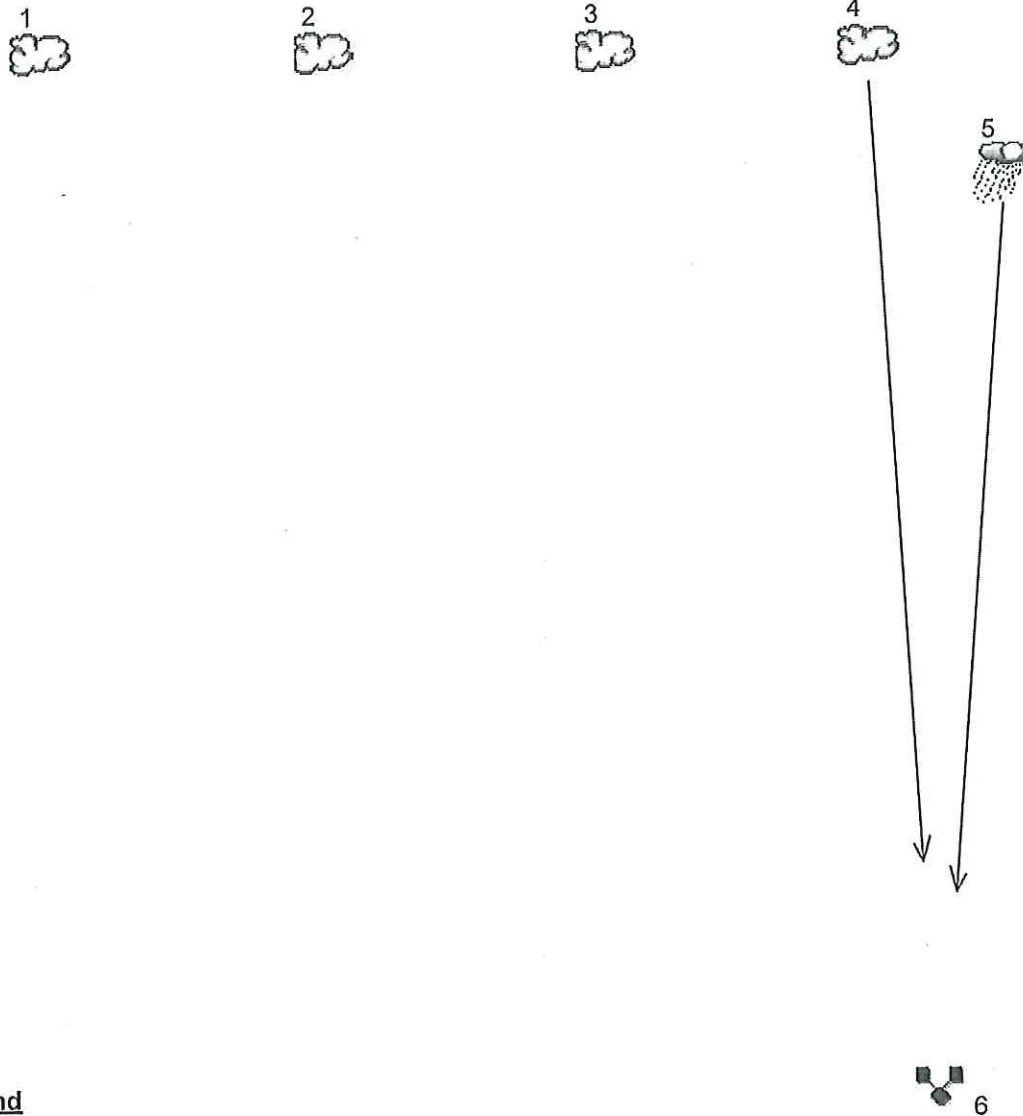


# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



## Legend

| Hyd. | Origin     | Description                               |
|------|------------|-------------------------------------------|
| 1    | SCS Runoff | Pre-Developed Area #1 - Analysis Point #1 |
| 2    | SCS Runoff | Pre-Developed Area #2 - Analysis Point #2 |
| 3    | SCS Runoff | Pre-Developed Area #3 - Analysis Point #3 |
| 4    | SCS Runoff | Pre-Developed Area #4 - Analysis Point #4 |
| 5    | Manual     | Offsite Miami University 50yr             |
| 6    | Combine    | Analysis Point #4 Allowable               |

Project: Allowable.gpw

Monday, Apr 16, 2012

# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

| Hyd. No. | Hydrograph type (origin) | Inflow hyd(s) | Peak Outflow (cfs) |       |       |       |       |       |       |        | Hydrograph Description               |
|----------|--------------------------|---------------|--------------------|-------|-------|-------|-------|-------|-------|--------|--------------------------------------|
|          |                          |               | 1-yr               | 2-yr  | 3-yr  | 5-yr  | 10-yr | 25-yr | 50-yr | 100-yr |                                      |
| 1        | SCS Runoff               | -----         | 5.576              | ----- | ----- | ----- | 33.39 | 48.59 | 62.80 | 80.12  | Pre-Developed Area #1 - Analysis Poi |
| 2        | SCS Runoff               | -----         | 2.622              | ----- | ----- | ----- | 37.24 | 61.30 | 85.37 | 115.56 | Pre-Developed Area #2 - Analysis Poi |
| 3        | SCS Runoff               | -----         | 1.366              | ----- | ----- | ----- | 17.86 | 28.93 | 39.73 | 53.21  | Pre-Developed Area #3 - Analysis Poi |
| 4        | SCS Runoff               | -----         | 1.868              | ----- | ----- | ----- | 26.01 | 41.88 | 57.14 | 76.13  | Pre-Developed Area #4 - Analysis Poi |
| 5        | Manual                   | -----         | 22.70              | ----- | ----- | ----- | 0.000 | 0.000 | 0.000 | 0.000  | Offsite Miami University 50yr        |
| 6        | Combine                  | 4, 5          | 24.38              | ----- | ----- | ----- | 26.01 | 41.88 | 57.14 | 76.13  | Analysis Point #4 Allowable          |
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# Hydrograph Report

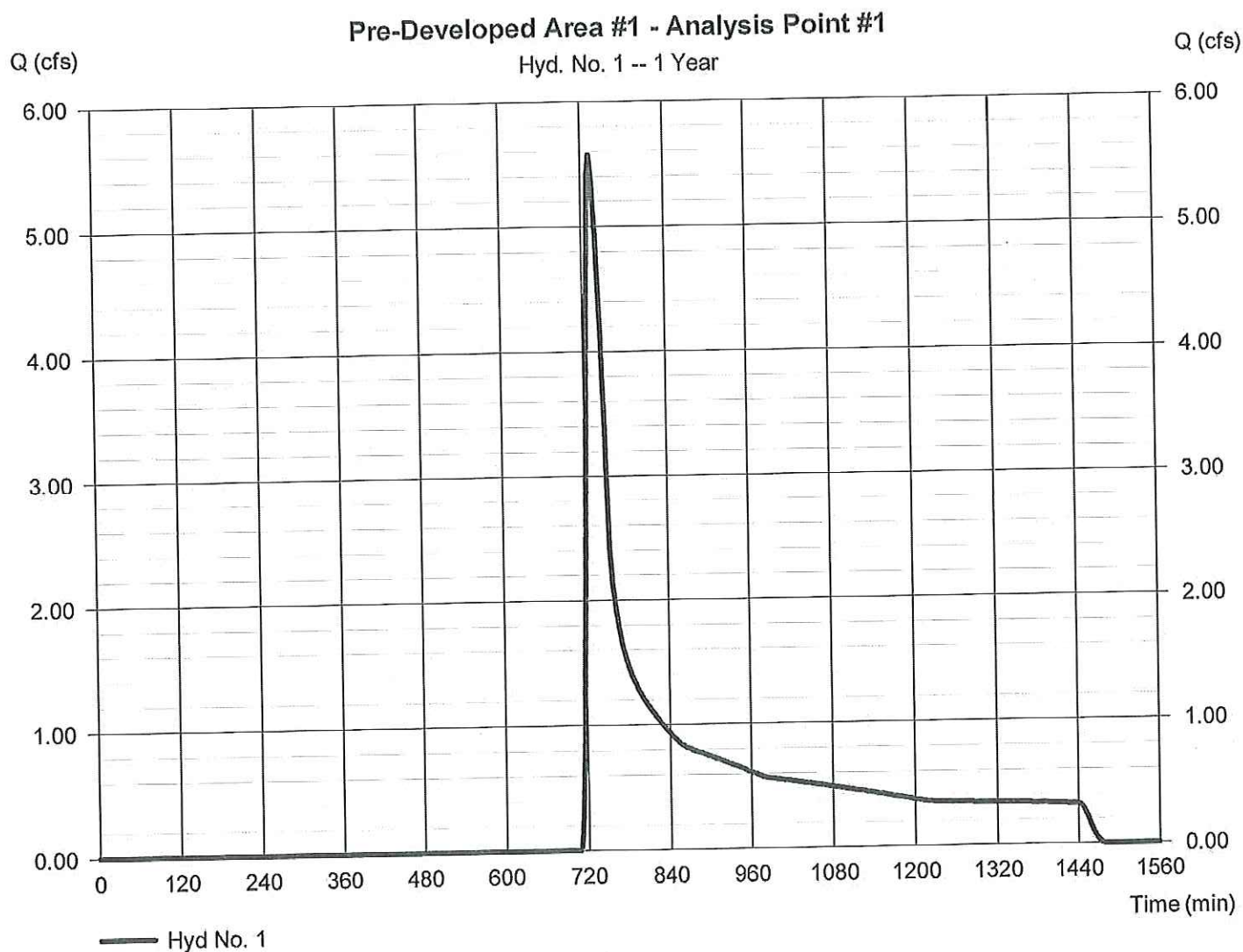
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Monday, Apr 16, 2012

