoff Area=242.600 ac Runoff Depth=2.47"
Flow Length=5,862' Slope=0.0078 '/' Tc=208.5 min CN=68 Runoff=119.42 cfs 49.900 af

**Reach 8R:** Avg. Depth=1.25' Max Vel=0.68 fps Inflow=140.89 cfs 518.563 af
n=0.050 L=5,615.0' S=0.0004 '/' Capacity=622.17 cfs Outflow=137.02 cfs 518.562 af

**Reach 10R:** Avg. Depth=0.46' Max Vel=1.01 fps Inflow=94.50 cfs 393.841 af
n=0.050 L=2,510.0' S=0.0034 '/' Capacity=2,299.12 cfs Outflow=94.46 cfs 393.841 af

**Reach 12R:** Avg. Depth=1.84' Max Vel=1.20 fps Inflow=520.40 cfs 318.125 af
n=0.050 L=3,585.0' S=0.0008 '/' Capacity=1,117.13 cfs Outflow=485.21 cfs 318.124 af

**Reach 13R:** Avg. Depth=1.26' Max Vel=2.20 fps Inflow=594.67 cfs 297.580 af
n=0.050 L=1,570.0' S=0.0043 '/' Capacity=2,584.96 cfs Outflow=591.04 cfs 297.580 af

**Reach 14R:** Avg. Depth=0.70' Max Vel=1.49 fps Inflow=215.76 cfs 147.576 af
n=0.050 L=2,200.0' S=0.0043 '/' Capacity=2,567.45 cfs Outflow=215.04 cfs 147.576 af

**Reach 15R:** Avg. Depth=0.26' Max Vel=1.01 fps Inflow=54.97 cfs 24.501 af
n=0.050 L=1,122.0' S=0.0070 '/' Capacity=3,295.84 cfs Outflow=53.53 cfs 24.501 af

**Reach 16R:** Avg. Depth=0.64' Max Vel=1.19 fps Inflow=157.91 cfs 100.035 af
n=0.050 L=1,610.0' S=0.0030 '/' Capacity=2,166.87 cfs Outflow=157.61 cfs 100.035 af

**Reach 21R:** Avg. Depth=1.85' Max Vel=0.71 fps Inflow=313.30 cfs 668.701 af
n=0.070 L=1,342.0' S=0.0006 '/' Capacity=732.00 cfs Outflow=310.02 cfs 668.700 af

**Pond 1P:** Peak Elev=1,191.73' Storage=30,327,507 cf Inflow=2,375.26 cfs 949.217 af
90.0" x 20.0' Culvert Outflow=45.19 cfs 842.036 af

**Pond 4P:** Peak Elev=1,196.14' Storage=1,710,587 cf Inflow=95.37 cfs 39.270 af
Outflow=0.00 cfs 0.000 af

**Pond 5P: Greley Lake** Peak Elev=1,193.88' Storage=1,291,380 cf Inflow=248.90 cfs 29.646 af
Outflow=0.00 cfs 0.000 af

**Pond 6P:** Peak Elev=1,201.72' Storage=2,125,754 cf Inflow=313.22 cfs 518.563 af
Outflow=140.89 cfs 518.563 af



**Pond 7P:** Peak Elev=1,260.91' Storage=488,301 cf Inflow=98.07 cfs 27.658 af
Outflow=54.97 cfs 24.501 af

**Pond 8P:** Peak Elev=1,258.93' Storage=820,415 cf Inflow=271.13 cfs 100.035 af
Outflow=157.91 cfs 100.035 af

**Pond 9P:** Peak Elev=1,211.97' Storage=12,087,121 cf Inflow=526.21 cfs 393.841 af
Outflow=94.50 cfs 393.841 af

**Pond 10P:** Peak Elev=1,229.83' Storage=445,054 cf Inflow=229.27 cfs 147.855 af
Outflow=215.76 cfs 147.576 af

**Pond 11P:** Peak Elev=1,212.38' Storage=2,022,245 cf Inflow=648.89 cfs 326.712 af
Outflow=520.40 cfs 318.125 af

**Pond 17P: Marsh Lake** Peak Elev=1,193.63' Storage=1,869,893 cf Inflow=719.03 cfs 58.909 af
Outflow=27.02 cfs 23.944 af

**Pond EXIT:** Inflow=45.19 cfs 842.036 af
Primary=45.19 cfs 842.036 af

Total Runoff Area = 3,899.300 ac Runoff Volume = 1,089.070 af Average Runoff Depth = 3.35"
93.32% Pervious Area = 3,638.700 ac 6.68% Impervious Area = 260.600 ac



## Subcatchment A:

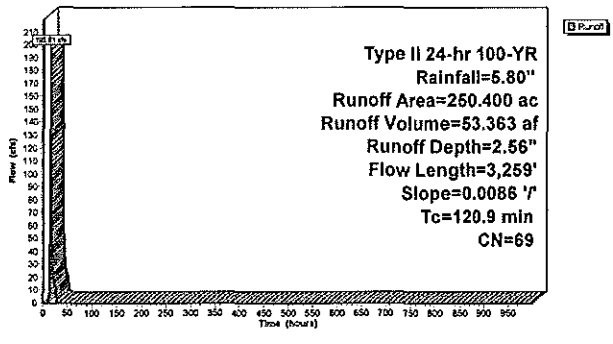
Runoff = 195.91 cfs @ 13.55 hrs, Volume= 53.363 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 250.400 | 69 | |
| 250.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 120.9 | 3,259 | 0.0088 | 0.45 | | Lag/CN Method, |

## Subcatchment A:



### Subcatchment A1: Lake Magnor

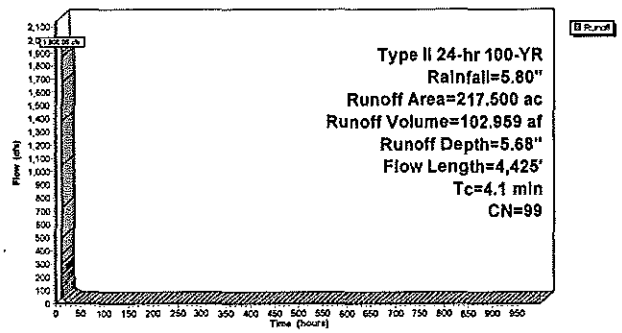
Runoff = 1,906.06 cfs @ 11.94 hrs, Volume= 102.959 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 217.500 | 99 | LAKE MAGNOR |
| 217.500 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.1 | 4,425 | | 17.94 | | Lake or Reservoir, Mean Depth= 10.00' |

### Subcatchment A1: Lake Magnor






### Subcatchment B:

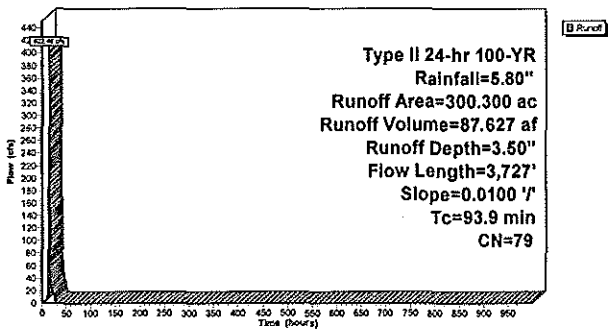
Runoff = 402.46 cfs @ 13.05 hrs, Volume= 87.627 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 300.300 | 79 | |
| 300.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 93.9 | 3,727 | 0.0100 | 0.66 | | Lag/CN Method, |

### Subcatchment B:






### Subcatchment B1: Barbo Lake

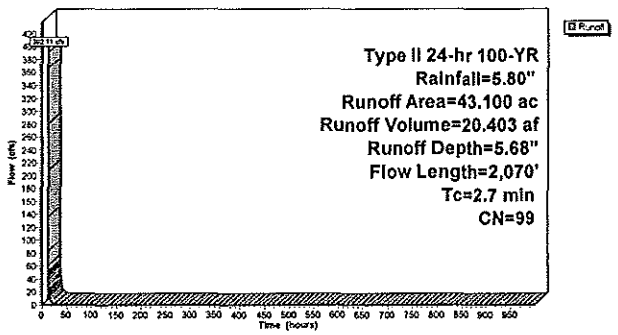
Runoff = 392.11 cfs @ 11.93 hrs, Volume= 20.403 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 43.100 | 99 | BARBO LAKE |
| 43.100 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.7 | 2,070 | | 12.69 | | Lake or Reservoir, Mean Depth= 5.00' |

### Subcatchment B1: Barbo Lake






### Subcatchment C:

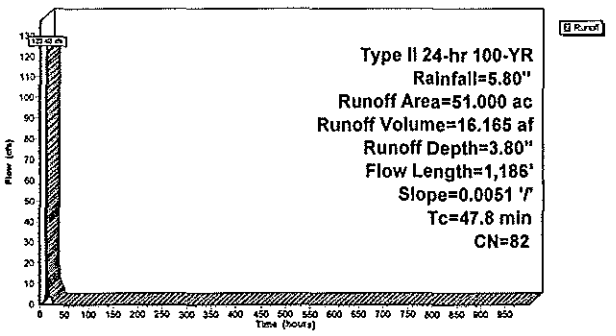
Runoff = 122.40 cfs @ 12.47 hrs, Volume= 16.165 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 51.000 | 82 | |
| 51.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.8 | 1,186 | 0.0051 | 0.41 | | Lag/CN Method, |

### Subcatchment C:



### Subcatchment D:

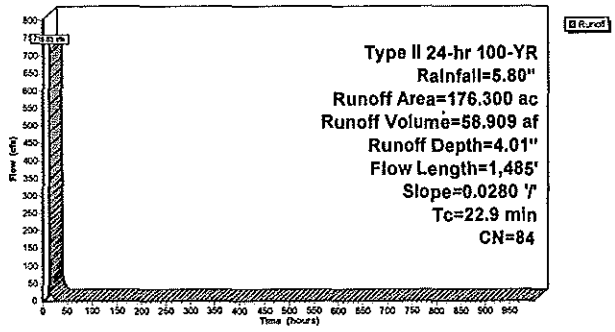
Runoff = 719.03 cfs @ 12.15 hrs, Volume= 58.909 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 176.300 | 84 | |
| 176.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 22.9 | 1,485 | 0.0280 | 1.08 | | Lag/CN Method, |

### Subcatchment D:






### Subcatchment E:

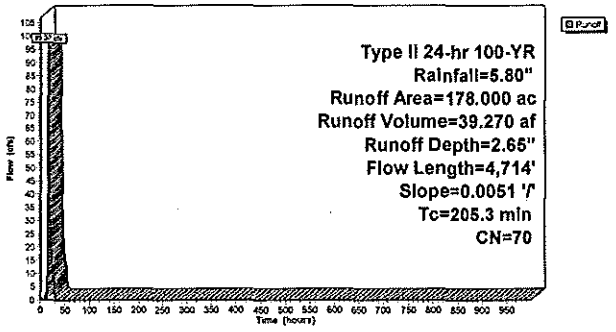
Runoff = 95.37 cfs @ 14.61 hrs, Volume= 39.270 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 178.000 | 70 | |
| 178.000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 205.3 | 4,714 | 0.0051 | 0.38 | | Lag/CN Method, |

### Subcatchment E:






### Subcatchment F:

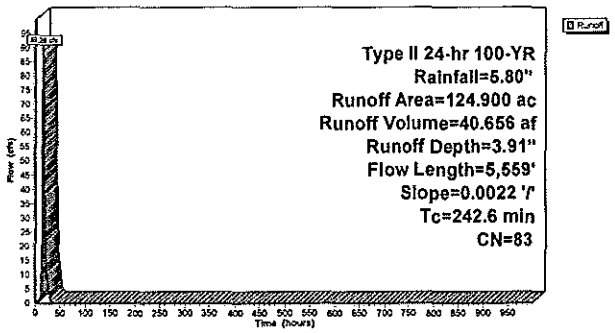
Runoff = 89.28 cfs @ 14.84 hrs, Volume= 40.656 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 124.900 | 83 | |
| 124.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 242.6 | 5,559 | 0.0022 | 0.38 | | Lag/CN Method, |

### Subcatchment F:






### Subcatchment G:

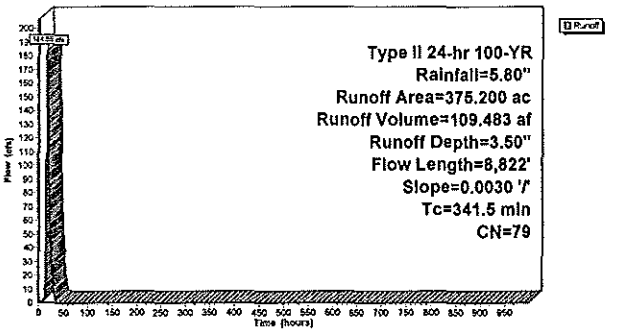
Runoff = 184.55 cfs @ 16.32 hrs, Volume= 109.483 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 375.200 | 79 | |
| 375.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 341.5 | 8,822 | 0.0030 | 0.43 | | Lag/CN Method, |

### Subcatchment G:



## Subcatchment H:

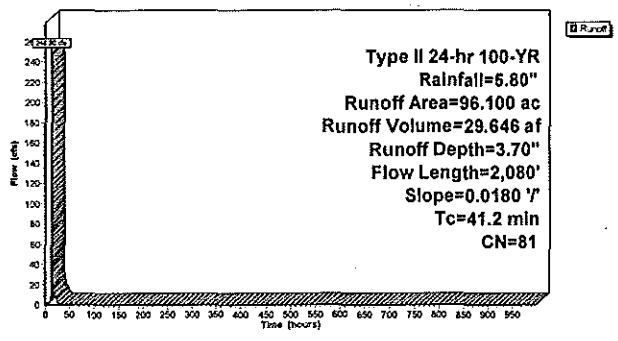
Runoff = 248.90 cfs @ 12.38 hrs, Volume= 29.646 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 96.100 | 81 | |
| 96.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 41.2 | 2,080 | 0.0180 | 0.84 | | Lag/CN Method, |

## Subcatchment H:






## Subcatchment I:

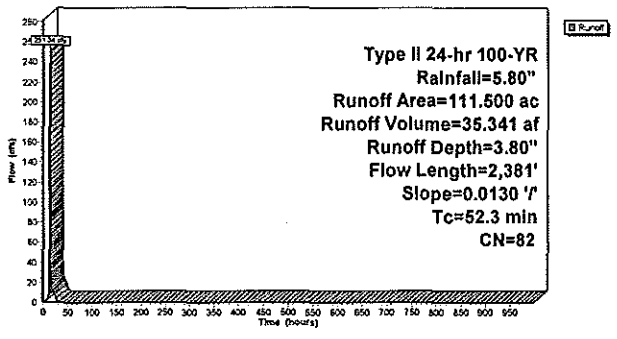
Runoff = 251.34 cfs @ 12.50 hrs, Volume= 35.341 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 111.500 | 82 | |
| 111.500 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 52.3 | 2,381 | 0.0130 | 0.76 | | Lag/CN Method, |