## Hyd. No. 1

### Pre-Developed Area #1 - Analysis Point #1

|                 |   |            |                    |   |             |
|-----------------|---|------------|--------------------|---|-------------|
| Hydrograph type | = | SCS Runoff | Peak discharge     | = | 5.576 cfs   |
| Storm frequency | = | 1 yrs      | Time to peak       | = | 732 min     |
| Time interval   | = | 2 min      | Hyd. volume        | = | 34,194 cuft |
| Drainage area   | = | 32.570 ac  | Curve number       | = | 67.2        |
| Basin Slope     | = | 0.0 %      | Hydraulic length   | = | 0 ft        |
| Tc method       | = | User       | Time of conc. (Tc) | = | 25.20 min   |
| Total precip.   | = | 2.33 in    | Distribution       | = | Type II     |
| Storm duration  | = | 24 hrs     | Shape factor       | = | 484         |



# Hydrograph Report

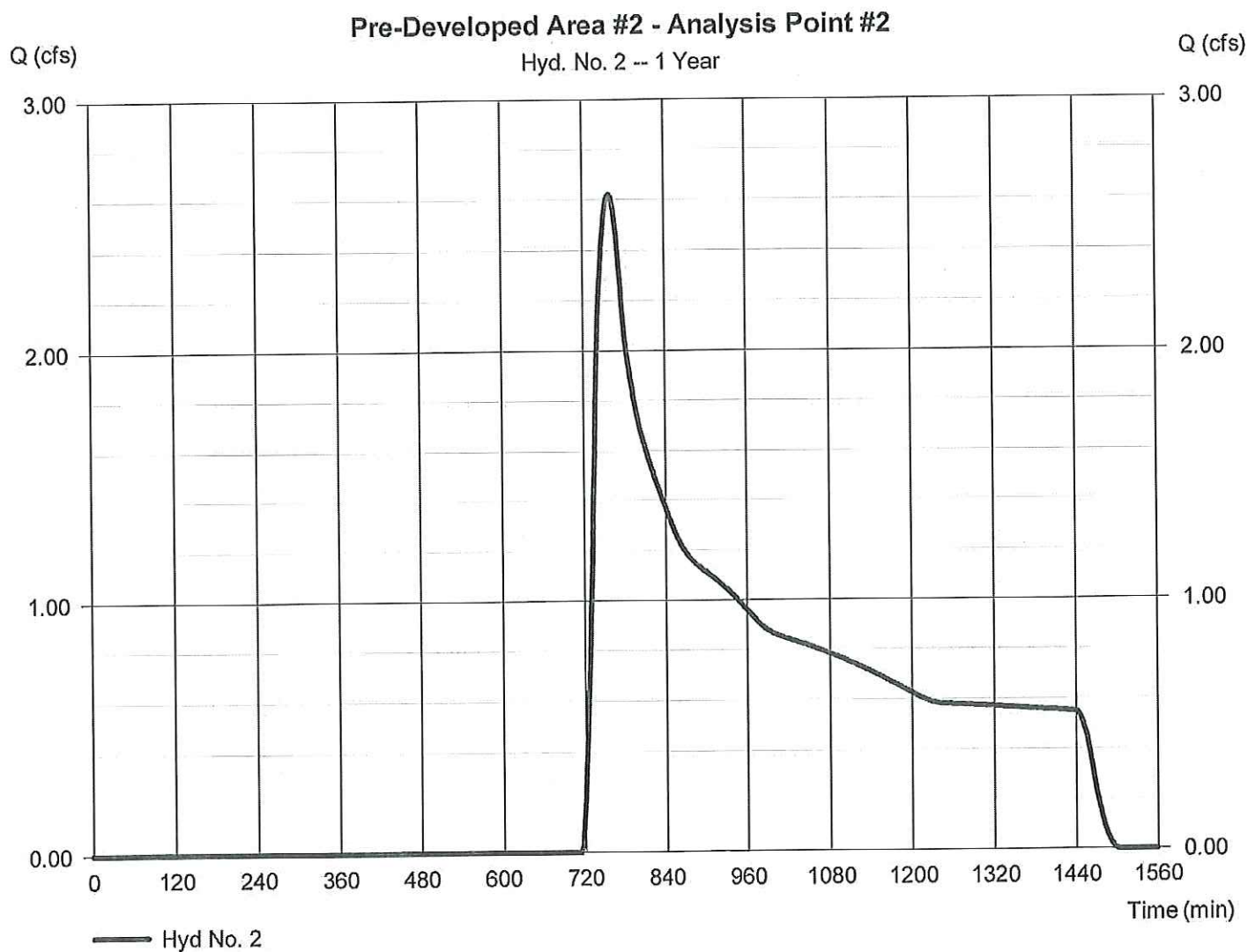
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Monday, Apr 16, 2012

## Hyd. No. 2

### Pre-Developed Area #2 - Analysis Point #2

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 2.622 cfs   |
| Storm frequency | = 1 yrs      | Time to peak       | = 760 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 41,581 cuft |
| Drainage area   | = 83.620 ac  | Curve number       | = 60.4        |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 37.10 min   |
| Total precip.   | = 2.33 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |





# Hydrograph Report

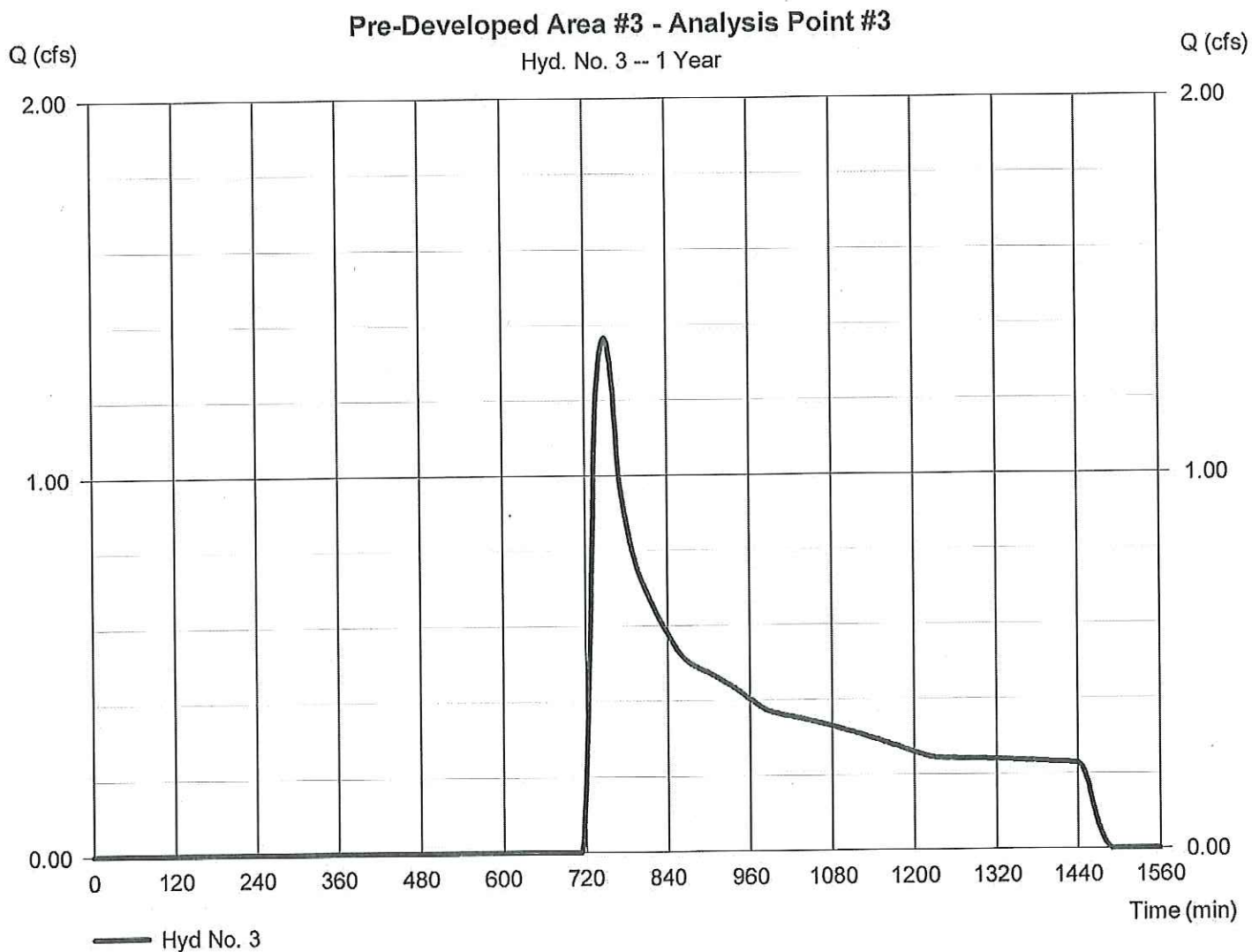
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Monday, Apr 16, 2012

## Hyd. No. 3

### Pre-Developed Area #3 - Analysis Point #3

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 1.366 cfs   |
| Storm frequency | = 1 yrs      | Time to peak       | = 750 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 18,211 cuft |
| Drainage area   | = 32.220 ac  | Curve number       | = 61.3        |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 31.30 min   |
| Total precip.   | = 2.33 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



# Hydrograph Report

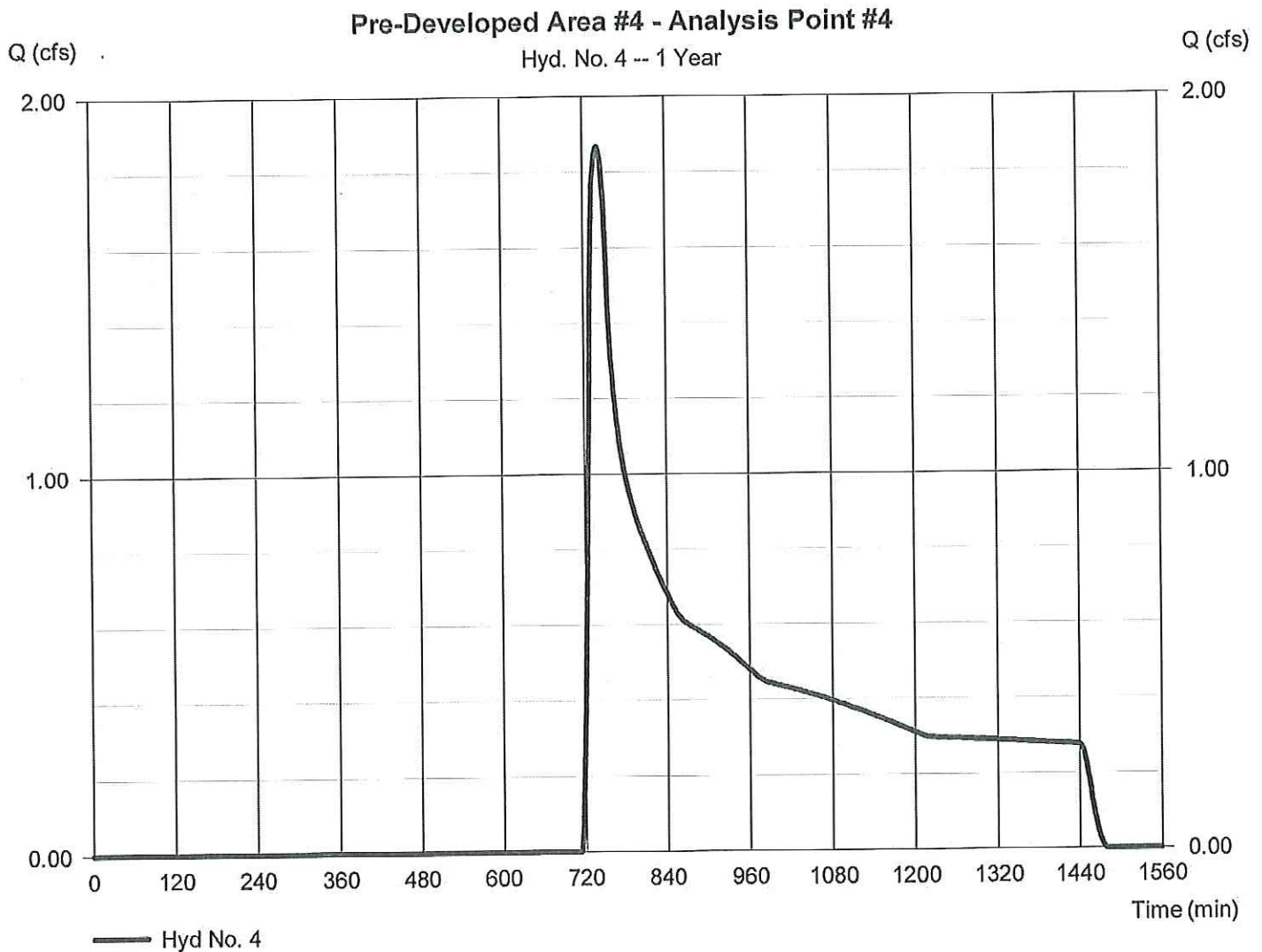
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Monday, Apr 16, 2012

## Hyd. No. 4

### Pre-Developed Area #4 - Analysis Point #4

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 1.868 cfs   |
| Storm frequency | = 1 yrs      | Time to peak       | = 742 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 22,165 cuft |
| Drainage area   | = 39.810 ac  | Curve number       | = 61.4        |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 26.40 min   |
| Total precip.   | = 2.33 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



# Hydrograph Report

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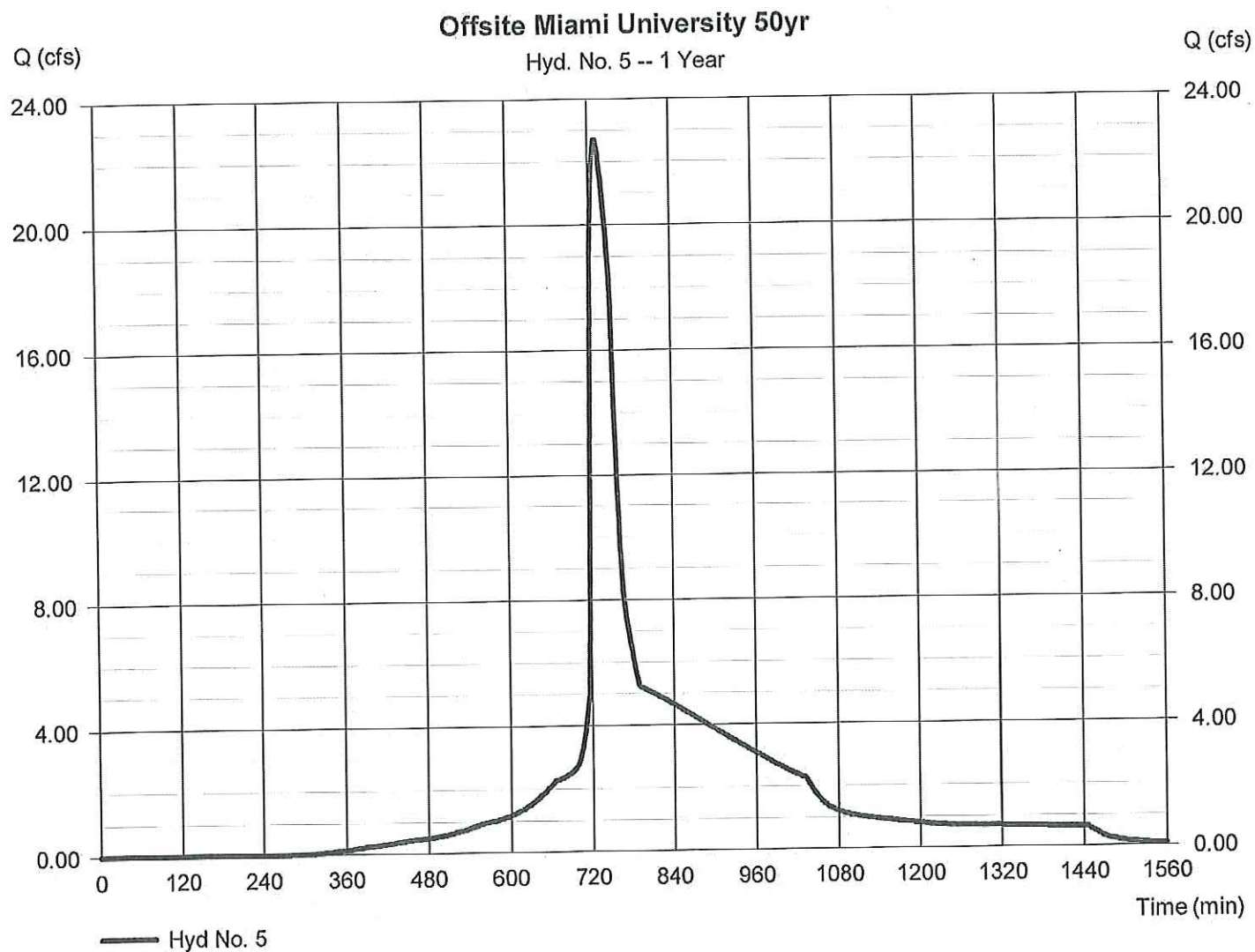
Monday, Apr 16, 2012