## Subcatchment I:






## Subcatchment J:

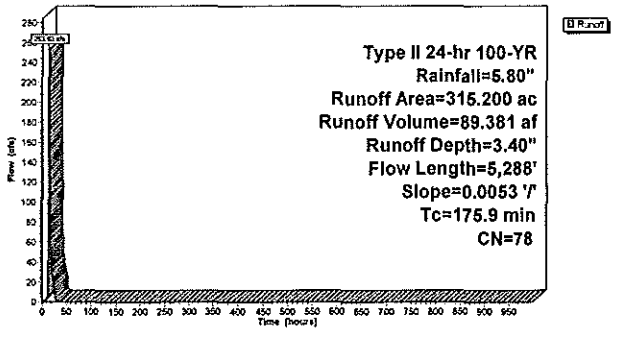
Runoff = 253.63 cfs @ 14.25 hrs, Volume= 89.381 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 315.200 | 78 | |
| 315.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 175.9 | 5,288 | 0.0053 | 0.50 | | Lag/CN Method, |

## Subcatchment J:






## Subcatchment K:

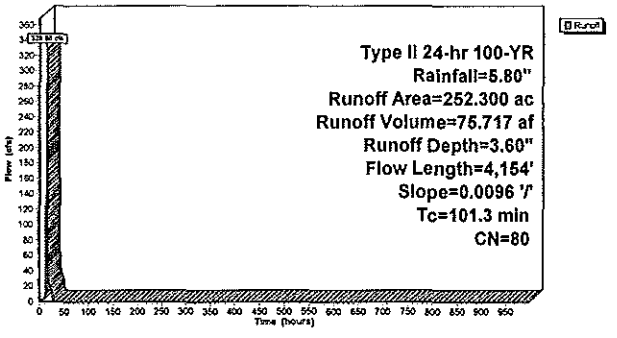
Runoff = 328.86 cfs @ 13.16 hrs, Volume= 75.717 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 252.300 | 80 | |
| 252.300 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 101.3 | 4,154 | 0.0096 | 0.68 | | Lag/CN Method, |

## Subcatchment K:



### Subcatchment L:

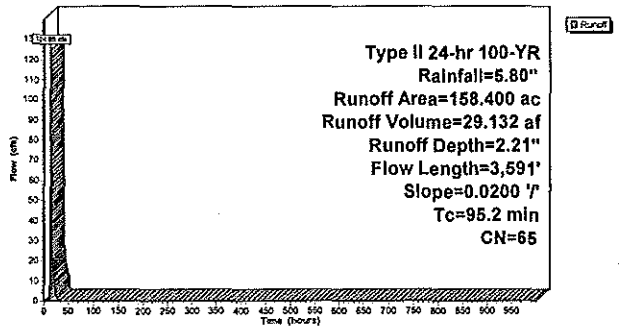
Runoff = 124.95 cfs @ 13.14 hrs, Volume= 29.132 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 158.400 | 65 | |
| 158.400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 95.2 | 3,591 | 0.0200 | 0.63 | | Lag/CN Method, |

### Subcatchment L:






### Subcatchment M:

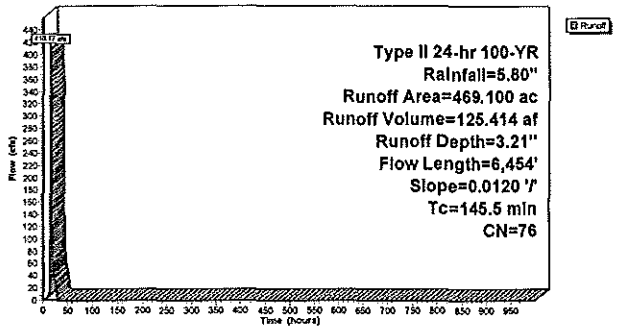
Runoff = 410.17 cfs @ 13.74 hrs, Volume= 125.414 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 469.100 | 76 | |
| 469.100 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 145.5 | 6,454 | 0.0120 | 0.74 | | Lag/CN Method, |

### Subcatchment M:






### Subcatchment N:

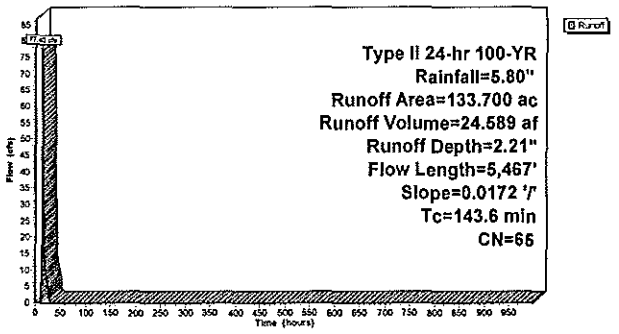
Runoff = 77.40 cfs @ 13.68 hrs, Volume= 24.589 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 133.700 | 65 | |
| 133.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 143.6 | 5,467 | 0.0172 | 0.63 | | Lag/CN Method, |

### Subcatchment N:






### Subcatchment O:

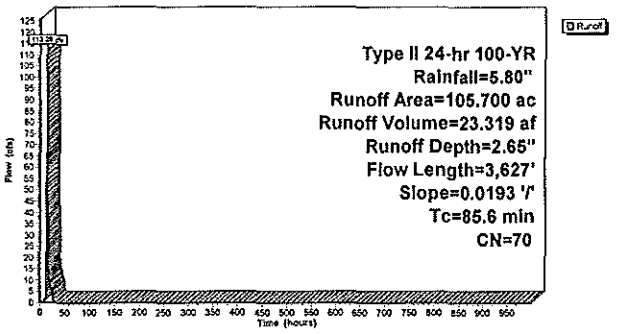
Runoff = 112.29 cfs @ 13.02 hrs, Volume= 23.319 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 105.700 | 70 | |
| 105.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 85.6 | 3,627 | 0.0193 | 0.71 | | Lag/CN Method, |

### Subcatchment O:



### Subcatchment P:

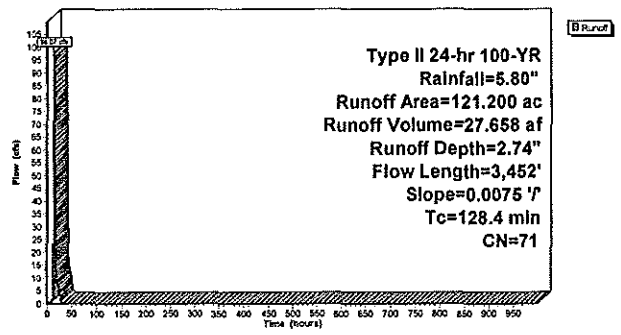
Runoff = 98.07 cfs @ 13.55 hrs, Volume= 27.658 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 121.200 | 71 | |
| 121.200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 128.4 | 3,452 | 0.0075 | 0.45 | | Lag/CN Method, |

### Subcatchment P:






### Subcatchment Q:

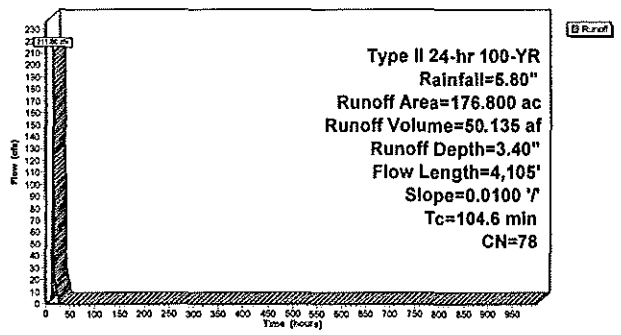
Runoff = 211.00 cfs @ 13.16 hrs, Volume= 50.135 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 176.800 | 78 | |
| 176.800 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 104.6 | 4,105 | 0.0100 | 0.65 | | Lag/CN Method, |

### Subcatchment Q:






### Subcatchment R:

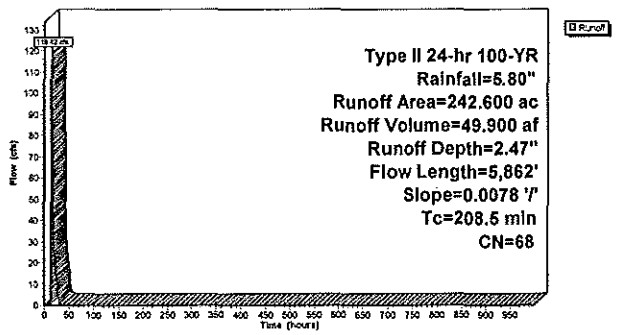
Runoff = 119.42 cfs @ 14.60 hrs, Volume= 49.900 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-YR Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 242.600 | 68 | |
| 242.600 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 208.5 | 5,862 | 0.0078 | 0.47 | | Lag/CN Method, |

### Subcatchment R:






### Reach 8R:

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 1.05'

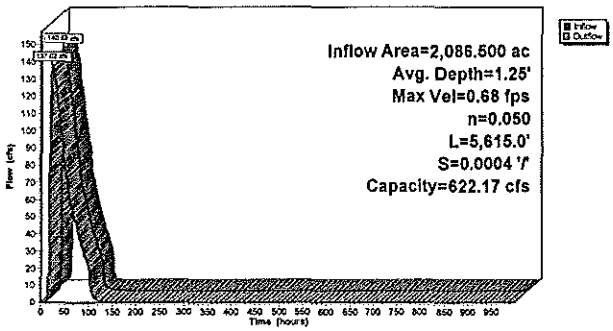
Inflow Area = 2,086.500 ac, Inflow Depth = 2.98" for 100-YR event
Inflow = 140.89 cfs @ 16.87 hrs, Volume= 518.563 af
Outflow = 137.02 cfs @ 22.44 hrs, Volume= 518.562 af, Atten= 3%, Lag= 334.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.68 fps, Min. Travel Time= 138.2 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 923.3 min

Peak Storage= 1,136,491 cf @ 20.13 hrs, Average Depth at Peak Storage= 1.25'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 622.17 cfs

150.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 210.00'
Length= 5,615.0' Slope= 0.0004 '/'
Inlet Invert= 1,196.90', Outlet Invert= 1,194.50'

### Reach 8R:



## Reach 10R:

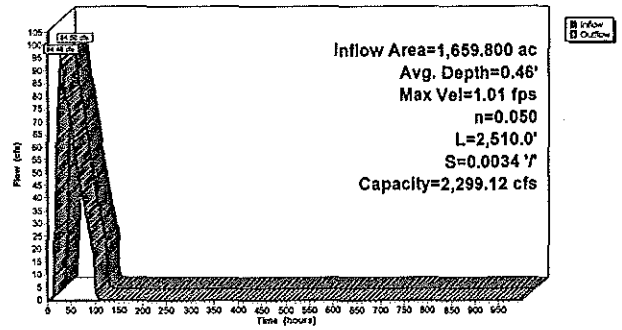
Inflow Area = 1,659.800 ac, Inflow Depth = 2.85" for 100-YR event
Inflow = 94.50 cfs @ 26.79 hrs, Volume= 393.841 af
Outflow = 94.46 cfs @ 27.92 hrs, Volume= 393.841 af, Atten= 0%, Lag= 67.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.01 fps, Min. Travel Time= 41.2 min
Avg. Velocity = 0.22 fps, Avg. Travel Time= 187.5 min

Peak Storage= 233,691 cf @ 27.23 hrs, Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,299.12 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,510.0' Slope= 0.0034 '/'
Inlet Invert= 1,205.80', Outlet Invert= 1,197.20'

## Reach 10R:






## Reach 12R:

[81] Warning: Exceeded Pond 11P by 2.00' @ 0.00 hrs

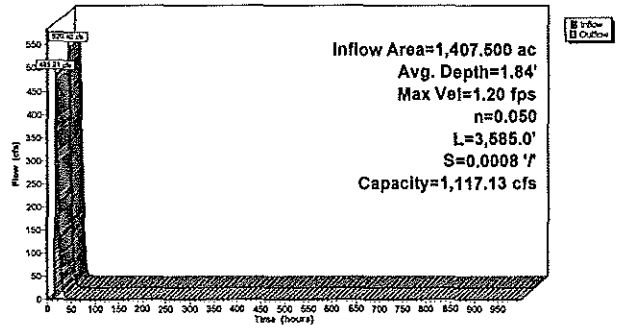
Inflow Area = 1,407.500 ac, Inflow Depth = 2.71" for 100-YR event
Inflow = 520.49 cfs @ 15.09 hrs, Volume= 318.125 af
Outflow = 485.21 cfs @ 16.71 hrs, Volume= 318.124 af, Atten= 7%, Lag= 97.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 49.6 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 614.3 min

Peak Storage= 1,444,762 cf @ 15.88 hrs, Average Depth at Peak Storage= 1.84'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,117.13 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 3,585.0' Slope= 0.0008 '/'
Inlet Invert= 1,209.00', Outlet Invert= 1,206.10'

## Reach 12R:






## Reach 13R:

[61] Hint: Submerged 12% of Reach 14R bottom

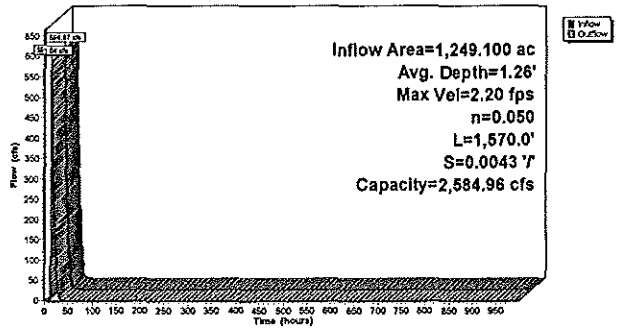
Inflow Area = 1,249.100 ac, Inflow Depth = 2.86" for 100-YR event
Inflow = 594.67 cfs @ 13.99 hrs, Volume= 297.580 af
Outflow = 591.04 cfs @ 14.31 hrs, Volume= 297.580 af, Atten= 1%, Lag= 19.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.20 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 124.2 min

Peak Storage= 421,928 cf @ 14.11 hrs, Average Depth at Peak Storage= 1.26'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,584.96 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,570.0' Slope= 0.0043 '/'
Inlet Invert= 1,214.00', Outlet Invert= 1,207.20'

## Reach 13R:






## Reach 14R:

[61] Warning: Exceeded Pond 10P by 0.50' @ 0.00 hrs

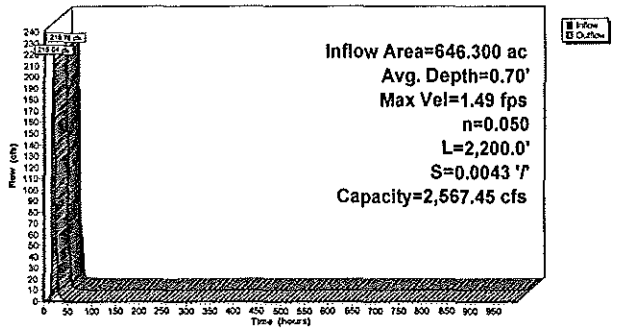
Inflow Area = 646.300 ac, Inflow Depth = 2.74" for 100-YR event
Inflow = 215.76 cfs @ 16.16 hrs, Volume= 147.576 af
Outflow = 215.04 cfs @ 16.84 hrs, Volume= 147.576 af, Atten= 0%, Lag= 41.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 24.6 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 180.6 min

Peak Storage= 316,969 cf @ 16.43 hrs, Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,567.45 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 2,200.0' Slope= 0.0043 '/'
Inlet Invert= 1,223.50', Outlet Invert= 1,214.10'