## Hyd. No. 5

Offsite Miami University 50yr

Hydrograph type = Manual  
Storm frequency = 1 yrs  
Time interval = 2 min

Peak discharge = 22.70 cfs  
Time to peak = 732 min  
Hyd. volume = 163,737 cuft



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

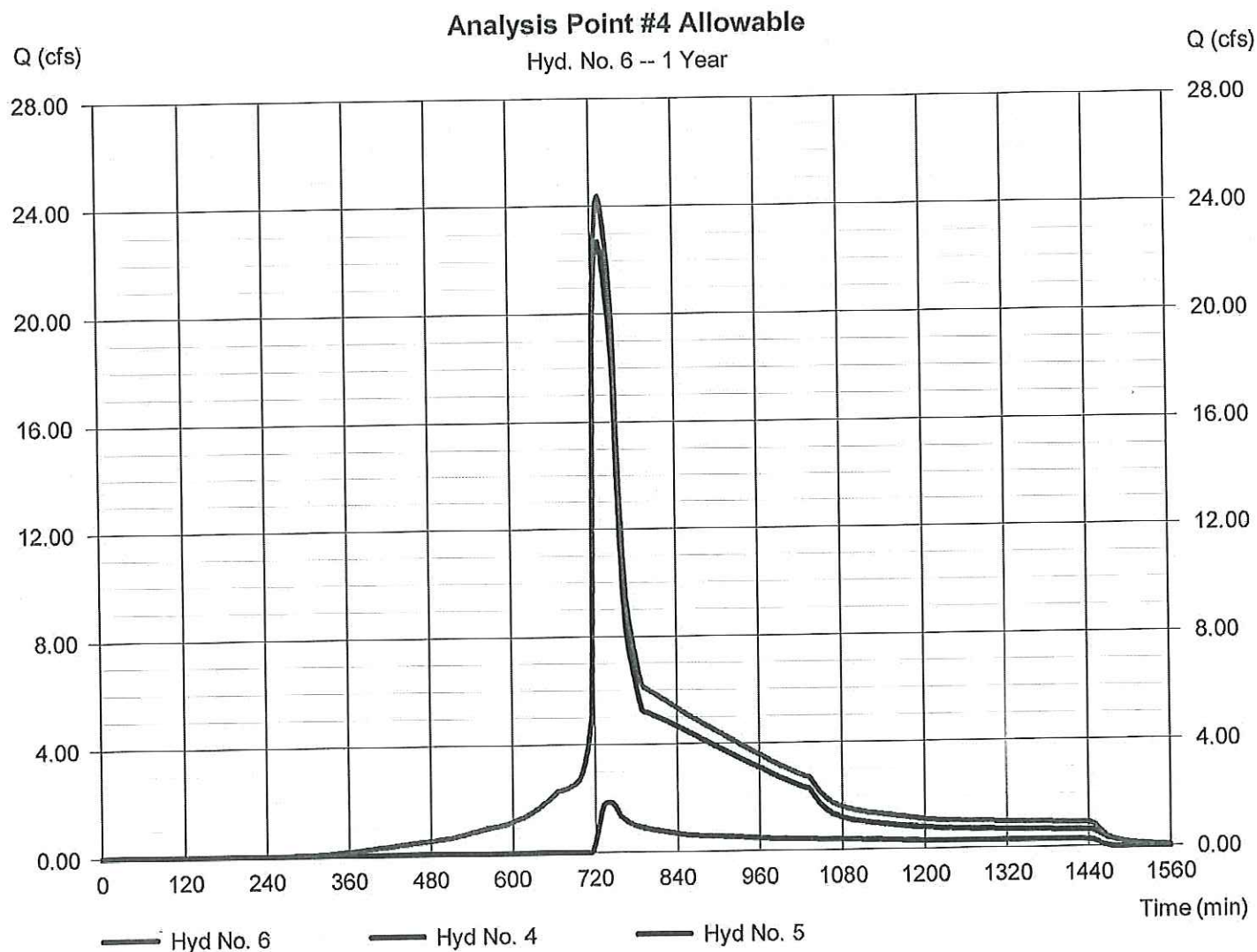
Monday, Apr 16, 2012

## Hyd. No. 6

### Analysis Point #4 Allowable

Hydrograph type = Combine  
Storm frequency = 1 yrs  
Time interval = 2 min  
Inflow hyds. = 4, 5

Peak discharge = 24.38 cfs  
Time to peak = 732 min  
Hyd. volume = 185,901 cuft  
Contrib. drain. area = 39.810 ac





# Hydrograph Report

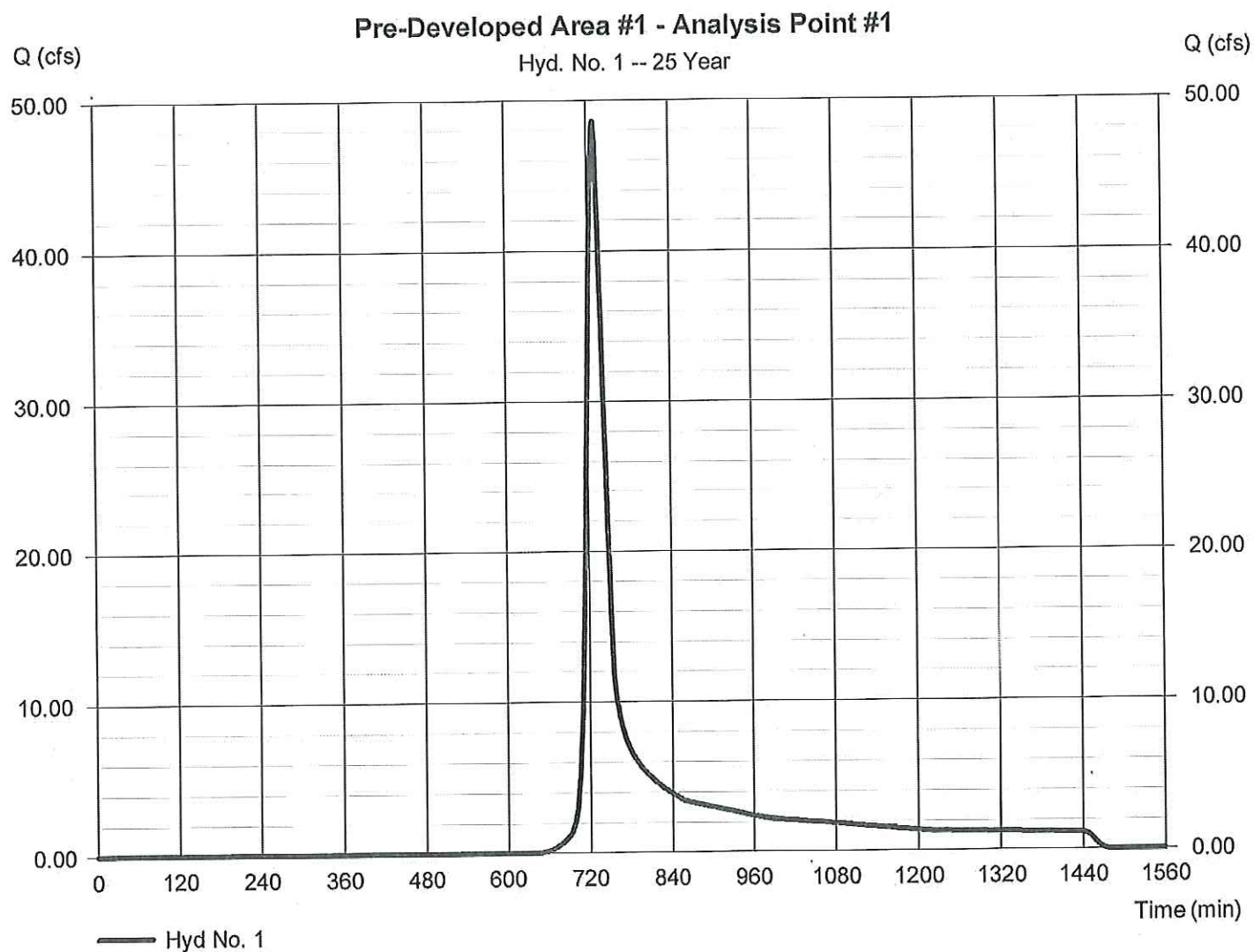
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Monday, Apr 16, 2012

## Hyd. No. 1

### Pre-Developed Area #1 - Analysis Point #1

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 48.59 cfs    |
| Storm frequency | = 25 yrs     | Time to peak       | = 730 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 187,552 cuft |
| Drainage area   | = 32.570 ac  | Curve number       | = 67.2         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 25.20 min    |
| Total precip.   | = 4.70 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |





# Hydrograph Report

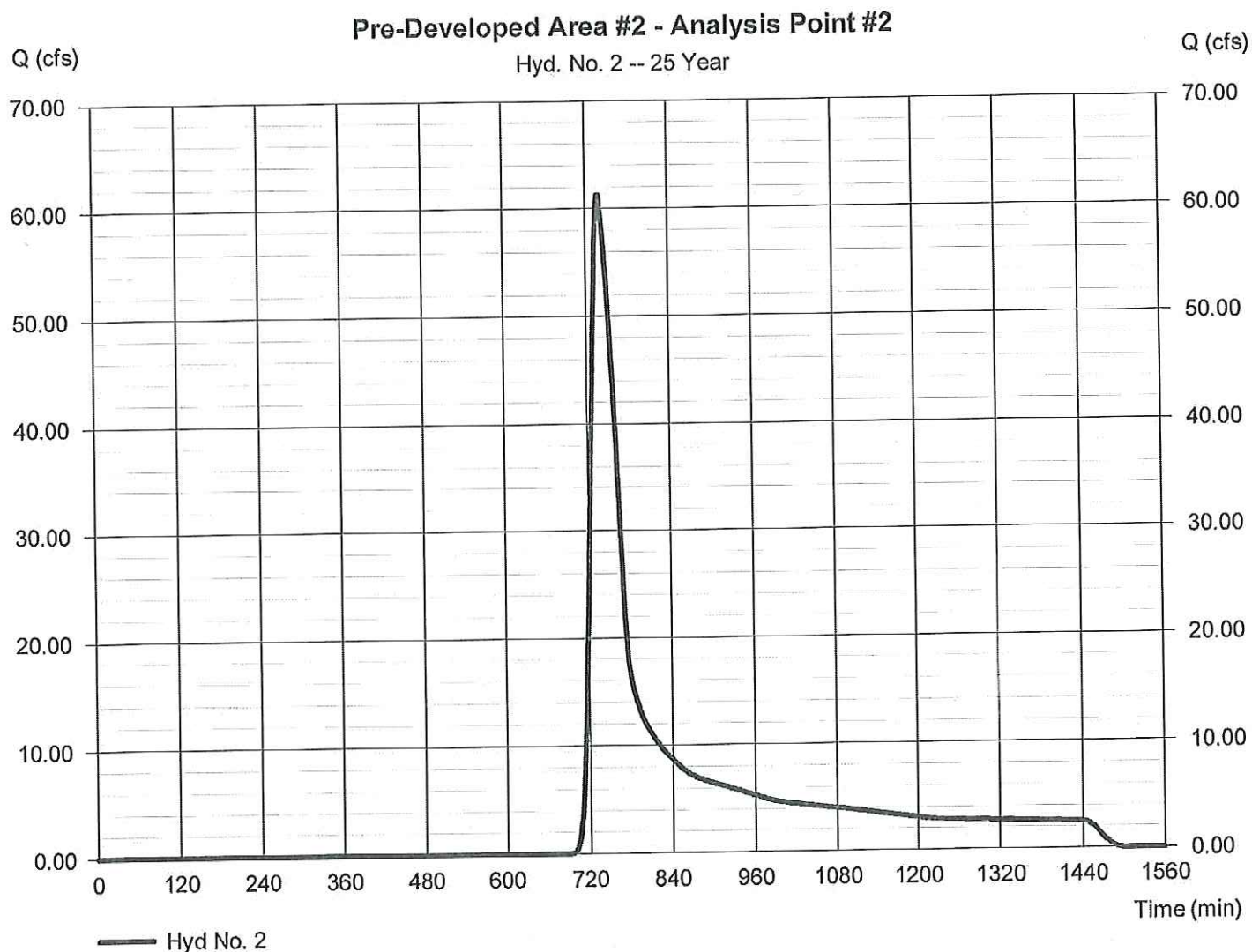
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Monday, Apr 16, 2012

## Hyd. No. 2

### Pre-Developed Area #2 - Analysis Point #2

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 61.30 cfs    |
| Storm frequency | = 25 yrs     | Time to peak       | = 738 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 350,500 cuft |
| Drainage area   | = 83.620 ac  | Curve number       | = 60.4         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 37.10 min    |
| Total precip.   | = 4.70 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

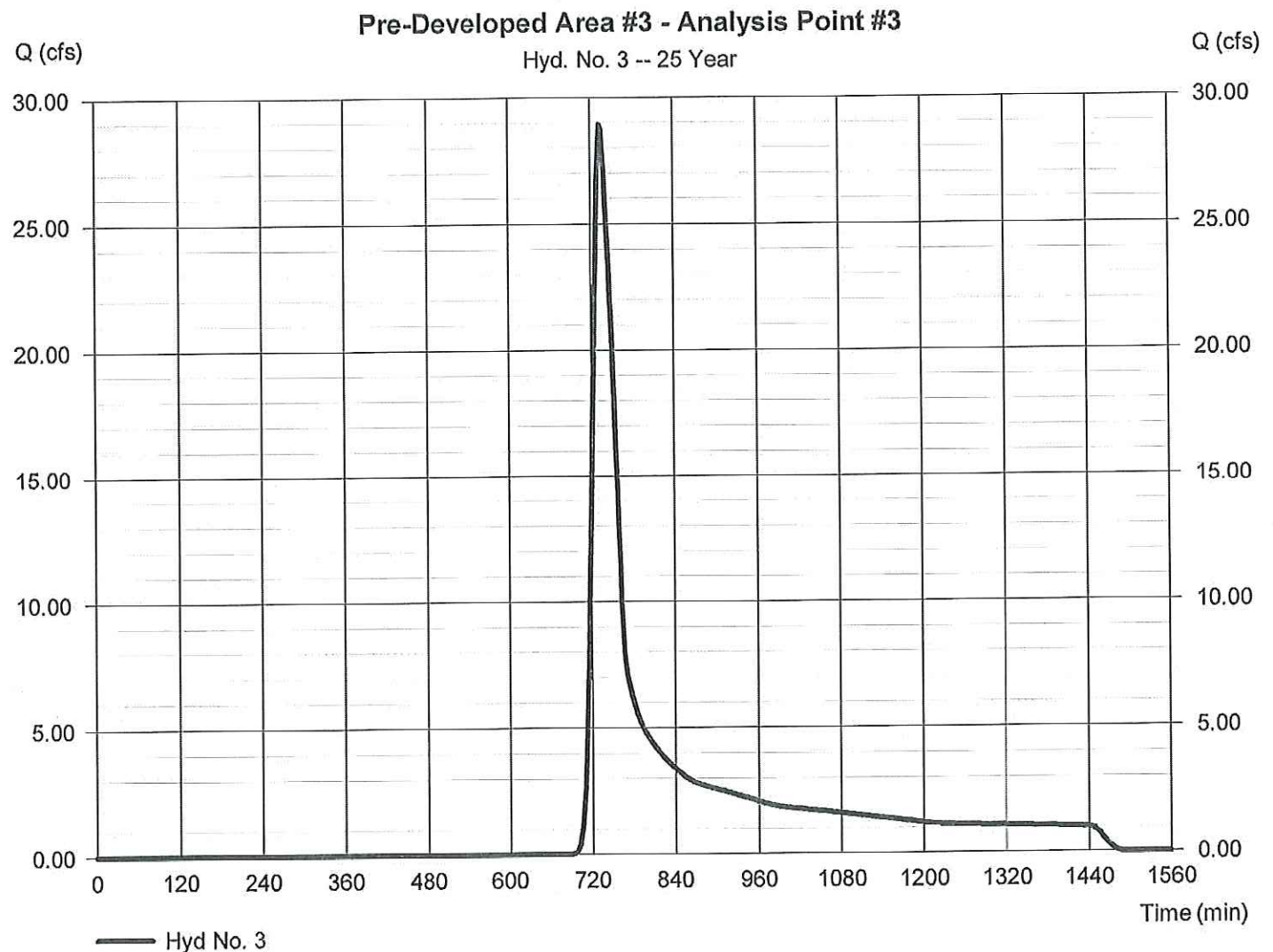
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Monday, Apr 16, 2012

## Hyd. No. 3

### Pre-Developed Area #3 - Analysis Point #3

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 28.93 cfs    |
| Storm frequency | = 25 yrs     | Time to peak       | = 734 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 143,498 cuft |
| Drainage area   | = 32.220 ac  | Curve number       | = 61.3         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 31.30 min    |
| Total precip.   | = 4.70 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

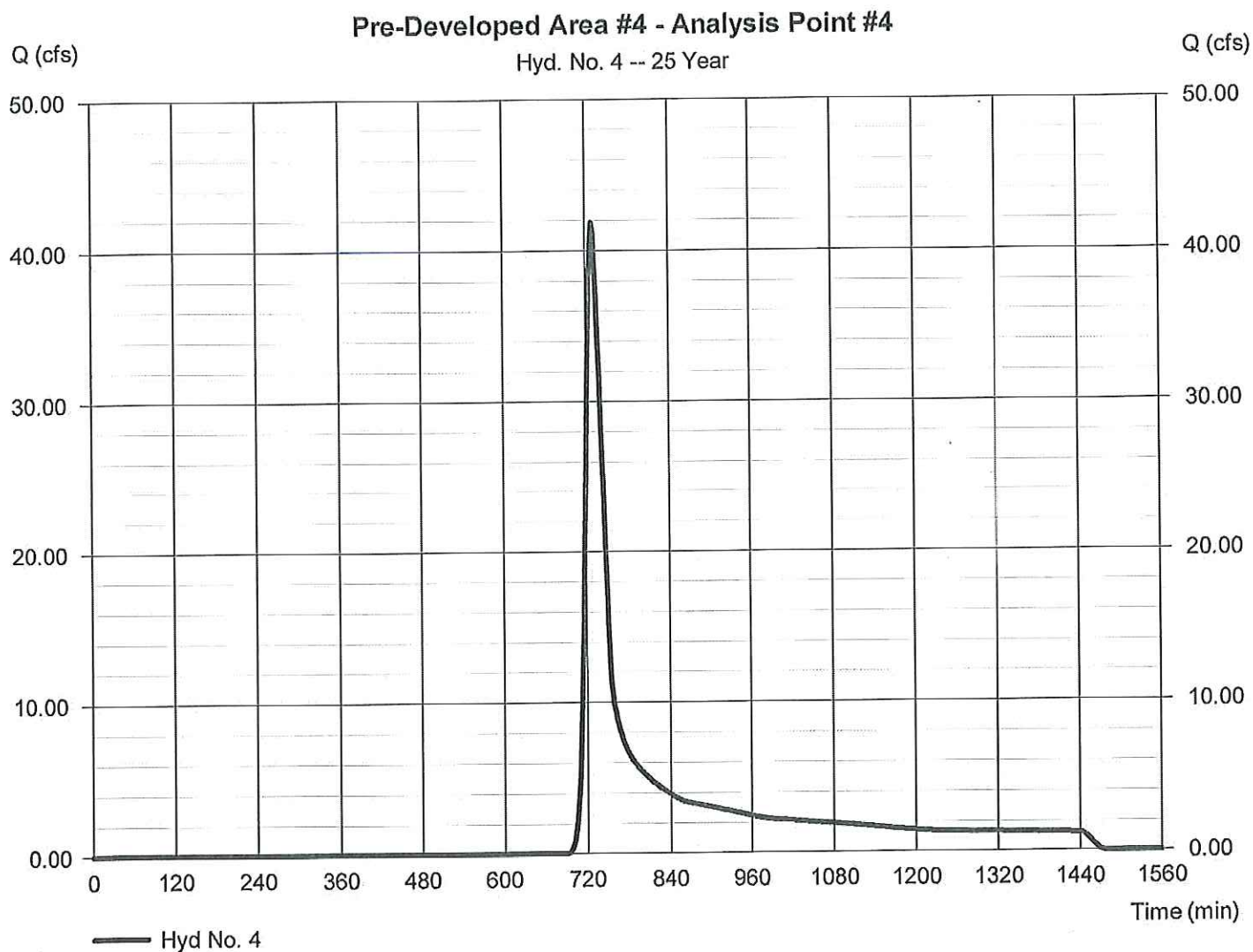
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Monday, Apr 16, 2012

## Hyd. No. 4

### Pre-Developed Area #4 - Analysis Point #4

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 41.88 cfs    |
| Storm frequency | = 25 yrs     | Time to peak       | = 730 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 173,288 cuft |
| Drainage area   | = 39.810 ac  | Curve number       | = 61.4         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 26.40 min    |
| Total precip.   | = 4.70 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