## Reach 14R:



## Reach 15R:

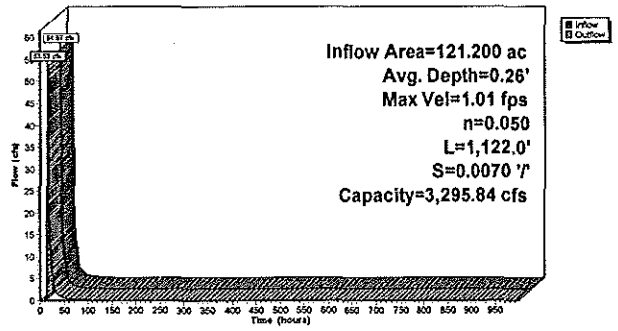
Inflow Area = 121.200 ac, Inflow Depth = 2.43" for 100-YR event
Inflow = 54.97 cfs @ 14.68 hrs, Volume= 24.501 af
Outflow = 53.53 cfs @ 15.25 hrs, Volume= 24.501 af, Atten= 3%, Lag= 34.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.01 fps, Min. Travel Time= 18.5 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 76.0 min

Peak Storage= 59,371 cf @ 14.94 hrs, Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 3,295.84 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,122.0' Slope= 0.0070 '/'
Inlet Invert= 1,258.00', Outlet Invert= 1,250.10'

## Reach 15R:






## Reach 16R:

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 2.64'

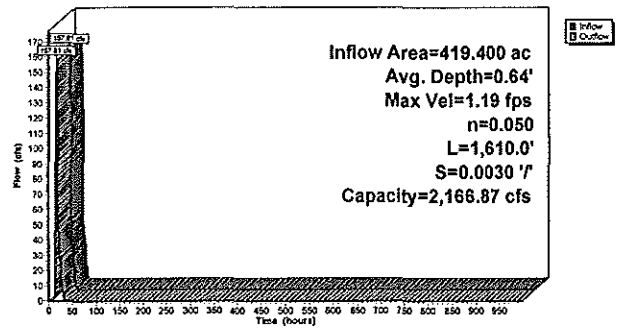
Inflow Area = 419.400 ac, Inflow Depth = 2.86" for 100-YR event
Inflow = 157.91 cfs @ 15.34 hrs, Volume= 100.035 af
Outflow = 157.61 cfs @ 15.95 hrs, Volume= 100.035 af, Atten= 0%, Lag= 36.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.19 fps, Min. Travel Time= 22.5 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 75.2 min

Peak Storage= 212,670 cf @ 15.58 hrs, Average Depth at Peak Storage= 0.64'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,166.87 cfs

200.00' x 3.00' deep channel, n= 0.050
Side Slope Z-value= 10.0 '/' Top Width= 260.00'
Length= 1,610.0' Slope= 0.0030 '/'
Inlet Invert= 1,255.00', Outlet Invert= 1,250.10'

## Reach 16R:






## Reach 21R:

[61] Hint: Submerged 98% of Reach 8R bottom

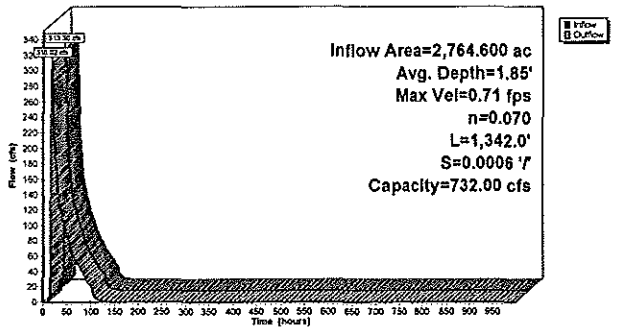
Inflow Area = 2,764.600 ac, Inflow Depth = 2.90" for 100-YR event
Inflow = 313.30 cfs @ 16.33 hrs, Volume= 668.701 af
Outflow = 310.02 cfs @ 17.41 hrs, Volume= 668.700 af, Atten= 1%, Lag= 65.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Max. Velocity= 0.71 fps, Min. Travel Time= 31.6 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 259.3 min

Peak Storage= 587,375 cf @ 16.88 hrs, Average Depth at Peak Storage= 1.85'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 732.00 cfs

200.00' x 3.00' deep channel, n= 0.070 Sluggish weedy reaches w/pools
Side Slope Z-value= 20.0 '/' Top Width= 320.00'
Length= 1,342.0' Slope= 0.0006 '/'
Inlet Invert= 1,195.00', Outlet Invert= 1,194.20'

## Reach 21R:






## Pond 1P:

Inflow Area = 3,626.900 ac, Inflow Depth = 3.14" for 100-YR event
Inflow = 2,375.26 cfs @ 11.94 hrs, Volume= 949.217 af
Outflow = 45.19 cfs @ 74.37 hrs, Volume= 842.036 af, Atten= 98%, Lag= 3,745.7 min
Primary = 45.19 cfs @ 74.37 hrs, Volume= 842.036 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,191.73' @ 74.37 hrs Surf.Area= 18,135,309 sf Storage= 30,327,507 cf

Plug-Flow detention time= 12,219.1 min calculated for 842.019 af (89% of inflow)
Center-of-Mass det. time= 11,814.6 min ( 13,843.5 - 2,028.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 39,292,918 cf | Lake Magnor (Prismatic)Listed below (Recalc) |
| #2 | 1,190.00' | 24,221,898 cf | Barbo Lake (Prismatic)Listed below (Recalc) |
| #3 | 1,190.00' | 19,504,098 cf | Mud Lake (Prismatic)Listed below (Recalc) |
| | | 83,018,913 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 9,474,713 | 0 | 0 |
| 1,192.00 | 9,822,178 | 19,296,891 | 19,296,891 |
| 1,194.00 | 10,173,849 | 19,996,027 | 39,292,918 |

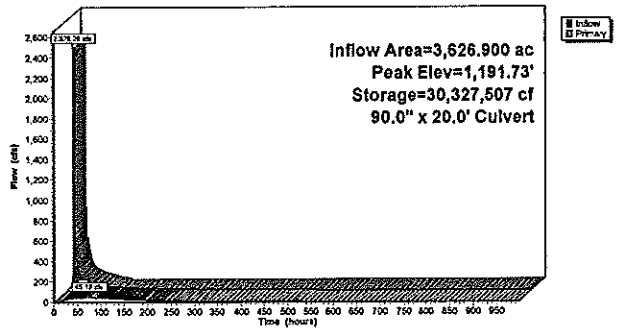
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,912,341 | 0 | 0 |
| 1,195.00 | 5,776,418 | 24,221,898 | 24,221,898 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 3,587,635 | 0 | 0 |
| 1,195.00 | 4,214,004 | 19,504,098 | 19,504,098 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,190.00' | 90.0" x 20.0' long Culvert X 2.00<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,189.70' S= 0.0150 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |

Primary OutFlow Max=45.19 cfs @ 74.37 hrs HW=1,191.73' (Free Discharge)
└1=Culvert (Barrel Controls 45.19 cfs @ 4.43 fps)

## Pond 1P:






## Pond 4P:

Inflow Area = 178.000 ac, Inflow Depth = 2.65" for 100-YR event
Inflow = 95.37 cfs @ 14.61 hrs, Volume= 39.270 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

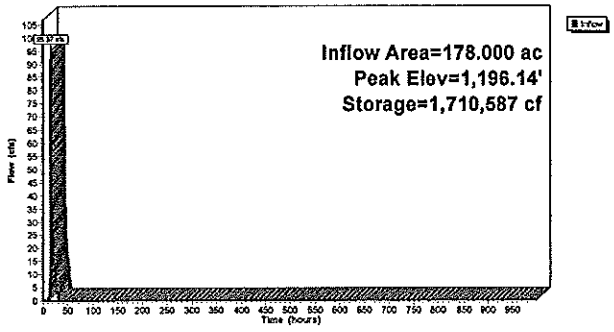
Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,196.14' @ 35.60 hrs Surf.Area= 1,290,624 sf Storage= 1,710,587 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,194.50' | 2,879,843 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,194.50 | 279,331 | 0 | 0 |
| 1,195.00 | 1,101,921 | 345,313 | 345,313 |
| 1,197.00 | 1,432,609 | 2,534,530 | 2,879,843 |

## Pond 4P:






## Pond 5P: Greley Lake

Inflow Area = 96.100 ac, Inflow Depth = 3.70" for 100-YR event
Inflow = 248.90 cfs @ 12.38 hrs, Volume= 29.646 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.88' @ 26.38 hrs Surf.Area= 704,690 sf Storage= 1,291,380 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,192.00' | 6,458,361 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

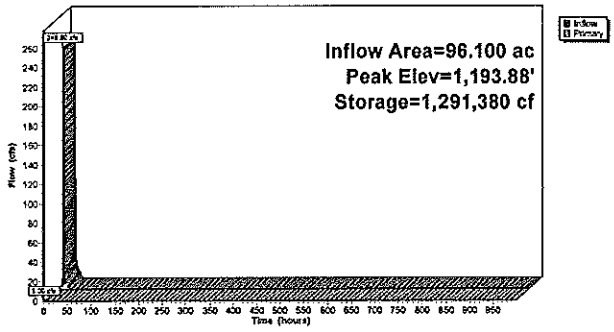
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,192.00 | 666,399 | 0 | 0 |
| 1,194.00 | 707,054 | 1,373,453 | 1,373,453 |
| 1,196.00 | 748,224 | 1,455,278 | 2,828,731 |
| 1,198.00 | 789,737 | 1,537,961 | 4,366,692 |
| 1,200.00 | 1,301,932 | 2,091,669 | 6,458,361 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,199.00' | 20.0' long x 20.0' breadth Broad-Crested Rectangular Weir<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,192.00' (Free Discharge)
↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 5P: Greley Lake



## Pond 6P:

[61] Hint: Submerged 53% of Reach 10R bottom

Inflow Area = 2,086.500 ac, Inflow Depth = 2.98" for 100-YR event
Inflow = 313.22 cfs @ 12.60 hrs, Volume= 518.563 af
Outflow = 140.89 cfs @ 16.87 hrs, Volume= 518.563 af, Atten= 55%, Lag= 256.2 min
Primary = 140.89 cfs @ 16.87 hrs, Volume= 518.563 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,201.72' @ 16.87 hrs Surf.Area= 2,009,090 sf Storage= 2,125,754 cf

Plug-Flow detention time= 104.3 min calculated for 518.563 af (100% of inflow)
Center-of-Mass det. time= 104.3 min ( 2,525.5 - 2,421.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,200.00' | 5,386,561 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

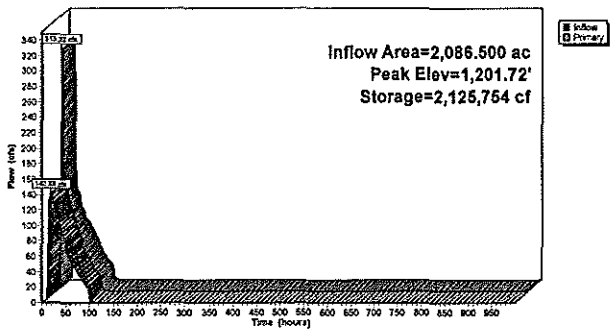
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,200.00 | 404,702 | 0 | 0 |
| 1,201.00 | 1,385,892 | 895,297 | 895,297 |
| 1,203.00 | 3,105,372 | 4,491,264 | 5,386,561 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,197.10' | **48.0" x 20.0' long Culvert X 2.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,197.00' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,202.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=140.89 cfs @ 16.87 hrs HW=1,201.72' (Free Discharge)**
**1=Culvert (Barrel Controls 140.89 cfs @ 6.09 fps)**
**2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**



## Pond 6P:






## Pond 7P:

Inflow Area = 121.200 ac, Inflow Depth = 2.74" for 100-YR event
Inflow = 98.07 cfs @ 13.55 hrs, Volume= 27.658 af
Outflow = 54.97 cfs @ 14.68 hrs, Volume= 24.501 af, Atten= 44%, Lag= 67.9 min
Primary = 54.97 cfs @ 14.68 hrs, Volume= 24.501 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,260.91' @ 14.68 hrs Surf.Area= 195,715 sf Storage= 488,301 cf

Plug-Flow detention time= 758.4 min calculated for 24.501 af (89% of inflow)
Center-of-Mass det. time= 700.7 min ( 1,648.0 - 947.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,258.00' | 505,511 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

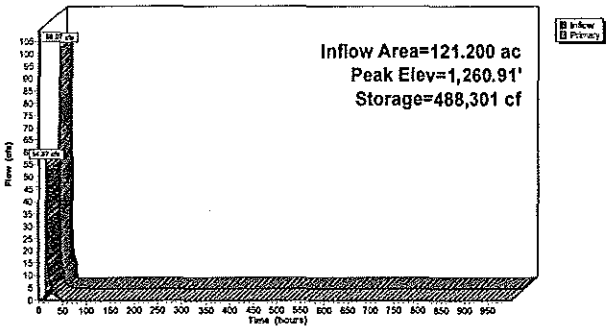
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,258.00 | 114,081 | 0 | 0 |
| 1,260.00 | 195,715 | 309,796 | 309,796 |
| 1,261.00 | 195,715 | 195,715 | 505,511 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,259.00' | **24.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,258.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=54.96 cfs @ 14.68 hrs HW=1,260.91' (Free Discharge)**
**1=Culvert (Barrel Controls 9.07 cfs @ 3.76 fps)**
**2=Broad-Crested Rectangular Weir (Weir Controls 45.89 cfs @ 2.52 fps)**



## Pond 7P:



## Pond 8P:

Inflow Area = 419.400 ac, Inflow Depth = 2.86" for 100-YR event
Inflow = 271.13 cfs @ 13.43 hrs, Volume= 100.035 af
Outflow = 157.91 cfs @ 15.34 hrs, Volume= 100.035 af, Atten= 42%, Lag= 114.4 min
Primary = 157.91 cfs @ 15.34 hrs, Volume= 100.035 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,258.93' @ 15.34 hrs Surf.Area= 780,876 sf Storage= 820,415 cf

Plug-Flow detention time= 47.2 min calculated for 100.033 af (100% of inflow)
Center-of-Mass det. time= 47.2 min ( 1,015.9 - 968.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,257.00' | 3,038,942 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

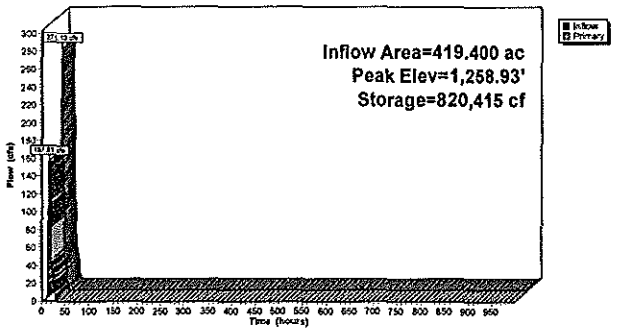
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,257.00 | 68,271 | 0 | 0 |
| 1,260.00 | 1,174,614 | 1,864,328 | 1,864,328 |
| 1,261.00 | 1,174,614 | 1,174,614 | 3,038,942 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,253.00' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,252.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,260.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=157.91 cfs @ 15.34 hrs HW=1,258.93' TW=1,255.00' (Fixed TW Elev= 1,255.00')**
1=Culvert (Barrel Controls 157.91 cfs @ 7.02 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 8P:






## Pond 9P:

[63] Warning: Exceeded Reach 12R inflow depth by 2.54' @ 30.90 hrs

Inflow Area = 1,659.800 ac, Inflow Depth = 2.85" for 100-YR event
Inflow = 526.21 cfs @ 16.61 hrs, Volume= 393.841 af
Outflow = 94.50 cfs @ 26.79 hrs, Volume= 393.841 af, Atten= 82%, Lag= 610.8 min
Primary = 94.50 cfs @ 26.79 hrs, Volume= 393.841 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,211.97' @ 26.79 hrs Surf.Area= 3,874,404 sf Storage= 12,087,121 cf