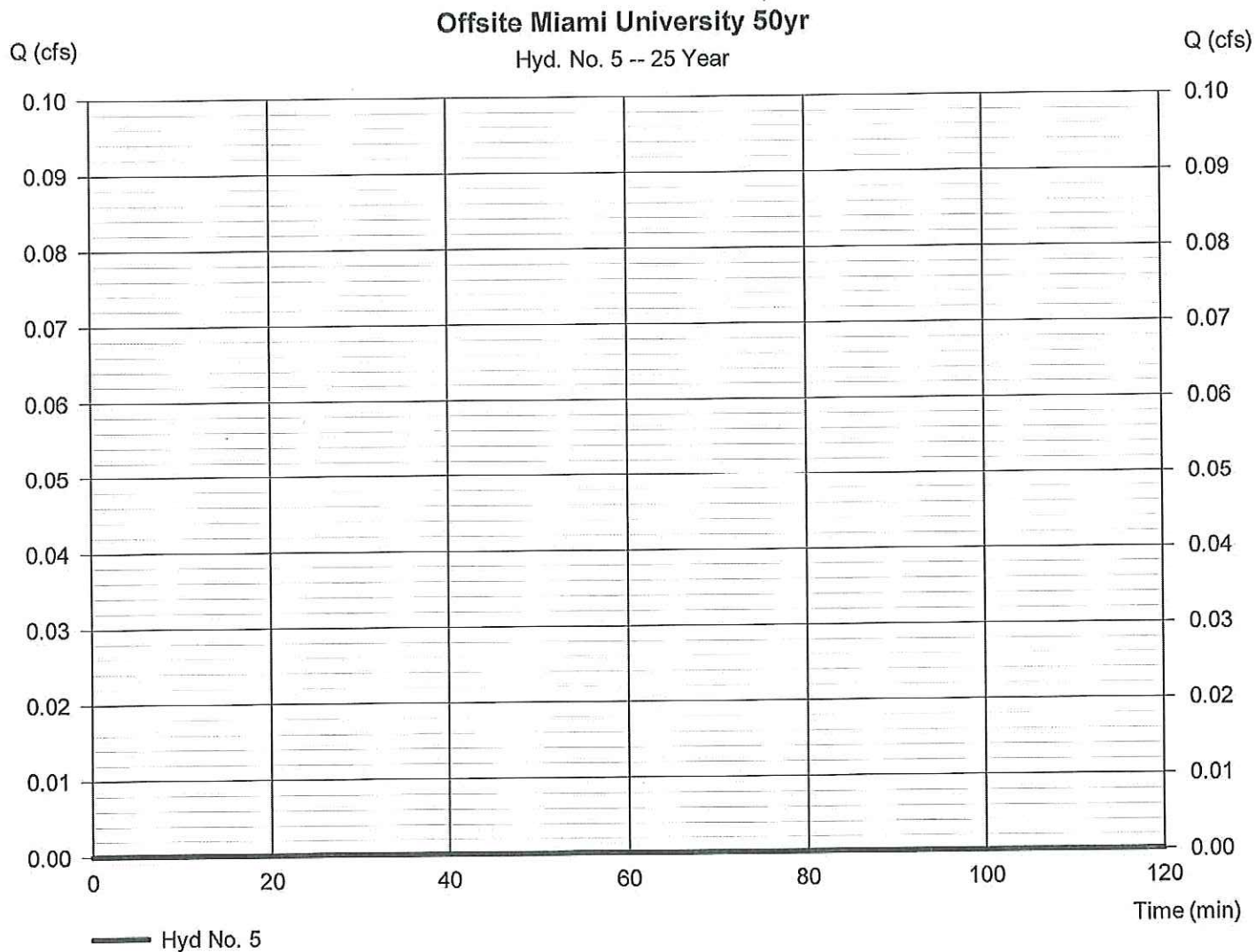
Monday, Apr 16, 2012

## Hyd. No. 5

Offsite Miami University 50yr

Hydrograph type = Manual  
Storm frequency = 25 yrs  
Time interval = 2 min

Peak discharge = 0.000 cfs  
Time to peak = n/a  
Hyd. volume = 0 cuft





# Hydrograph Report

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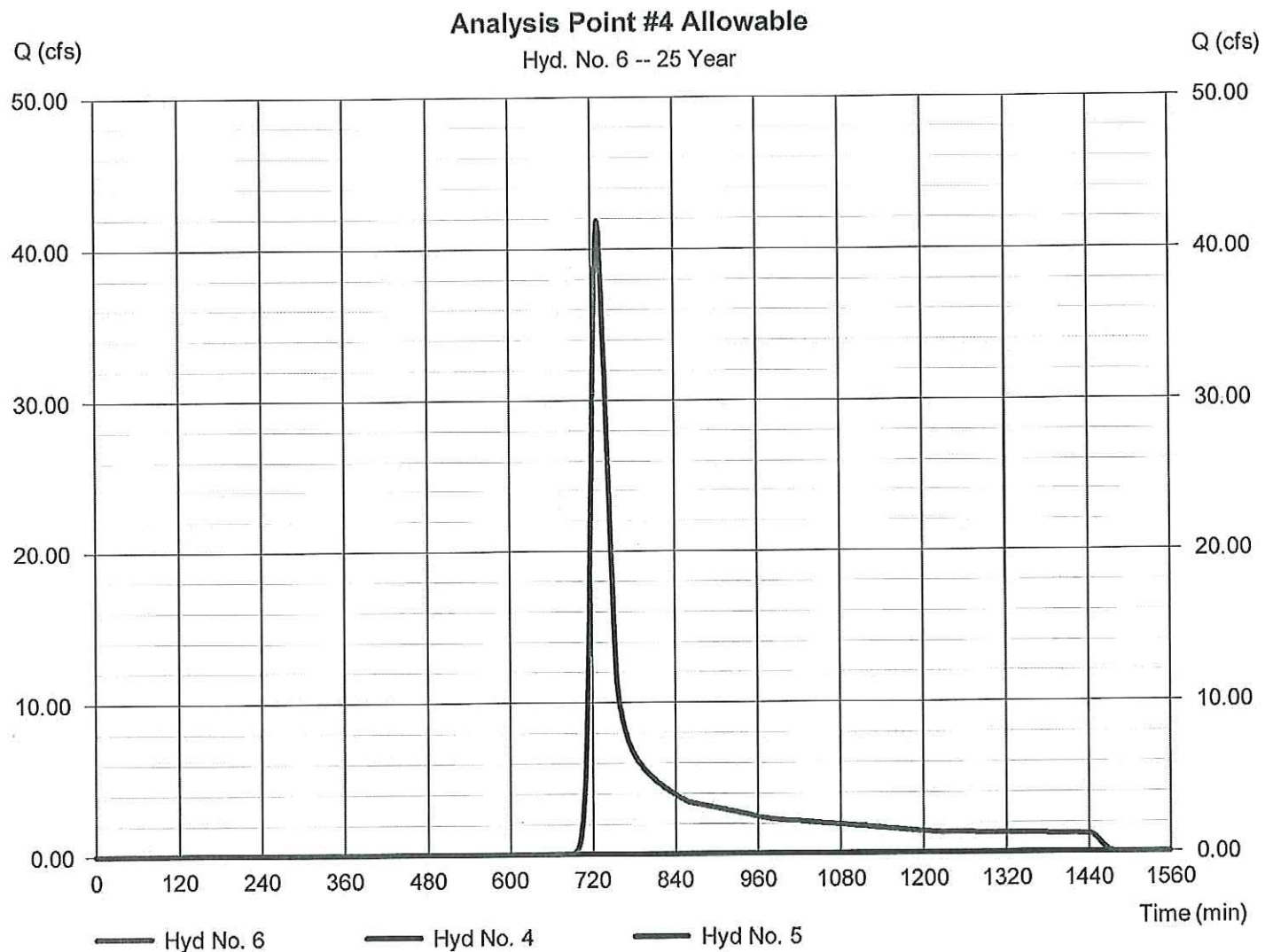
Monday, Apr 16, 2012

## Hyd. No. 6

### Analysis Point #4 Allowable

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 2 min  
Inflow hyds. = 4, 5

Peak discharge = 41.88 cfs  
Time to peak = 730 min  
Hyd. volume = 173,288 cuft  
Contrib. drain. area = 39.810 ac



# Hydrograph Report

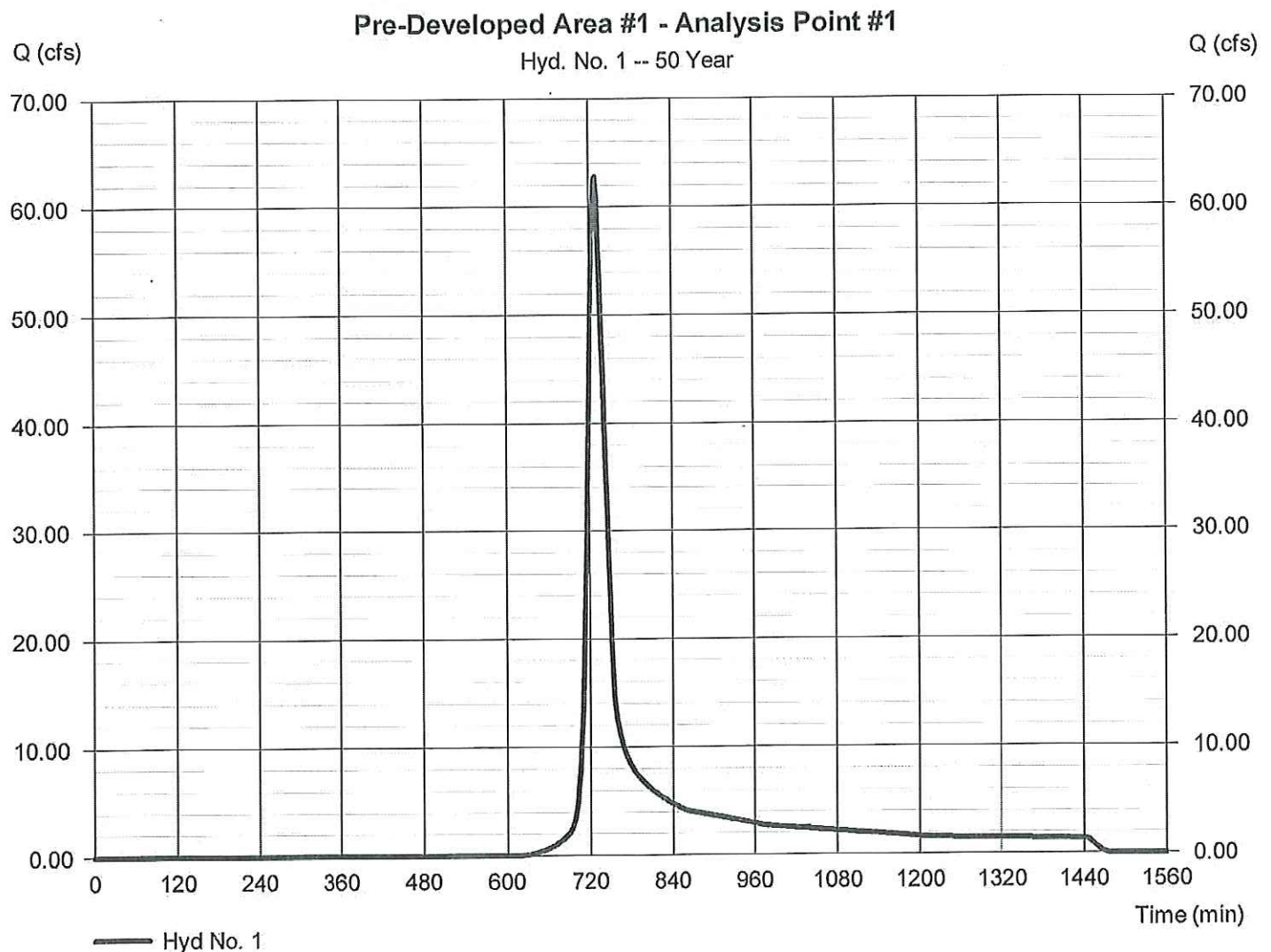
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Monday, Apr 16, 2012

## Hyd. No. 1

### Pre-Developed Area #1 - Analysis Point #1

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 62.80 cfs    |
| Storm frequency | = 50 yrs     | Time to peak       | = 730 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 238,052 cuft |
| Drainage area   | = 32.570 ac  | Curve number       | = 67.2         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 25.20 min    |
| Total precip.   | = 5.32 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

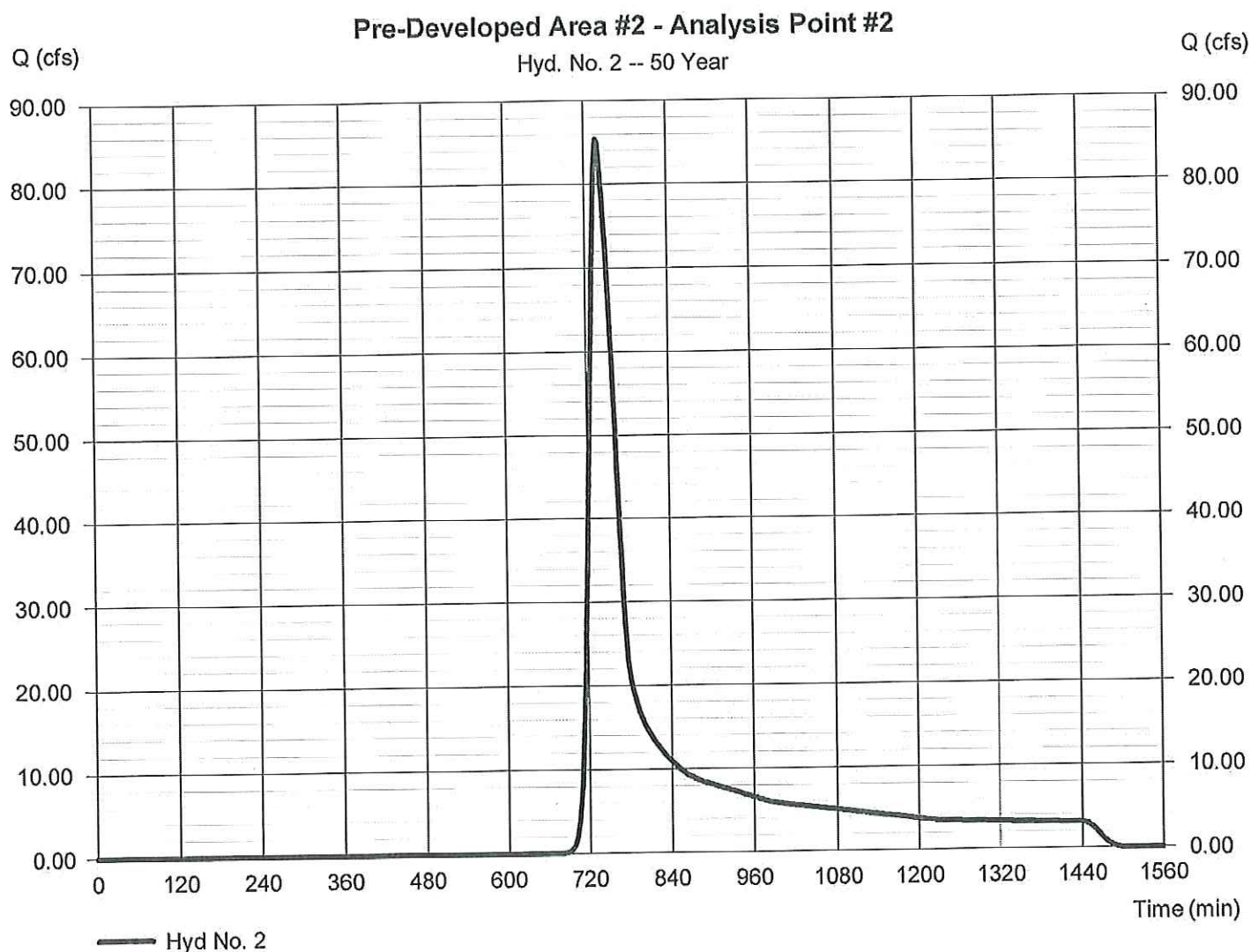
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Monday, Apr 16, 2012

## Hyd. No. 2

### Pre-Developed Area #2 - Analysis Point #2

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 85.37 cfs    |
| Storm frequency | = 50 yrs     | Time to peak       | = 738 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 461,701 cuft |
| Drainage area   | = 83.620 ac  | Curve number       | = 60.4         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 37.10 min    |
| Total precip.   | = 5.32 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

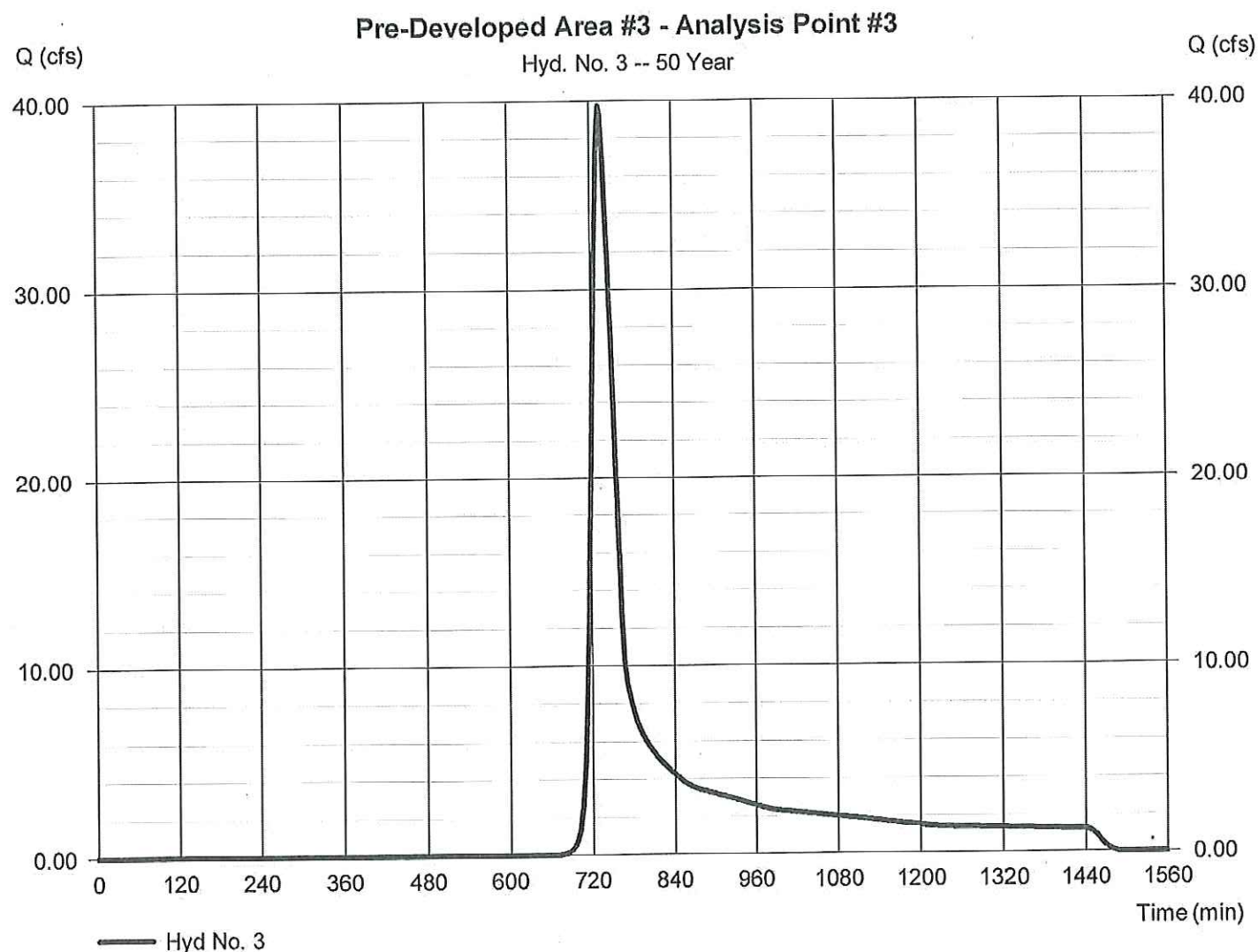
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Monday, Apr 16, 2012