Plug-Flow detention time= 1,585.3 min calculated for 393.841 af (100% of inflow)
Center-of-Mass det. time= 1,585.3 min ( 2,798.4 - 1,213.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,208.00' | 16,083,958 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

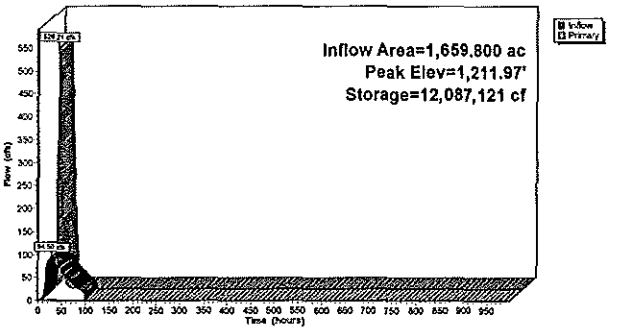
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,208.00 | 1,411,294 | 0 | 0 |
| 1,210.00 | 3,455,564 | 4,866,858 | 4,866,858 |
| 1,212.00 | 3,880,768 | 7,336,332 | 12,203,190 |
| 1,213.00 | 3,880,768 | 3,880,768 | 16,083,958 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,206.00' | **48.0" x 25.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,205.90' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,212.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow Max=94.50 cfs @ 26.79 hrs HW=1,211.97' TW=1,207.00' (Fixed TW Elev= 1,207.00')**
1=Culvert (Barrel Controls 94.50 cfs @ 7.52 fps)
2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 9P:



## Pond 10P:

Inflow Area = 648.300 ac, Inflow Depth = 2.75" for 100-YR event
Inflow = 229.27 cfs @ 15.24 hrs, Volume= 147.855 af
Outflow = 215.76 cfs @ 16.16 hrs, Volume= 147.576 af, Atten= 6%, Lag= 54.7 min
Primary = 215.76 cfs @ 16.16 hrs, Volume= 147.576 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,229.83' @ 16.16 hrs Surf.Area= 125,397 sf Storage= 445,054 cf

Plug-Flow detention time= 71.3 min calculated for 147.573 af (100% of inflow)
Center-of-Mass det. time= 29.7 min ( 1,177.5 - 1,147.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,223.00' | 596,246 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

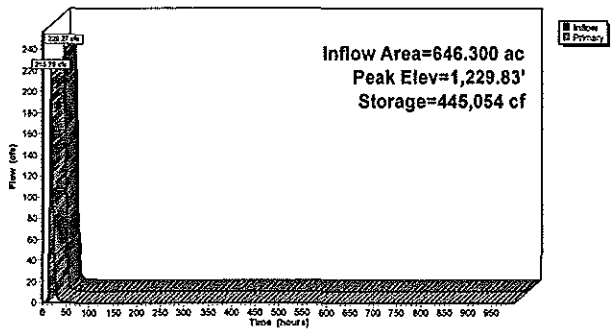
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,223.00 | 21,295 | 0 | 0 |
| 1,228.00 | 81,139 | 256,085 | 256,085 |
| 1,230.00 | 129,511 | 210,650 | 466,735 |
| 1,231.00 | 129,511 | 129,511 | 596,246 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,222.50' | **72.0" x 20.0' long Culvert** CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,222.30' S= 0.0100 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,230.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=215.77 cfs @ 16.16 hrs HW=1,229.83' TW=1,223.50' (Fixed TW Elev= 1,223.50')
├─1=Culvert (Barrel Controls 215.77 cfs @ 7.95 fps)
└─2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 10P:






## Pond 11P:

[51] Hint: Submerged 76% of Reach 13R bottom

Inflow Area = 1,407.500 ac, Inflow Depth = 2.79" for 100-YR event
Inflow = 648.89 cfs @ 14.23 hrs, Volume= 326.712 af
Outflow = 520.40 cfs @ 15.09 hrs, Volume= 318.125 af, Atten= 20%, Lag= 51.9 min
Primary = 520.40 cfs @ 15.09 hrs, Volume= 318.125 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,212.38' @ 15.09 hrs Surf.Area= 544,729 sf Storage= 2,022,245 cf

Plug-Flow detention time= 115.3 min calculated for 318.119 af (97% of inflow)
Center-of-Mass det. time= 55.3 min ( 1,163.9 - 1,108.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,207.00' | 2,933,772 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |

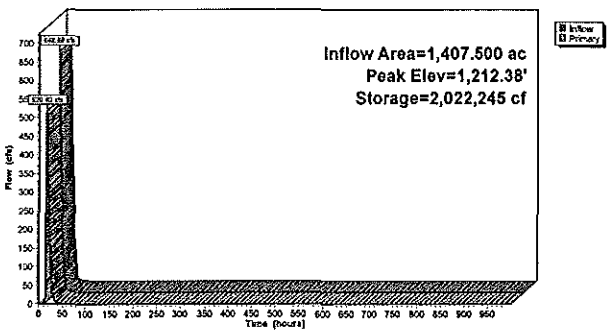
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,207.00 | 34,962 | 0 | 0 |
| 1,210.00 | 491,135 | 789,146 | 789,146 |
| 1,214.00 | 581,178 | 2,144,626 | 2,933,772 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,207.10' | **72.0" x 25.0' long Culvert X 4.00**<br>CMP, projecting, no headwall, Ke= 0.900<br>Outlet Invert= 1,207.00' S= 0.0040 '/' Cc= 0.900<br>n= 0.025 Corrugated metal |
| #2 | Primary | 1,214.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=520.39 cfs @ 15.09 hrs HW=1,212.38' TW=1,209.00' (Fixed TW Elev= 1,209.00')
├─1=Culvert (Barrel Controls 520.39 cfs @ 6.57 fps)
└─2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



## Pond 11P:



## Pond 17P: Marsh Lake

Inflow Area = 176.300 ac, Inflow Depth = 4.01" for 100-YR event
Inflow = 719.03 cfs @ 12.15 hrs, Volume= 58.909 af
Outflow = 27.02 cfs @ 15.54 hrs, Volume= 23.944 af, Atten= 96%, Lag= 203.6 min
Primary = 27.02 cfs @ 15.54 hrs, Volume= 23.944 af

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs
Peak Elev= 1,193.63' @ 15.54 hrs Surf.Area= 556,381 sf Storage= 1,869,893 cf

Plug-Flow detention time= 554.5 min calculated for 23.943 af (41% of inflow)
Center-of-Mass det. time= 431.8 min ( 1,249.2 - 817.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,190.00' | 3,205,992 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

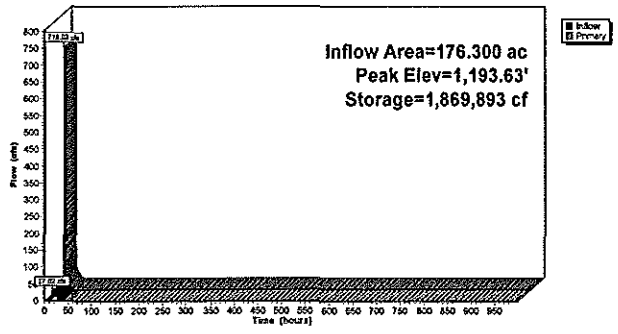
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 1,190.00 | 473,448 | 0 | 0 |
| 1,194.00 | 564,774 | 2,076,444 | 2,076,444 |
| 1,196.00 | 564,774 | 1,129,548 | 3,205,992 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,193.00' | **20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** |
| | | | Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 |
| | | | Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

Primary OutFlow Max=27.01 cfs @ 15.54 hrs HW=1,193.63' (Free Discharge)
└1=Broad-Crested Rectangular Weir (Weir Controls 27.01 cfs @ 2.14 fps)



## Pond 17P: Marsh Lake





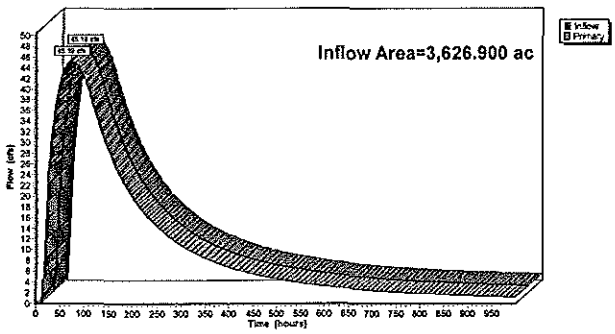

## Pond EXIT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,626.900 ac, Inflow Depth > 2.79" for 100-YR event
Inflow = 45.19 cfs @ 74.37 hrs, Volume= 842.036 af
Primary = 45.19 cfs @ 74.37 hrs, Volume= 842.036 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-999.00 hrs, dt= 0.02 hrs

## Pond EXIT:



# APPENDIX C

## WiLMS REPORT

both English (lb./acre) and metric (mg/m2) units. The WiLMS phosphorus-loading module also allows the user to evaluate future planning scenarios with the % SOURCE CHANGE slide bar. By selecting a value between 0 and 100%, WiLMS calculates corresponding future percent increase or decrease in the annual non-point source or point source total and areal loading in English and metric units. WiLMS applies the reduction to all nonpoint loading sources except atmospheric deposition on the lake's surface and septic tank loading. On the point source side, the change is applied to the total point source load value. Setting the % SOURCE CHANGE value to 0 will output the existing total and areal phosphorus loading to the lake without reduction.

### Phosphorus Export Coefficients

Because export coefficients can vary greatly within and between different land use types and geographic regions, it is highly recommended that local export values be used whenever possible. One source of this data is a WDNR Bureau of Research study on the recommended export coefficients for agricultural and forested land and a U.S. Geological Survey fact sheet. Monitoring data for the watershed should be used when possible to determine export coefficients. WiLMS accounts for phosphorus loading from precipitation and dry fallout in Kg / Ha / Yr over the lake's surface. Regional precipitation and dryfall loading values are usually available and are adequate for input into WiLMS.

Panuska, John C. and R.A. Lilly, 1995. Phosphorus Loadings from Wisconsin Watersheds: Recommended Export Coefficients for Agricultural and Forested Watersheds. WDNR Research Management Findings. No. 38, 4p.

Corsi, S. R., Graczyk, D. J., Owens, D.W. and R. T. Bannerman. 1997. Unit-area loads of suspended sediment, suspended solids, and total phosphorus from small watersheds in Wisconsin. USGS fact sheet No. FS-195-97. 5p.

### Phosphorus Reduction

WiLMS contains a slide bar feature that allows the user to increase or decrease the non-point source or point source loading a specified amount. By moving the bar to the right the lump sum TP loading from the land use driven non-point sources is changed (increased or decreased) by the noted percentage. Moving the point source pointer performs the same operation on the total point source TP loading. The track ball feature for the nonpoint source loading applies only to the upland sources (each land cover class) and does not apply to septic loads or atmospheric deposition. To advance the slider bar up or down by a single percentage point, simple left mouse click in the white slide area to the right or left of the pointer

## Point Source Module

### Point Sources

In addition to phosphorus sources from the drainage area and precipitation upon the lake surface, WiLMS permits the user to input up to 6 point sources and net septic system loading values. Direct annual nutrient loading in kilograms and water loading in cubic meters can be entered as point sources such as wastewater treatment plants, augmentation pumping, etc. Actual monitoring data collected over a suitable period of time, coupled with the flow- weighted mean nutrient concentration and hydraulic loading, is one way to obtain point source loading estimates.

### Septic Tanks

The septic system phosphorus loading is calculated using drain field outflow values in kilograms/capita-year. One capita-year is equal to one person occupying a dwelling for a period of one year. Use of this subroutine in the model requires the collection of population survey data for the number of individuals along the shoreline served by septic systems. Such a population survey determines usage data for both permanent and seasonal dwellings adjacent to the lake for inclusion into the following equations from Reckhow, K. H. and J. T Simpson (1980):

**Date: 1/9/2006 Scenario: 24**

Lake Id: Lake Magnor 1
Watershed Id: 80% Contribution

**Hydrologic and Morphometric Data**

Tributary Drainage Area: 1429.8 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 953.2 acre-ft
Lake Surface Area <As>: 275 acre
Lake Volume <V>: 2302 acre-ft
Lake Mean Depth <z>: 8.4 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1028.8 acre-ft/year
Areal Water Load <qs>: 3.7 ft/year
Lake Flushing Rate <p>: 0.45 1/year
Water Residence Time: 2.24 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

**NON-POINT SOURCE DATA**

| Land Use | Acre (ac) | Low Loading (kg/ha-year) | Most Likely Loading (kg/ha-year) | High Loading (kg/ha-year) | Loading % | Low Loading (kg/year) | Most Likely Loading (kg/year) | High Loading (kg/year) |
|---|---|---|---|---|---|---|---|---|
| Row Crop AG | 0.0 | 0.50 | 1.00 | 3.00 | 0.0 | 0 | 0 | 0 |
| Mixed AG | 641.9 | 0.30 | 0.80 | 1.40 | 64.3 | 78 | 208 | 364 |
| Pasture/Grass | 162.0 | 0.10 | 0.30 | 0.50 | 6.1 | 7 | 20 | 33 |
| HD Urban (1/8 Ac) | 26.3 | 1.00 | 1.50 | 2.00 | 4.9 | 11 | 16 | 21 |
| MD Urban (1/4 Ac) | 144.7 | 0.30 | 0.50 | 0.80 | 9.1 | 18 | 29 | 47 |
| Rural Res (>1 Ac) | 15.6 | 0.05 | 0.10 | 0.25 | 0.2 | 0 | 1 | 2 |
| Wetlands | 144.9 | 0.10 | 0.10 | 0.10 | 1.8 | 6 | 6 | 6 |
| Forest | 294.4 | 0.05 | 0.09 | 0.18 | 3.3 | 6 | 11 | 21 |
| Urban (Industrial/Commercial) | 0 | 0.00 | 0.00 | 0.00 | 0.0 | 0 | 0 | 0 |
| Lake Surface | 275.0 | 0.10 | 0.30 | 1.00 | 10.3 | 11 | 33 | 111 |

**POINT SOURCE DATA**

| Point Sources | Water Load (m^3/year) | Low (kg/year) | Most Likely (kg/year) | High (kg/year) | Loading % |
|---|---|---|---|---|---|

**SEPTIC TANK DATA**

| Description | | Low | Most Likely | High | Loading % |
|---|---|---|---|---|---|
| Septic Tank Output (kg/capita-year) | | 0.30 | 0.50 | 0.80 | |
| # capita-years | 0.0 | | | | |
| % Phosphorus Retained by Soil | | 98.0 | 90.0 | 80.0 | |
| Septic Tank Loading (kg/year) | | 0.00 | 0.00 | 0.00 | 0.0 |

**TOTALS DATA**

| Description | Low | Most Likely | High | Loading % |
|---|---|---|---|---|
| Total Loading (lb) | 299.8 | 712.8 | 1333.3 | 100.0 |
| Total Loading (kg) | 136.0 | 323.3 | 604.8 | 100.0 |
| Areal Loading (lb/ac-year) | 1.09 | 2.59 | 4.85 | |
| Areal Loading (mg/m^2-year) | 122.18 | 290.54 | 543.44 | |
| Total PS Loading (lb) | 0.0 | 0.0 | 0.0 | 0.0 |
| Total PS Loading (kg) | 0.0 | 0.0 | 0.0 | 0.0 |
| Total NPS Loading (lb) | 275.2 | 639.2 | 1088.0 | 100.0 |
| Total NPS Loading (kg) | 124.8 | 290.0 | 493.5 | 100.0 |

**Date: 1/9/2006 Scenario: 26**

Lake Id: Lake Magnor 2
Watershed Id: 20 % Contribution

**Hydrologic and Morphometric Data**

Tributary Drainage Area: 2086.2 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1390.8 acre-ft
Lake Surface Area <As>: 275.0 acre
Lake Volume <V>: 2302.0 acre-ft
Lake Mean Depth <z>: 8.4 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1466.4 acre-ft/year
Areal Water Load <qs>: 5.3 ft/year
Lake Flushing Rate <p>: 0.64 1/year
Water Residence Time: 1.57 year
Observed spring overturn total phosphorus (SPO): 60.0 mg/m^3
Observed growing season mean phosphorus (GSM): 43.0 mg/m^3
% NPS Change: 50%
% PS Change: 0%

**NON-POINT SOURCE DATA**

| Land Use | Acre (ac) | Low Loading (kg/ha-year) | Most Likely Loading (kg/ha-year) | High Loading (kg/ha-year) | Loading % | Low Loading (kg/year) | Most Likely Loading (kg/year) | High Loading (kg/year) |
|---|---|---|---|---|---|---|---|---|
| Row Crop AG | 0.0 | 0.50 | 1.00 | 3.00 | 0.0 | 0 | 0 | 0 |
| Mixed AG | 964.3 | 0.30 | 0.80 | 1.40 | 67.0 | 176 | 468 | 820 |
| Pasture/Grass | 160.3 | 0.10 | 0.30 | 0.50 | 4.2 | 10 | 29 | 49 |
| HD Urban (1/8 Ac) | 21.5 | 1.00 | 1.50 | 2.00 | 2.8 | 13 | 20 | 26 |
| MD Urban (1/4 Ac) | 44.6 | 0.30 | 0.50 | 0.80 | 1.9 | 8 | 14 | 22 |
| Rural Res (>1 Ac) | 36.8 | 0.05 | 0.10 | 0.25 | 0.3 | 1 | 2 | 6 |
| Wetlands | 202.1 | 0.10 | 0.10 | 0.10 | 1.8 | 12 | 12 | 12 |
| Forest | 656.6 | 0.05 | 0.09 | 0.18 | 5.1 | 20 | 36 | 72 |
| Urban Stuff | 0.0 | 0.00 | 0.00 | 0.00 | 0.0 | 0 | 0 | 0 |
| More Urban Stuff | 0.0 | 0.00 | 0.00 | 0.00 | 0.0 | 0 | 0 | 0 |
| Less Urban Stuff | 0.0 | 0.00 | 0.00 | 0.00 | 0.0 | 0 | 0 | 0 |
| Lake Surface | 275.0 | 0.10 | 0.30 | 1.00 | 4.8 | 11 | 33 | 111 |

**POINT SOURCE DATA**

| Point Sources | Water Load (m^3/year) | Low (kg/year) | Most Likely (kg/year) | High (kg/year) | Loading % |
|---|---|---|---|---|---|
| STP | 0 | 20.0 | 40.0 | 55.0 | 5.7 |
| Tomahawk | 0 | 15.0 | 20.0 | 35.0 | 2.9 |
| Rhinelander | 0 | 20.0 | 25.0 | 30.0 | 3.6 |
| Madison | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**SEPTIC TANK DATA**

| Description | | Low | Most Likely | High | Loading % |
|---|---|---|---|---|---|
| Septic Tank Output (kg/capita-year) | | 0.30 | 0.50 | 0.80 | |
| # capita-years | 0 | | | | |
| % Phosphorus Retained by Soil | | 98.0 | 90.0 | 80.0 | |
| Septic Tank Loading (kg/year) | | 0.00 | 0.00 | 0.00 | 0.0 |

**TOTALS DATA**

| Description | Low | Most Likely | High | Loading % |
|---|---|---|---|---|
| Total Loading (lb) | 674.5 | 1541.8 | 2726.7 | 100.0 |
| Total Loading (kg) | 306.0 | 699.4 | 1236.8 | 100.0 |
| Areal Loading (lb/ac-year) | 2.45 | 5.61 | 9.92 | |
| Areal Loading (mg/m^2-year) | 274.93 | 628.43 | 1111.38 | |

| | | | | |
|---|---|---|---|---|
| Total PS Loading (lb) | 121.3 | 187.4 | 264.6 | 12.2 |
| Total PS Loading (kg) | 55.0 | 85.0 | 120.0 | 12.2 |
| Total NPS Loading (lb) | 528.7 | 1280.8 | 2216.8 | 87.8 |
| Total NPS Loading (kg) | 239.8 | 581.0 | 1005.5 | 87.8 |

# APPENDIX D

## MODEL ORDINANCES

**POLK COUNTY**

**CHAPTER _____**

**ESTABLISHING REGULATIONS FOR LAWN FERTILIZER APPLICATION AND SALE**



**X.01 AUTHORITY.** This chapter is recommended by the Polk County Land Conservation Committee and adopted by the Polk County Board of Supervisors under the authority of sec. 92.17, Wis. Stats.

**X.02 PURPOSE AND INTENT.** The Polk County Board of Supervisors finds that Polk County's lakes and streams are a natural asset, which enhance the environmental, recreational, cultural and economic resources of the area and contribute to the general health and welfare of the public. The Board further finds that regulating the amount of nutrients and contaminants, including phosphorus contained in fertilizer, entering the lakes will improve and maintain lake water quality.

**X.03 APPLICABILITY.** **(1)** This ordinance applies in all areas of Polk County.
**(2)** Cities and villages wholly or partially in Polk County may assume administration and regulation of lawn fertilizer application and sale if they have adopted ordinances that include standards at least as restrictive as those described in ss. X.05 – X.09.

**X.04 DEFINITIONS.** **(1)** *Agricultural use* has the meaning set forth in sec. 10.01(2a).
**(2)** *Fertilizer* has the meaning set forth in sec. 94.64(1)(e), Wis. Stats.
**(3)** *Lawn fertilizer* means any fertilizer, whether distributed by property owner, renter or commercial entity, distributed for nonagricultural use, such as for lawns, golf courses, parks and cemeteries. *Lawn fertilizer* does not include fertilizer products intended primarily for garden and indoor plant application.

**X.05 REGULATION OF THE USE AND APPLICATION OF LAWN FERTILIZER.**
**(1)**
Effective _____, ____, no person shall apply any lawn fertilizer within Polk County that is labeled as containing more than 0%, 1%, 1.5% phosphorus or other compound containing phosphorus, such as phosphate, except as provided in section X.06.
**(2)** No lawn fertilizer shall be applied when the ground is frozen.
**(3)** No person shall apply fertilizer to any impervious surface including parking lots, roadways, and sidewalks. If such application occurs, the fertilizer must be immediately contained and either legally applied to turf or placed in an appropriate container.

**X.06 EXEMPTIONS.** The prohibition against the use of fertilizer under section X.05 shall not apply to:
**(1)** Newly established turf or lawn areas during their first growing season.
**(2)** Turf or lawn areas that soil tests, performed within the past three years by a state certified soil testing laboratory, confirm are below phosphorus levels established by the University of Wisconsin Extension Service. The lawn fertilizer application shall not contain an amount of phosphorus exceeding the amount and rate of application recommended in the soil test evaluation.
**(3)** Agricultural uses, vegetable and flower gardens, or application to trees or shrubs.
**(4)** Yard waste compost, biosolids or other similar materials that are primarily organic in nature and are applied to improve the physical condition of the soil.

**X.07 SALE OF FERTILIZER CONTAINING PHOSPHORUS.** **(1)** Effective _____, 200_, no person shall sell or offer for sale any lawn fertilizer within Polk County that is labeled as containing more than ___% phosphorus, or other compound containing phosphorus, such as phosphate, except such fertilizer may be sold for use as provided in section X.06.
**(2)** Effective _____, 200_, no person shall

display lawn fertilizer containing phosphorus. Signs may be posted advising customers that lawn fertilizer containing phosphorus is available upon request for uses permitted by s. X.06. X.01 – X.07(2)

**(3)** Effective _____, 200_, a sign containing the
regulations set forth in this ordinance and the effects of phosphorus on Polk County's waters must be prominently displayed where lawn fertilizers are sold.

**X.08 ENFORCEMENT.** Violations of this ordinance will be enforced by the Environmental Health Section of the Public Health Division, Department of Human Services.

**X.09 PENALTY.** Any person who violates section X.05 in the application of fertilizer at his or her residence shall be subject to a forfeiture of $25 per violation. Any commercial fertilizer applicator, residential or commercial developer, industrial or commercial owner, or other person who violates section X.05, and any person who violates section X.07, shall be subject to a forfeiture of $50 for the first violation within a twelve month period, $150 for the second violation within a twelve month period, and $300 for the third and each subsequent violation within a twelve month period.

**X.10 SEVERABILITY CLAUSE.** If any section, provision or portion of this ordinance is ruled invalid by a court, the remainder of the ordinance shall not for that reason be rendered ineffective or invalid.

x.11 EFFECTIVE DATE This ordinance shall be in force and effective from after its adoption and publication. The above foregoing ordinance was duly adopted by the Polk County Board on the _____ day of_____, 200_.

APPROVED: _____

ATTESTED: _____

PUBLISHED: _____

## APPENDIX A: TOWN OF CLAYTON CONSTRUCTION SITE EROSION CONTROL ORDINANCE

### TABLE OF CONTENTS

## MODEL CONSTRUCTION SITE EROSION CONTROL ZONING ORDINANCE

## AN ORDINANCE TO CREATE CHAPTER [NUMBER] OF THE ORDINANCE OF THE TOWN OF CLAYTON RELATING TO THE CONTROL OF CONSTRUCTION SITE EROSION RESULTING FROM LAND DISTURBING CONSTRUCTION ACTIVITIES

**FOREWORD.**

The intent of this ordinance is to require use of best management practices to reduce the amount of sediment and other pollutants resulting from land disturbing construction activities on sites that do not include the construction of a building and is otherwise regulated by the Wisconsin Department of Commerce in s. COMM 21.125 or COMM 50.115, Wis. Adm. Code. Use of this ordinance will foster consistent, statewide application of the construction site performance standards for new development and redevelopment contained in subchapters III and IV of ch. NR 151, Wis. Adm. Code.

The Town Chair of the Town of Clayton hereby ordains that Chapter [number] of the ordinance of the Town of Clayton created to read as follows:

## [CHAPTER]
## CONSTRUCTION SITE EROSION

### S.01 AUTHORITY.

(1) This ordinance is adopted under the authority granted by s. 60.627, Wis. Stats.. This ordinance supersedes all provisions of an ordinance previously enacted under s. 60.62, Wis. Stats., that relate to construction site erosion control. Except as otherwise specified in s. 60.627 Wis. Stats., s. 60.62, Wis. Stats., applies to this ordinance and to any amendments to this ordinance.

(2) The provisions of this ordinance are deemed not to limit any other lawful regulatory powers of the same governing body.

(3) The Town Chair hereby designates the Town Engineer to administer and enforce the provisions of this ordinance.

(4) The requirements of this ordinance do not pre-empt more stringent erosion and sediment control requirements that may be imposed by any of the following:

(a) Wisconsin Department of Natural Resources administrative rules, permits or approvals including those authorized under ss. 281.16 and 283.33, Wis. Stats.

(b) Targeted non-agricultural performance standards promulgated in rules by the Wisconsin Department of Natural Resources under s. NR 151.004, Wis. Adm. Code.

### S.02 FINDINGS OF FACT.

The Town Chair finds that runoff from land disturbing construction activity carries a significant amount of sediment and other pollutants to the waters of the state in the Town of Clayton.

### S.03 PURPOSE.

It is the purpose of this ordinance to further the maintenance of safe and healthful conditions; prevent and control water pollution; prevent and control soil erosion; protect spawning grounds, fish and aquatic life; control building sites, placement of structures and land uses; preserve ground cover and scenic beauty; and promote sound economic growth, by minimizing the amount of sediment and other pollutants carried by runoff or discharged from land disturbing construction activity to waters of the state in the Town of Clayton.

## S.04 APPLICABILITY AND JURISDICTION.

(1) APPLICABILITY.

(a) This ordinance applies to the following land disturbing construction activities except as provided under sub. (b):

1. A construction site, which has 1 or more acres of land disturbing construction activity.

**Note to Users**: The 1-acre land disturbance thresholds are consistent with state and federal laws regarding applicability of construction site erosion control permits.

(b) This ordinance does not apply to the following:

1. Land disturbing construction activity that includes the construction of a building and is otherwise regulated by the Wisconsin Department of Commerce under s. COMM 21.125 or COMM 50.115, Wis. Adm. Code.
2. A construction project that is exempted by federal statutes or regulations from the requirement to have a national pollutant discharge elimination system permit issued under chapter 40, Code of Federal Regulations, part 122, for land disturbing construction activity.
3. Nonpoint discharges from agricultural facilities and practices.
4. Nonpoint discharges from silviculture activities.
5. Routine maintenance for project sites under 5 acres of land disturbance if performed to maintain the original line and grade, hydraulic capacity or original purpose of the facility.

(c) Notwithstanding the applicability requirements in paragraph (a), this ordinance applies to construction sites of any size that, in the opinion of the Town Engineer, are likely to result in runoff that exceeds the safe capacity of the existing drainage facilities or receiving body of water, that causes undue channel erosion, that increases water pollution by scouring or the transportation of particulate matter or that endangers property or public safety.

**Note to Users**: The municipality may want to consider separate legal authority to address situations where persons other than the responsible party destroy or render ineffective BMPs constructed to meet the performance standards of this ordinance.

(2) JURISDICTION.

This ordinance applies to land disturbing construction activity on construction sites located within the boundaries and jurisdiction of the Town of Clayton.

or

land disturbing construction activities on lands within the boundaries and jurisdiction of the Town of Clayton, as well as the extraterritorial division of land subject to an ordinance enacted pursuant to s. 236.45(2) and (3), Wis. Stats.

or

land disturbing construction activities on lands within the boundaries and jurisdiction of the Town of Clayton, as well as all lands located within the extraterritorial plat approval jurisdiction of Town of Clayton, even if plat approval is not involved.

**Note to Users**: These options differ in the amount of land area covered by this ordinance and may have ramifications for enforcement authority. For counties, the first option will be the only option since counties do not have extraterritorial authority. Under s. 59.693(10), Wis. Stats., if a county ordinance exists at the time of annexation, then the municipal ordinance must be at least as restrictive as the county ordinance.

(3) EXCLUSIONS.

This ordinance is not applicable to activities conducted by a state agency, as defined under s. 227.01 (1), Wis. Stats., but also including the office of district attorney, which is subject to the state plan promulgated or a memorandum of understanding entered into under s. 281.33 (2), Wis. Stats.

**Note to Users:** The Wisconsin Department of Transportation (WisDOT) has entered into a memorandum of understanding with the Wisconsin Department of Natural Resources that satisfies s. 281.33 (2), Wis. Stats., such that activities directed and supervised by WisDOT are exempt from this model ordinance.

**S.05 DEFINITIONS.**

(1) "Administering authority" means a governmental employee, or a regional planning commission empowered under s. 60.627, Wis. Stats., that is designated by the Town Chair to administer this ordinance.

(2) "Agricultural facilities and practices " has the meaning in s. 281.16(1), Wis. Stats.

(3) "Average annual rainfall" means a calendar year of precipitation, excluding snow, which is considered typical.

(4) "Best management practice" or "BMP" means structural or non-structural measures, practices,

techniques or devices employed to avoid or minimize soil, sediment or pollutants carried in runoff to waters of the state.

(5) "Business day" means a day the office of the Town Engineer is routinely and customarily open for business.

(6) "Cease and desist order" means a court-issued order to halt land disturbing construction activity that is being conducted without the required permit.

(7) "Construction site" means an area upon which one or more land disturbing construction activities occur, including areas that are part of a larger common plan of development or sale where multiple separate and distinct land disturbing construction activities may be taking place at different times on different schedules but under one plan.

(8) "Division of land" means the creation from one parcel of [number] or more parcels or building sites of [number] or fewer acres each in area where such creation occurs at one time or through the successive partition within a 5 year period.

(9) "Erosion" means the process by which the land's surface is worn away by the action of wind, water, ice or gravity.

(10) "Erosion and sediment control plan" means a comprehensive plan developed to address pollution caused by erosion and sedimentation of soil particles or rock fragments during construction.

(11) "Extraterritorial" means the unincorporated area within 3 miles of the corporate limits of a first, second, or third class city, or within 1.5 miles of a fourth class city or village.

(12) "Final stabilization" means that all land disturbing construction activities at the construction site have been completed and that a uniform perennial vegetative cover has been established, with a density of at least 70 percent of the cover, for the unpaved areas and areas not covered by permanent structures, or that employ equivalent permanent stabilization measures.

(13) "Governing body" means town board of supervisors, county board of supervisors, city council, village board of trustees or village council.

(14) "Land disturbing construction activity" means any man-made alteration of the land surface resulting in a change in the topography or existing vegetative or non-vegetative soil cover, that may result in runoff and lead to an increase in soil erosion and movement of sediment into waters of the state. Land disturbing construction activity includes clearing and grubbing, demolition, excavating, pit trench dewatering, filling and grading activities.

(15) "MEP" or "maximum extent practicable" means a level of implementing best management practices in order to achieve a performance standard specified in this chapter which takes into account the best available technology, cost effectiveness and other competing issues such as human safety and welfare, endangered and threatened resources, historic properties and geographic features. MEP allows flexibility in the way to meet the performance standards and may vary based on the performance standard and site conditions.

(16) "Performance standard" means a narrative or measurable number specifying the minimum acceptable outcome for a facility or practice.

(17) "Permit" means a written authorization made by the Town Engineer to the applicant to conduct land disturbing construction activity or to discharge post-construction runoff to waters of the state.

(18) "Pollutant" has the meaning given in s. 283.01 (13), Wis. Stats.

(19) "Pollution" has the meaning given in s. 281.01 (10), Wis. Stats.

(20) "Responsible party" means any entity holding fee title to the property or performing services to meet the performance standards of this ordinance through a contract or other agreement.

(21) "Runoff" means storm water or precipitation including rain, snow or ice melt or similar water that moves on the land surface via sheet or channelized flow.

(22) "Sediment" means settleable solid material that is transported by runoff, suspended within runoff or deposited by runoff away from its original location.

(23) "Separate storm sewer" means a conveyance or system of conveyances including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all of the following criteria:

(a) Is designed or used for collecting water or conveying runoff.

(b) Is not part of a combined sewer system.

(c) Is not draining to a storm water treatment device or system.

(d) Discharges directly or indirectly to waters of the state.

(24) "Site" means the entire area included in the legal description of the land on which the land disturbing construction activity is proposed in the permit application.

(25) "Stop work order" means an order issued by the Town Engineer which requires that all construction activity on the site be stopped.

(26) "Technical standard" means a document that specifies design, predicted performance and operation and maintenance specifications for a material, device or method.

(27) "Waters of the state" has the meaning given in s. 281.01 (18), Wis. Stats.

**S.06 TECHNICAL STANDARDS.**

(1) DESIGN CRITERIA, STANDARDS AND SPECIFICATIONS. All BMPs required to comply with this ordinance shall meet the design criteria, standards and specifications based on any of the following:

(a) Applicable design criteria, standards and specifications identified in the *Wisconsin Construction Site Best Management Practice Handbook,* WDNR Pub. WR-222 November 1993 Revision.

(b) Other design guidance and technical standards identified or developed by the Wisconsin Department of Natural Resources under subchapter V of chapter NR 151, Wis. Adm. Code.

(c) For this ordinance, average annual basis is calculated using the appropriate annual rainfall or runoff factor, also referred to as the R factor, or an equivalent design storm using a type II distribution, with consideration given to the geographic location of the site and the period of disturbance.

**Note to Users :** The USLE and its successors RUSLE and RUSLE2, utilize an R factor which has been developed to estimate annual soil erosion, averaged over extended time periods. The R factor can be modified to estimate monthly and single-storm erosion. A design storm can be statistically calculated to provide an equivalent R factor as an average annual calculation.

(2) OTHER STANDARDS. Other technical standards not identified or developed in sub. (1), may be used provided that the methods have been approved by the Town Engineer.

**S.07 PERFORMANCE STANDARDS.**

(1) RESPONSIBLE PARTY. The responsible party shall implement an erosion and sediment control plan, developed in accordance with S. 09, that incorporates the requirements of this section.

(2) PLAN. A written plan shall be developed in accordance with S. 09 and implemented for each construction site.

**Note to Users:** The written plan may be that specified within s. NR 216.46, the erosion control portion of a construction plan or other plan.

(3) EROSION AND OTHER POLLUTANT CONTROL REQUIREMENTS. The plan required under sub. (2) shall include the following:

(a) BMPs that, by design, achieve to the maximum extent practicable, a reduction of 80% of the sediment load carried in runoff, on an average annual basis, as compared with no sediment or erosion controls until the construction site has undergone final stabilization. No person shall be required to exceed an 80% sediment reduction to meet the requirements of this paragraph. Erosion and sediment control BMPs may be used alone or in combination to meet the requirements of this paragraph. Credit toward meeting the sediment reduction shall be given for limiting the duration or area, or both, of land disturbing construction activity, or other appropriate mechanism.

**Note to Users:** Soil loss prediction tools that estimate the sediment load leaving the construction site under varying land and management conditions, or methodology identified in subch. V. of ch. NR 151, Wis. Adm. Code, may be used to calculate sediment reduction.

(b) Notwithstanding par. (a), if BMPs cannot be designed and implemented to reduce the sediment load by 80%, on an average annual basis, the plan shall include a written and site-specific explanation as to why the 80% reduction goal is not attainable and the sediment load shall be reduced to the maximum extent practicable.

(c) Where appropriate, the plan shall include sediment controls to do all of the following to the maximum extent practicable:

1. Prevent tracking of sediment from the construction site onto roads and other paved surfaces.
2. Prevent the discharge of sediment as part of site de-watering.
3. Protect the separate storm drain inlet structure from receiving sediment.

(d) The use, storage and disposal of chemicals, cement and other compounds and materials used on the construction site shall be managed during the construction period, to prevent their entrance into waters of the state. However, projects that require the placement of these materials in waters of the state, such as constructing bridge footings or BMP installations, are not prohibited by this paragraph.

(4) LOCATION. The BMPs used to comply with this section shall be located prior to runoff entering waters of the state.

**Note to Users:** While regional treatment facilities are appropriate for control of post-construction pollutants, they should not be used for construction site sediment removal.

(5) ALTERNATE REQUIREMENTS. The Town Engineer may establish storm water management requirements more stringent than those set forth in this section if the Town Engineer determines that an added level of protection is needed for sensitive resources.

**S.08 PERMITTING REQUIREMENTS, PROCEDURES AND FEES.**

(1) PERMIT REQUIRED. No responsible party may commence a land disturbing construction activity subject to this ordinance without receiving prior approval of an erosion and sediment control plan for the site and a permit from the Town Engineer.

(2) PERMIT APPLICATION AND FEES. At least one responsible party desiring to undertake a land disturbing construction activity subject to this ordinance shall submit an application for a permit and an erosion and sediment control plan that meets the requirements of S.09 and shall pay an application fee of [amount] to the Town Engineer. By submitting an application, the applicant is authorizing the Town Engineer to enter the site to obtain information required for the review of the erosion and sediment control plan.

(3) REVIEW AND APPROVAL OF PERMIT APPLICATION. The Town Engineer shall review any permit application that is submitted with an erosion and sediment control plan, and the required fee. The following approval procedure shall be used:

(a) Within [number] business days of the receipt of a complete permit application, as required by sub. (2), the Town Engineer shall inform the applicant whether the application and plan are approved or disapproved based on the requirements of this ordinance.

(b) If the permit application and plan are approved, the Town Engineer shall issue the permit.

(c) If the permit application or plan is disapproved, the Town Engineer shall state in writing the reasons for disapproval.

(d) The Town Engineer may request additional information from the applicant. If additional information is submitted, the Town Engineer shall have [number] business days from the date the additional information is received to inform the applicant that the plan is either approved or disapproved.

(e) Failure by the Town Engineer to inform the permit applicant of a decision within [number] business days of a required submittal shall be deemed to mean approval of the submittal and the applicant may proceed as if a permit had been issued.

(4) SURETY BOND. As a condition of approval and issuance of the permit, the Town Engineer may require the applicant to deposit a surety bond or irrevocable letter of credit to guarantee a good faith execution of the approved erosion control plan and any permit conditions.

(5) PERMIT REQUIREMENTS. All permits shall require the responsible party to:

(a) Notify the Town Engineer within 48 hours of commencing any land disturbing construction activity.

(b) Notify the Town Engineer of completion of any BMPs within 14 days after their installation.

(c) Obtain permission in writing from the Town Engineer prior to any modification pursuant to S.09(3) of the erosion and sediment control plan.

(d) Install all BMPs as identified in the approved erosion and sediment control plan.

(e) Maintain all road drainage systems, stormwater drainage systems, BMPs and other facilities identified in the erosion and sediment control plan.

(f) Repair any siltation or erosion damage to adjoining surfaces and drainage ways resulting from land disturbing construction activities and document repairs in a site erosion control log.

(g) Inspect the BMPs within 24 hours after each rain of 0.5 inches or more which results in runoff during active construction periods, and at least once each week, make needed repairs and document the findings of the inspections in a site erosion control log with the date of inspection, the name of the person conducting the inspection, and a description of the present phase of the construction at the site.

(h) Allow the Town Engineer to enter the site for the purpose of inspecting compliance with the erosion and sediment control plan or for performing any work necessary to bring the site into compliance with the control plan. Keep a copy of the erosion and sediment control plan at the construction site.

(6) PERMIT CONDITIONS. Permits issued under this section may include conditions established by Town Engineer in addition to the requirements set forth in sub. (5), where needed to assure compliance with the performance standards in S.07.

(7) PERMIT DURATION. Permits issued under this section shall be valid for a period of 180 days, or the length of the building permit or other construction authorizations, whichever is longer, from the date of issuance. The Town Engineer may extend the period one or more times for up to an additional 180 days. The Town Engineer may require additional BMPs as a condition of the extension if they are necessary to meet the requirements of this ordinance.

(8) MAINTENANCE. The responsible party throughout the duration of the construction activities shall maintain all BMPs necessary to meet the requirements of this ordinance until the site has undergone final stabilization.

## S.09 EROSION AND SEDIMENT CONTROL PLAN, STATEMENT, AND AMENDMENTS.

(1) EROSION AND SEDIMENT CONTROL PLAN.

(a) An erosion and sediment control plan shall be prepared and submitted to the Town Engineer.

(b) The erosion and sediment control plan shall be designed to meet the performance standards in S.07 and other requirements of this ordinance.

(c) The erosion and sediment control plan shall address pollution caused by soil erosion and sedimentation during construction and up to final stabilization of the site. The erosion and sediment control plan shall include, at a minimum, the following items:

1. The name(s) and address(es) of the owner or developer of the site, and of any consulting firm retained by the applicant, together with the name of the applicant's principal contact at such firm. The application shall also include start and end dates for construction.
2. Description of the site and the nature of the construction activity, including representation of the limits of land disturbance on a United States Geological Service 7.5 minute series topographic map.
3. A sequence of construction of the development site, including stripping and clearing; rough grading; construction of utilities, infrastructure, and buildings; and final grading and landscaping. Sequencing shall identify the expected date on which clearing will begin, the estimated duration of exposure of cleared areas, areas of clearing, installation of temporary erosion and sediment control measures, and establishment of permanent vegetation.
4. Estimates of the total area of the site and the total area of the site that is expected to be disturbed by construction activities.
5. Estimates, including calculations, if any, of the runoff coefficient of the site before and after construction activities are completed.
6. Calculations to show the expected percent reduction in the average annual sediment load carried in runoff as compared to no sediment or erosion controls.
7. Existing data describing the surface soil as well as subsoils.
8. Depth to groundwater, as indicated by Natural Resources Conservation Service soil information where available.
9. Name of the immediate named receiving water from the United States Geological Service 7.5 minute series topographic maps.

(d) The erosion and sediment control plan shall include a site map. The site map shall include the following items and shall be at a scale not greater than 100 feet per inch and at a contour interval not to exceed five feet.

1. Existing topography, vegetative cover, natural and engineered drainage systems, roads and surface waters. Lakes, streams, wetlands, channels, ditches and other watercourses on and immediately adjacent to the site shall be shown. Any identified 100-year flood plains, flood fringes and floodways shall also be shown.
2. Boundaries of the construction site.
3. Drainage patterns and approximate slopes anticipated after major grading activities.
4. Areas of soil disturbance.
5. Location of major structural and non-structural controls identified in the plan.
6. Location of areas where stabilization practices will be employed.
7. Areas which will be vegetated following construction.
8. Areal extent of wetland acreage on the site and locations where storm water is discharged to a surface water or wetland.
9. Locations of all surface waters and wetlands within one mile of the construction site.
10. An alphanumeric or equivalent grid overlying the entire construction site map.

(e) Each erosion and sediment control plan shall include a description of appropriate controls and measures that will be performed at the site to prevent pollutants from reaching waters of the state. The plan shall clearly describe the appropriate control measures for each major activity and the timing during the construction process that the measures will be implemented. The description of erosion controls shall include, when appropriate, the following minimum requirements:

1. Description of interim and permanent stabilization practices, including a practice implementation schedule. Site plans shall ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized.
2. Description of structural practices to divert flow away from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from the site. Unless otherwise specifically approved in writing by the Town Engineer, structural measures shall be installed on upland soils.
3. Management of overland flow at all sites, unless otherwise controlled by outfall controls.
4. Trapping of sediment in channelized flow.
5. Staging construction to limit bare areas subject to erosion.
6. Protection of downslope drainage inlets where they occur.
7. Minimization of tracking at all sites.
8. Clean up of off-site sediment deposits.
9. Proper disposal of building and waste materials at all sites.

10. Stabilization of drainage ways.
11. Control of soil erosion from dirt stockpiles.
12. Installation of permanent stabilization practices as soon as possible after final grading.
13. Minimization of dust to the maximum extent practicable.

(f) The erosion and sediment control plan shall require that velocity dissipation devices be placed at discharge locations and along the length of any outfall channel, as necessary, to provide a non-erosive flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected.

**Note to Users:** The plan requirements of this subsection will meet the erosion control plan requirements of s. NR 216.46, Wis. Adm. Code, when prepared in accordance with good engineering practices and the design criteria, standards and specifications outlined in the *Wisconsin Construction Site Best Management Practice Handbook* (WDNR Pub. WR-222 November 1993 Revision).

(2) EROSION AND SEDIMENT CONTROL PLAN STATEMENT. For each construction site identified under S.04 (1)(c), an erosion and sediment control plan statement shall be prepared. This statement shall be submitted to the Town Engineer. The control plan statement shall briefly describe the site, including a site map. Further, it shall also include the best management practices that will be used to meet the requirements of the ordinance, including the site development schedule.

(3) AMENDMENTS. The applicant shall amend the plan if any of the following occur:

(a) There is a change in design, construction, operation or maintenance at the site which has the reasonable potential for the discharge of pollutants to waters of the state and which has not otherwise been addressed in the plan.

(b) The actions required by the plan fail to reduce the impacts of pollutants carried by construction site runoff.

(c) The Town Engineer notifies the applicant of changes needed in the plan.

**S.10 FEE SCHEDULE.**

The fees referred to in other sections of this ordinance shall be established by the Town Engineer and may from time to time be modified by resolution. A schedule of the fees established by the Town Engineer shall be available for review in [location].

## S.11 INSPECTION.

If land disturbing construction activities are being carried out without a permit required by this ordinance, the Town Engineer may enter the land pursuant to the provisions of ss. 66.0119(1), (2), and (3), Wis. Stats.

## S.12 ENFORCEMENT.

(1) The Town Engineer may post a stop-work order if any of the following occurs:

(a) Any land disturbing construction activity regulated under this ordinance is being undertaken without a permit.

(b) The erosion and sediment control plan is not being implemented in a good faith manner.

(c) The conditions of the permit are not being met.

**Note to Users**: The Town Engineer should inspect any construction site that holds a permit under this chapter at least once a month during the period starting March 1 and ending October 31 and at least 2 times during the period starting November 1 and ending February 28 to ensure compliance with the approved sediment and erosion control plan.

(2) If the responsible party does not cease activity as required in a stop-work order posted under this section or fails to comply with the erosion and sediment control plan or permit conditions, the Town Engineer may revoke the permit.

(3) If the responsible party, where no permit has been issued, does not cease the activity after being notified by the Town Engineer, or if a responsible party violates a stop-work order posted under sub. (1), the Town Engineer may request the town attorney to obtain a cease and desist order in any court with jurisdiction.

(4) The Town Engineer may retract the stop-work order issued under sub. (1) or the permit revocation under sub. (2).

(5) After posting a stop-work order under sub. (1), the Town Engineer may issue a notice of intent to the responsible party of its intent to perform work necessary to comply with this ordinance. The Town Engineer may go on the land and commence the work after issuing the notice of intent. The costs of the work performed under this subsection by the Town Engineer, plus interest at the rate authorized by Town Engineer shall be billed to the responsible party. In the event a responsible party fails to pay the amount due, the clerk shall enter the amount due on the tax rolls

and collect as a special assessment against the property pursuant to subch. VII of ch. 66, Wis. Stats.

(6) Any person violating any of the provisions of this ordinance shall be subject to a forfeiture of not less than [amount] nor more than [amount] and the costs of prosecution for each violation. Each day a violation exists shall constitute a separate offense.

(7) Compliance with the provisions of this ordinance may also be enforced by injunction in any court with jurisdiction. It shall not be necessary to prosecute for forfeiture or a cease and desist order before resorting to injunctional proceedings.

**Note to Users:** Injunctional orders are authorized pursuant to s. 59.69(11), 61.35, or 62.23(8), Wis. Stats., for counties, villages and towns with village powers, and cities respectively.

**S.13 APPEALS.**

(1) BOARD OF [APPEALS or ADJUSTMENT]. The board of [appeals or adjustment] created pursuant to section [number] of the town's ordinance pursuant to s. 60.65, Wis. Stats.:

(a) Shall hear and decide appeals where it is alleged that there is error in any order, decision or determination made by the Town Engineer in administering this ordinance except for cease and desist orders obtained under S.12 (3).

(b) Upon appeal, may authorize variances from the provisions of this ordinance which are not contrary to the public interest and where owing to special conditions a literal enforcement of the provisions of the ordinance will result in unnecessary hardship; and

(c) Shall use the rules, procedures, duties and powers authorized by statute in hearing and deciding appeals and authorizing variances.

(2) WHO MAY APPEAL. Appeals to the board of [appeals or adjustment] may be taken by any aggrieved person or by any office, department, board, or bureau of the Town of Clayton affected by any decision of the Town Engineer.

**S.14 SEVERABILITY.**

If a court of competent jurisdiction judges any section, clause, provision or portion of this ordinance unconstitutional or invalid, the remainder of the ordinance shall remain in force and not be affected by such judgment.

**S.15 EFFECTIVE DATE.**

This ordinance shall be in force and effect from and after its adoption and publication. The above and foregoing ordinance was duly adopted by the Town Chair of the Town of Clayton on the [number] day of [month], [year].

Approved: _____

Attested _____

Published on [day, month, and year].

CHAPTER _____
TOWN OF CLAYTON

# STORM WATER MANAGEMENT

## SECTION I. AUTHORITY.

(1) This ordinance is adopted by the Town Board under the authority granted by s. 60.627, Wis. Stats. This ordinance supersedes all conflicting and contradicting storm water management regulations previously enacted that relate to storm water management regulations. Except as otherwise specified in ss. 60.627 and 60.622, Wis. Stats., applies to this ordinance and to any amendments to this ordinance.

(2) The provisions of this ordinance are deemed not to limit any other lawful regulatory powers of the Township.

(3) The Town Board hereby designates the Town Chair, with assistance from Town Engineer to administer and enforce the provisions of this ordinance.

(4) The requirements of this ordinance do not pre-empt more stringent storm water management requirements that may be imposed by any of the following:

(a) Wisconsin Department of Natural Resources administrative rules, permits or approvals including those authorized under ss. 281.16 and 283.33, Wis. Stats.

(b) Targeted non-agricultural performance standards promulgated in rules by the Wisconsin Department of Natural Resources under NR 151.004, Wis. Adm. Code.

(c) Other Township ordinances and zoning regulations.

## SECTION II. FINDINGS OF FACT.

The Town Board finds that uncontrolled, post-construction runoff has a significant impact upon water resources and the health, safety and general welfare of the community and diminishes the public enjoyment and use of natural resources. Specifically, uncontrolled post-construction runoff can:

(1) Degrade physical stream habitat by increasing stream bank erosion, increasing streambed scour, diminishing groundwater recharge, diminishing stream base flows and increasing stream temperature.

(2) Diminish the capacity of lakes and streams to support fish, aquatic life, recreational and water supply uses by increasing pollutant loading of sediment, suspended solids, nutrients, heavy metals, bacteria, pathogens and other urban pollutants.

(3) Alter wetland communities by changing wetland hydrology and by increasing pollutant loads.

(4) Reduce the quality of groundwater by increasing pollutant loading.

(5) Threaten public health, safety, property and general welfare by overtaxing storm sewers, drainage ways, and other minor drainage facilities.

(6) Threaten public health, safety, property and general welfare by increasing major flood peaks and volumes.

(7) Undermine floodplain management efforts by increasing the incidence and levels of flooding.

**SECTION III. PURPOSE AND INTENT.**

(1) PURPOSE. The general purpose of this ordinance is to establish long-term, post-construction runoff management requirements that will diminish the threats to public health, safety, welfare and the aquatic environment. Specific purposes are to:

(a) Further the maintenance of safe and healthful conditions.

(b) Prevent and control the adverse effects of storm water; prevent and control soil erosion; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control building sites, placement of structures and land uses; preserve ground cover and scenic beauty; and promote sound economic growth.

(c) Control exceedance of the safe capacity of existing drainage facilities and receiving water bodies; prevent undue channel erosion; control increases in the scouring and transportation of particulate matter; and prevent conditions that endanger downstream property.

(2) INTENT. It is the intent of the Town Board that this ordinance regulates post-construction storm water discharges within the Township and to waters of the state. This ordinance may be applied on a site-by-site basis. The Town Board recognizes, however, that the preferred method of achieving the storm water performance standards set forth in this ordinance is through the preparation and implementation of comprehensive, systems-level storm water management plans that cover hydrologic units,

such as watersheds, on a municipal and regional scale. Such plans may prescribe regional storm water devices, practices or systems, any of which may be designed to treat runoff from more than one site prior to discharge to waters of the state. Where such plans are in conformance with the performance standards developed under s. 281.16, Wis. Stats., for regional storm water management measures and have been approved by the Town Board, it is the intent of this ordinance that the approved plan be used to identify post-construction management measures acceptable for the community.

**SECTION IV. APPLICABILITY AND JURISDICTION.**

(1) APPLICABILITY.

(a) Where not otherwise limited by law, this ordinance applies after final stabilization to a site of land development or land disturbing activity of any size, which changes the pre-development hydrology and/or increases the rate of volume of runoff, or the thermal, chemical, or sediment loading leaving the site beyond the conditions that existed prior to any planned land development or land disturbing activity.

(b) A site that meets any of the criteria in this paragraph is exempt from the requirements of this ordinance.

1. Routine maintenance for project sites under 1 acres of land disturbance if performed to maintain the original line and grade, hydraulic capacity or original purpose of the facility.

2. Underground utility construction such as water, sewer and fiberoptic lines. This exemption does not apply to the construction of any above ground structures associated with utility construction.

(c) Notwithstanding the applicability requirements in paragraph (a), this ordinance applies to post-construction sites of any size that, in the opinion of the administering authority, is likely to result in runoff that exceeds the safe capacity of the existing drainage facilities or receiving body of water, that causes undue channel erosion, that increases water pollution by scouring or the transportation of particulate matter or that endangers property or public safety.

(d) The Town Chair, with assistance of Town Engineer, may establish on-site storm water management requirements less stringent than those set forth herein, provided that provisions are made to manage storm water by an off-site facility, provided that all of the following conditions for the off-site facility are met:

1. The off-site facility is operational prior to commencing the proposed land development or land disturbing activity.

2. The off-site facility is designed and adequately sized to provide a level of storm water control equal to or greater than that which would be afforded by on-site practices meeting the requirements of this ordinance.

3. The off-site facility has a legally obligated entity responsible for its long-term operation and maintenance.

(2) JURISDICTION.

This ordinance applies to any land development activity or land disturbing activity within the boundaries of the Town of Clayton. No land owner or land operator may undertake a land development or land disturbing activity subject to this ordinance without having met the performance standards set forth in this ordinance and without having received a permit from the Town Chair with assistance from the Town Engineer prior to commencing the proposed activity.

(3) EXCLUSIONS.

This ordinance is not applicable to:

(a) Activities conducted by a state agency, as defined under s. 227.01 (1), Wis. Stats., but also including the office of district attorney, which is subject to the state plan promulgated or a memorandum of understanding entered into under s. 281.33 (2), Wis. Stats.

(b) Any lot existing as of the effective date of this chapter that is currently platted and zoned single family residential or two family residential, provided, however, that the use after the land disturbing activity or land development activity shall be that of a single family residence or two family residence.

(c) Any lot containing, as of the effective date of this chapter, a single family residence or two family residence, regardless of zoning classification, provided, however, that the use after the land disturbing activity or land development activity shall continue to be that of a single family residence or two family residence.

**SECTION V. DEFINITIONS.**

(1) "Administering Authority" means a governmental employee, empowered under s. 60.627, Wis. Stats., that is designated by the Town Board to administer this ordinance.

(2) "Agricultural Facility and Agricultural Practice" have the meaning given in s. 281.16 (1), Wis. Stats.

(3) "Average Annual Rainfall" means a calendar year of precipitation, excluding snow, which is considered typical.

(4) "Best Management Practices" or "BMPs" means practices, techniques, or measures that are effective in reducing flooding, removing pollutants, providing thermal mitigation, enhancing infiltration, and/or providing other benefits related to storm water management.

(5) "Business Day" means a day the office of the Town of Clayton are routinely and customarily open for business.

(6) "Cease and Desist Order" means a court-issued order to halt land disturbing construction activity that is being conducted without the required permit.

(7) "Township" means the Town of Clayton and its representatives.

(8) "Town Chair" means the governmental employee designated by the Town Board to administer this chapter, and includes assistance from the Town Engineer, and any other governmental employees designated by the Town Chair or the Town Board in the absence of the Town Chair.

(9) "Combined Sewer System" means a system for conveying both sanitary sewage and storm water runoff.

(10) "Connected Imperviousness" means an impervious surface that is directly connected to a separate storm sewer or water of the state via an impervious flow path.

(11) "Design Storm" means a hypothetical discrete rainstorm characterized by a specific duration, temporal distribution, rainfall intensity, return frequency, and total depth of rainfall.

(12) "Detention" means the temporary detaining or storage of storm water in reservoirs, on rooftops, in streets, parking lots, or other areas under predetermined and controlled conditions, with the rate of distance therefore regulated by appropriately installed devices.

(13) "Development" means residential, commercial, industrial or institutional land uses and associated roads.

(14) "Effective Infiltration Area" means the area of the infiltration system that is used to infiltrate runoff and does not include the area used for site access, berms or pretreatment.

(15) "Erosion" or "Soil Erosion" means the detachment process and movement of soil and rock fragments by which the land's surface is worn away by the action of wind, water, ice or gravity.

(16) "Excavation" means any act by which organic matter, earth, sand, gravel, rock, or any other similar material is cut into, dug, quarried, uncovered, removed, displaced, relocated or bulldozed, and shall include the conditions resulting from the activity.

(17) "Exceptional Resource Waters" means waters listed in NR 102.11, Wis. Adm. Code.

(18) "Fill" means any act, by which earth, sand, gravel, rock, or any other material is deposited, placed, replaced, pushed, dumped, pulled, transported or moved by man to a new location and shall include the conditions resulting therefrom.

(19) "Final Stabilization" means that all land disturbing construction activities at the construction site have been completed and that a dense uniform, perennial, vegetative cover has been established, for the unpaved areas and areas not covered by permanent structures, or employment of equivalent permanent stabilization measures.

(20) "Financial Guarantee" means a performance bond, maintenance bond, surety bond, irrevocable letter of credit, or similar guarantees submitted to the Town of Clayton by the responsible party to assure that requirements of the ordinance are carried out in compliance with the storm water management plan.

(21) "Governing Body" means the Town Board of the Town of Clayton.

(22) "Grading" means altering the elevation of the land surface by stripping, excavating, filling, stockpiling of soil materials or any combination thereof and shall include the land from which the material was taken or upon which it was placed.

(23) "Impervious Surface" means an area that releases as runoff all or a large portion of the precipitation that falls on it, except for frozen soil. Rooftops, sidewalks, driveways, parking lots and streets are examples of areas that typically are impervious.

(24) "In-Fill Area" means an undeveloped area of land located within existing development.

(25) "Infiltration" means the process by which rainfall or surface runoff percolates or penetrates into the underlying soil.

(26) "Infiltration System" means a device or practice such as a basin, trench, rain garden or swale designed specifically to encourage infiltration, but does not include natural infiltration in pervious surfaces such as lawns, redirecting of rooftop downspouts onto lawns or minimal infiltration from practices, such as swales or road side channels designed for conveyance and pollutant removal only.

(27) "Karst Feature" means an area or surficial geologic feature subject to bedrock dissolution so that it is likely to provide a conduit to groundwater, and may include caves, enlarged fractures, mine features, exposed bedrock surfaces, sinkholes, springs, seeps or swallets.

(28) "Land Development Activity" means any construction of buildings, roads, parking lots, paved and unpaved storage areas and similar facilities, including agricultural facilities.

(29) "Land Disturbing Activity" means any man-made alteration of the land surface of public or private lands resulting in a change in the topography or existing vegetative or non-vegetative soil cover, that may result in runoff and lead to an increase in soil erosion and movement of sediment within the Township and into waters of the state. Land disturbing activity includes, but is not limited to, clearing and grubbing, tilling, removal of vegetative cover, stockpiling of soil, demolition, excavating, pit trench dewatering, filling and grading activities, except that the term shall not include such minor land disturbing activities as home gardens and normal repair and maintenance of private roads. This term does not include agricultural practices.

(30) "Land Occupier" means any person who holds title to land either as sole owner, a tenant in common or a joint tenant or has title as a trustee, assignee, or has a land contract vendor's or vendee's interest.

(31) "Land Cover" means the various cover types found on a specific parcel including impervious surface, green space, wooded area, parking lot, etc.

(32) "Lot" means a parcel of land having a width and depth sufficient to provide the space necessary for one main building and its accessory buildings, together with the open spaces required under Town of Clayton Town Ordinance and abutting on a public street or officially approved place.

(33) "Maintenance and Monitoring Agreement" means a legal document that is filed with the County Register of Deeds as a property deed restriction, and which provides for long-term maintenance of storm water management practices.

(34) "Natural Resources Conservation Service" or "NRCS" means the United States Agency responsible for establishing standards for and design of many water quality structures and practices. The NRCS was formerly the Soil Conservation Service or SCS.

(35) "MEP" or "Maximum Extent Practicable" means a level of implementing best management practices in order to achieve a performance standard specified in this ordinance which takes into account the best available technology, cost effectiveness and other competing issues such as human safety and welfare, endangered and threatened resources, historic properties and geographic features. MEP allows flexibility in the way to meet the performance standards and may vary based on the performance standard and site conditions.

(36) "New Development" means development resulting from the conversion of previously undeveloped land or agricultural land uses.

(37) "Off-Site" means located outside the property boundary described in the permit application for land development activity or land disturbing activity.

(38) "On-Site" means located within the property boundary described in the permit application for land development activity or land disturbing activity.

(39) "Ordinary High-Water Mark" has the meaning given in NR 115.03(6), Wis. Adm. Code.

(40) "Outstanding Resource Waters" means waters listed in NR 102.10, Wis. Adm. Code.

(41) "P8 - Urban Catchment Model" means a program for predicting polluting particle passage thru pits, puddles, and ponds; prepared for IEP, Inc. & Narragansett Bay Project USEPA/RIDEM by William W. Walker, Jr.

(42) "Parcel" means all contiguous lands under the ownership or control of a landowner, land occupier, or land user.

(43) "Peak Runoff Rate" means the maximum rate at which storm water is discharged from a site as expressed in cubic feet per second.

(44) "Percent Fines" means the percentage of a given sample of soil, which passes through a #200 sieve.

(45) "Performance Standard" means a narrative or measurable number specifying the minimum acceptable outcome for a facility or practice.

(46) "Permit" means a written authorization made by the administering authority to an applicant to conduct land development or land disturbing activities or to discharge post-construction runoff within the Township and to waters of the state.

(47) "Permit Administration Fee" means a sum of money paid to the administering authority by the permit applicant for the purpose of recouping the expenses incurred by the authority in administering the permit.

(48) "Permittee" means any person to whom a permit is issued.

(49) "Person" means any individual, corporation, partnership, joint venture, agency, unincorporated association, municipal corporation, county or state agency within Wisconsin, the Federal government or any combination thereof.

(50) "Pervious Surface" means an area that releases as runoff a small portion of the precipitation that falls on it. Lawns, gardens, parks, forests or other similar vegetated areas are examples of surfaces that typically are pervious.

(51) "Plan Commission" means the body established under s. 62.23(1), Wis. Stats.

(52) "Pollutant" has the meaning given in s. 283.01(13), Wis. Stats.

(53) "Pollution" has the meaning given in s. 281.01(10), Wis. Stats.

(54) "Post-Construction Site" means a construction site following the completion of land development or land disturbing activities and final site stabilization.

(55) "Pre-Development Condition" means the extent and distribution of land cover types present before the initiation of land development activity or land disturbing activity, provided that the current storm water drainage system is sufficient to satisfy the requirements of this ordinance. If the current storm water drainage system is insufficient to satisfy the requirements of this ordinance with respect to current existing land cover, "pre-development condition" shall mean that extent and distribution of land cover types for which the current storm water drainage system would be sufficient to satisfy the requirements of this ordinance.

(56) "Preventive Action Limit" has the meaning given in NR 140.05(17), Wis. Adm. Code.

(57) "Public Lands" means all publicly owned lands which are subject to regulation by the Township including, but not limited to:

(a) All lands owned by the Township.

(b) All lands which are owned by another unit of government if that unit of government or the development project is legally subject to erosion and storm water runoff control by the Township under this chapter or by reference under other ordinances.

(58) "Redevelopment " means areas where development is replacing older development.

(59) "Regional Pond" means a storm water pond intended to serve multiple parcels and/or developments, thus eliminating the need for individual on-site facilities.

(60) "Removal" means cutting vegetation to the ground or stumps, complete extraction or killing by spraying.

(61) "Responsible Party" means any entity holding fee title to the property or other person contracted or obligated by other agreement to implement and maintain post-construction storm water BMPs.

(62) "Retention" means the permanent storage of storm water without discharge.

(63) "Runoff" means the same as definition for "Storm Water Runoff".

(64) "Safe Capacity" means the rate of flow that can be handled by the receiving waterway without causing flooding or erosion damage.

(65) "Sediment" means solid material, both mineral and organic, that has been deposited by water, is in suspension in water, is being transported or has been removed from its site of origin by the processes of soil erosion or is discharged into surface waters from other sources.

(66) "Sedimentation" means settling or deposition of sediment.

(67) "Sensitive Resources" means natural resources that are sensitive to the impacts of urbanization, specifically including ground water, cold-water springs, wetlands with diverse functions and values and other unique resources.

(68) "Separate Storm Sewer" means a conveyance or system of conveyances including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all of the following criteria:

(a) Is designed or used for collecting water or conveying runoff.

(b) Is not part of a combined sewer system.

(c) Is not draining to a storm water treatment device or system.

(d) Discharges directly or indirectly to waters of the state.

(69) "Site" means the entire area included in the legal description of the land on which the land development or land disturbing activity occurred.

(70) "Site Restriction" means any physical characteristic which limits the use of storm water best management practice as prescribed in the Wisconsin Storm Water Manual published by the Wisconsin Department of Natural Resources.

(71) "Stop Work Order" means a method of giving notice to the permittee that one or more provisions of this chapter have been violated. Notice is given both by posting upon the lands where the disturbing activity occurs one or more copies of a poster stating the violation and by mailing a copy of this poster by certified mail to the permittee at the address shown on the permit.

(72) "Storm Sewer" means a closed conduit for conducting collected storm water.

(73) "Storm Water Drainage System" or "Drainage System" means all facilities used for conducting runoff to, through or from a drainage area to the point of final outlet including, but not limited to, any of the following: conduits and appurtenant features, canals, channels, ditches, streams, culverts, reservoirs, detention basins, storm sewers, streets and pumping stations.

(74) "Storm Water Management Plan" means a document that identifies what actions will be taken to reduce storm water quantity, volume, pollutant loads, thermal increases to the receiving stream and/or erosion resulting from land development activity to levels meeting the purpose and intent of this ordinance and the Lake Magnor Management Master Plan.

(75) "Lake Magnor Management Master Plan" is a comprehensive plan designed to reduce the discharge of runoff and pollutants from hydrologic units on a regional or municipal scale.

(76) "Storm Water Runoff" means that portion of the precipitation falling during a rainfall event, or that portion of snowmelt, that runs off the surface of the land and into the natural or artificial conveyance or drainage network.

(77) "Technical Standard" means a document that specifies design, predicted performance and operation and maintenance specifications for a material, device or method.

(78) "Top of the Channel" means an edge, or point on the landscape, landward from the ordinary high- water mark of a surface water of the state, where the slope of the land begins to be less than 12% continually for at least 50 feet. If the slope of the land is 12% or less continually for the initial 50 feet, landward from the ordinary high-water mark, the top of the channel is the ordinary high-water mark.

(79) "TR-55" means the United States Department of Agriculture, Natural Resources Conservation Service (previously Soil Conservation Service), Urban Hydrology for Small Watersheds, Second Edition, Technical Release 55, June 1986.

(80) "Type II Distribution" means a rainfall type curve as established in the "United States Department of Agriculture, Soil Conservation Service, Technical Paper 149, published 1973". The Type II curve is applicable to all of Wisconsin and represents the most intense storm pattern.

(81) "Waters of the State" has the meaning given in s. 281.01 (18), Wis. Stats.

(82) "Wetlands" means an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions. These wetlands include natural, mitigation, and restored wetlands.

(83) "WPDES Storm Water Permit" means a permit issued by the Wisconsin Department of Natural Resources under s. 283.31 Wis. Stats. that authorizes the point source discharge of storm water to waters of the state.

**SECTION VI. TECHNICAL STANDARDS.**

(1) DESIGN CRITERIA, STANDARDS, AND SPECIFICATIONS. All BMPs required to comply with this ordinance shall meet the design criteria, standards and specifications based on the following. If technical standards contained in the following documents conflict, the governing document shall be determined based on the order presented. Those technical standards with the highest priority shall prevail. In determining priorities, Section VI (1) (a) shall be deemed to have top priority followed by Section VI (1) (b), then Section VI (1) (c), with Section VI (1) (d) having the lowest priority.

(a) Applicable design criteria, standards and specifications identified in this ordinance.

(b) Applicable design criteria, standards and specifications identified in the Wisconsin Construction Site Best Management Practice Handbook, WDNR Pub. WT-222-2001 Revision.

(c) Applicable design criteria, standards and specifications identified in the Wisconsin Storm Water Manual, WDNR Pub. WR-349-94, 1994, including Technical Design Guidelines for Storm Water Management Practices, UW-Extension Pub. G3691, 2000.

(d) Other design guidance and technical standards identified or developed by the Wisconsin Department of Natural Resources under subchapter V or chapter NR 151, Wis. Adm. Code.

(2) OTHER STANDARDS. Other technical standards not identified or developed in sub. (1), but equivalent thereto, may be used provided that the methods have been approved by the Town Chair with assistance from the Town Engineer.

**SECTION VII. PERFORMANCE STANDARDS.**

(1) RESPONSIBLE PARTY. The responsible party shall implement a post-construction storm water management plan that incorporates the requirements of this section.

(2) PLAN. A written storm water management plan in accordance with Section IX shall be developed and implemented for each post-construction site. Unless the Town Chair, with assistance from the Town Engineer, gives prior written authorization, the methods in conformance with the technical standards shall be followed.

(3) REQUIREMENTS. The plan required under sub. (2) shall include the following:

(a) GENERAL REQUIREMENTS FOR STORM WATER MANAGEMENT MEASURES. The following shall be observed in managing storm water runoff:

1. The applicant shall attend a pre-application meeting with the Township before any data will be accepted. The purpose of the meeting is to specifically address required approvals and permits, and applicable technical standards.

2. Natural topography and land cover features such as natural swales, natural depressions, native soil infiltrating capacity, and natural ground water recharge areas shall be preserved and used, to the extent possible, to meet the requirements of this ordinance.

3. Emergency overland flow for all storm water facilities shall be provided during and after construction to prevent exceeding the safe capacity of downstream drainage facilities and prevent endangerment of downstream property or public safety.

4. All storm water rate control facilities shall be located within drainage, utility, and/or flowage easements to provide access and to prevent future alteration or encroachment.

5. Water quality facilities are required for all developments unless a development is part of a Township-approved regional facility drainage area.

6. All hydrologic data shall be submitted to the Township. Data shall be obtained using NRCS methodology including, but not limited to, HydroCad, Haestad Methods, or TR20/TR55 as defined by the NRCS.

7. Hydrologic analysis shall be based on NRCS methods using a Type II storm distribution, 24-hour duration, and average soil moisture conditions (AMC-2), as defined by NRCS.

8. Hydraulic calculations will be accepted in the Rational Method format or in commonly used software packages such as Eagle Point, HydroCad, Haestad Methods, HEC-RAS, or XP-SWMM.

9. When runoff from an upstream property passes through a downstream property, and it is desirable in the opinion of the Township to oversize a pond or conveyance system to serve increased runoff from predicted development of adjacent properties, the cost of oversizing the facility shall be determined by the Township, and assessed, in accordance with State Law and the Municipal Code.

10. Where appropriate, the plan shall include sediment controls to do all of the following to the maximum extent practicable:

    a. Prevent tracking of sediment from the construction site onto roads and other paved surfaces.

    b. Prevent the discharge of sediment as part of site dewatering.

    c. Protect the separate storm drain inlet structure from receiving sediment.

11. The use, storage, and disposal of chemicals, cement, and other compounds and materials used on the construction site shall be managed during the construction period, to prevent their entrance into waters of the state. However, projects that require the placement of these materials in waters of the state, such as constructing bridge footings or BMP installations, are not prohibited by this paragraph.

(b) TOTAL SUSPENDED SOLIDS. BMPs shall be designed, installed and maintained to control total suspended solids carried in runoff from the post-construction site as follows:

1. For new development, by design, reduce to the maximum extent practicable, the total suspended solids load by 80%, based on the average annual rainfall, as compared to no runoff management controls.

2. For redevelopment, by design, reduce to the maximum extent practicable, the total suspended solids load by 40%, based on the average annual rainfall, as compared to no runoff management controls. A 40% total suspended solids reduction shall meet the requirements of this ordinance.

3. All water quality analyses shall be based on the P8 Urban Catchment Model or other comparable model as approved by the Town Chair with assistance from the Town Engineer.

4. For this ordinance, the following year has been selected as average annual rainfall: Minneapolis, 1959, (Oct. 1, 1958 - Sept. 30, 1959).

5. Notwithstanding subds. 1. to 4., if the design cannot achieve the applicable total suspended solids reduction specified, the storm water management plan shall include a written and site-specific explanation why that level of reduction is not attained and the total suspended solids load shall be reduced to the maximum extent practicable.

(c) PEAK DISCHARGE RATE AND VOLUME. By design, BMPs shall be employed to meet the following performance standards.

1. For a 1.5 inch rainfall event the proposed post-development runoff volume and peak flow rate must not exceed the runoff volume and peak flow rate for pre-development conditions.

2. For the 2-year, 10-year, and 100-year rainfall event: the post-development peak flow rate shall not exceed the peak flow rate for pre-development land use conditions, or less if downstream system capacity problems exist.

3. Pre-development conditions shall assume "good hydrologic conditions" for appropriate land covers as identified in TR-55 or an equivalent methodology. The meanings of "hydrologic soil group" and "runoff curve number" are as determined in TR-55. However, when pre-development land cover is cropland, rather than using TR-55 values for cropland, the runoff curve numbers in Table 1 shall be used.

Table 1 - Maximum Pre-Development Runoff Curve Numbers for Cropland Areas

| Hydrologic Soil Group | A | B | C | D |
|---|---|---|---|---|
| Runoff Curve Number | 56 | 70 | 79 | 83 |