## Hyd. No. 3

### Pre-Developed Area #3 - Analysis Point #3

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 39.73 cfs    |
| Storm frequency | = 50 yrs     | Time to peak       | = 734 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 187,980 cuft |
| Drainage area   | = 32.220 ac  | Curve number       | = 61.3         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 31.30 min    |
| Total precip.   | = 5.32 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |





# Hydrograph Report

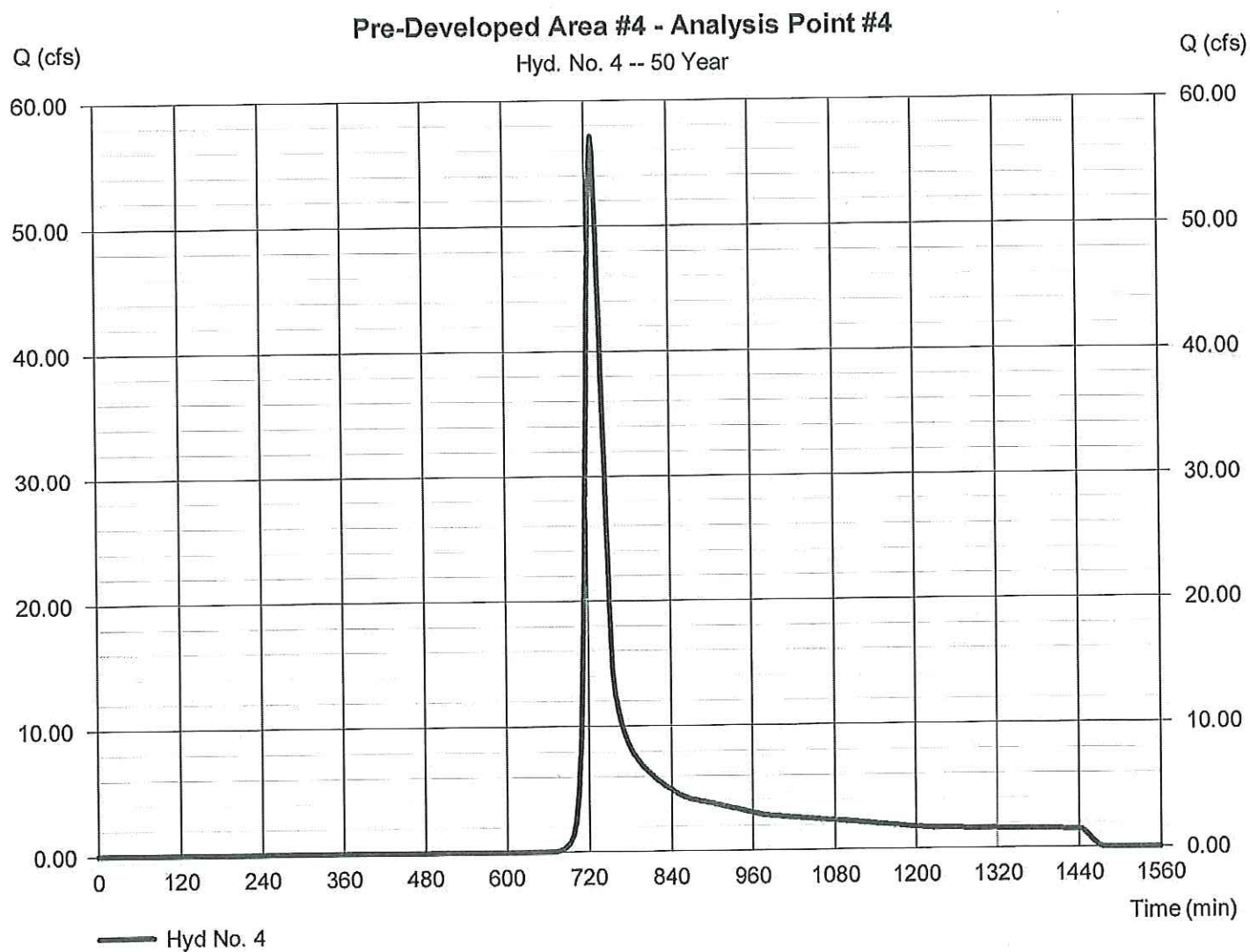
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Monday, Apr 16, 2012

## Hyd. No. 4

### Pre-Developed Area #4 - Analysis Point #4

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 57.14 cfs    |
| Storm frequency | = 50 yrs     | Time to peak       | = 730 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 226,866 cuft |
| Drainage area   | = 39.810 ac  | Curve number       | = 61.4         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 26.40 min    |
| Total precip.   | = 5.32 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

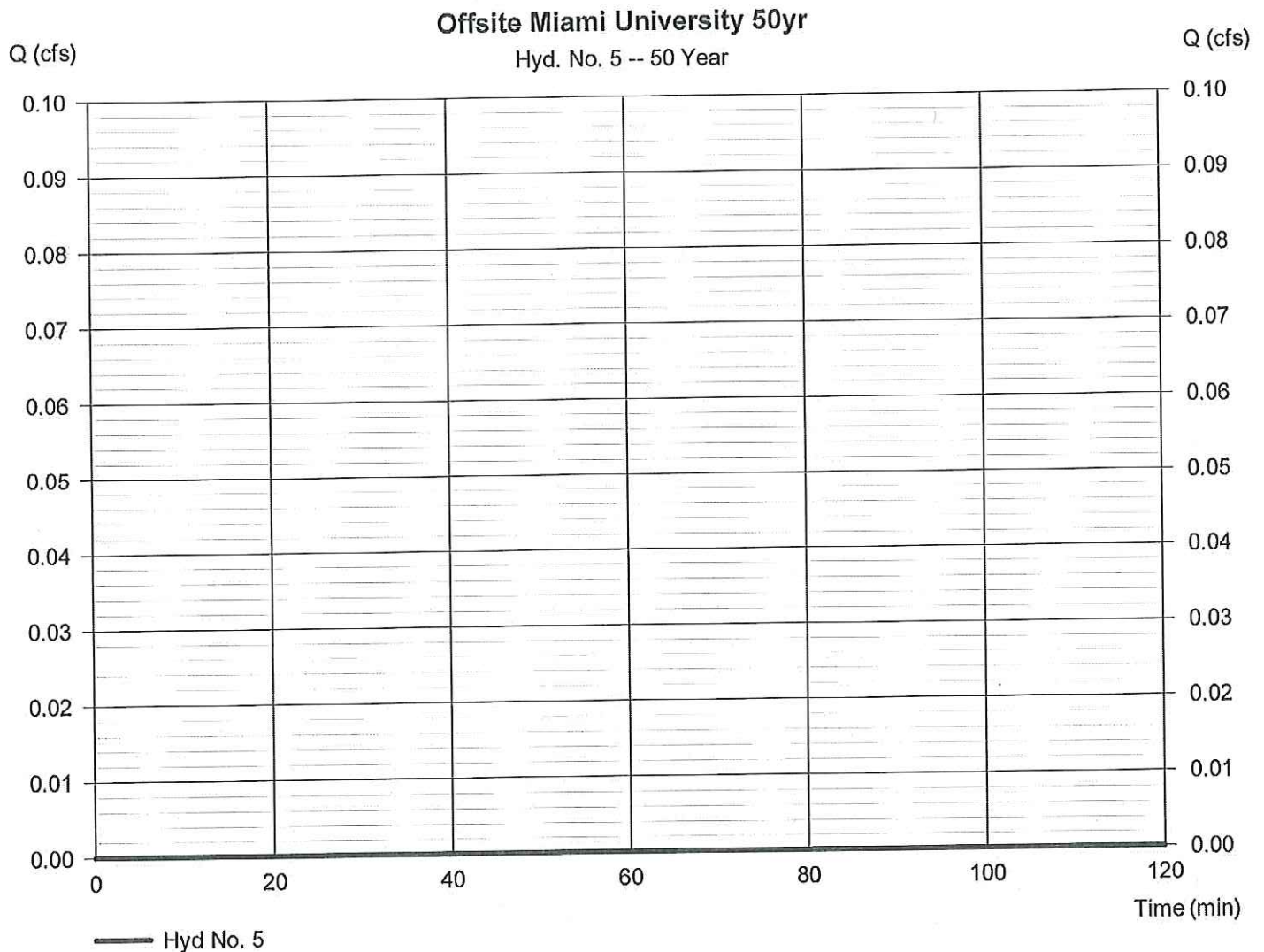
Monday, Apr 16, 2012

## Hyd. No. 5

Offsite Miami University 50yr

Hydrograph type = Manual  
Storm frequency = 50 yrs  
Time interval = 2 min

Peak discharge = 0.000 cfs  
Time to peak = n/a  
Hyd. volume = 0 cuft



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

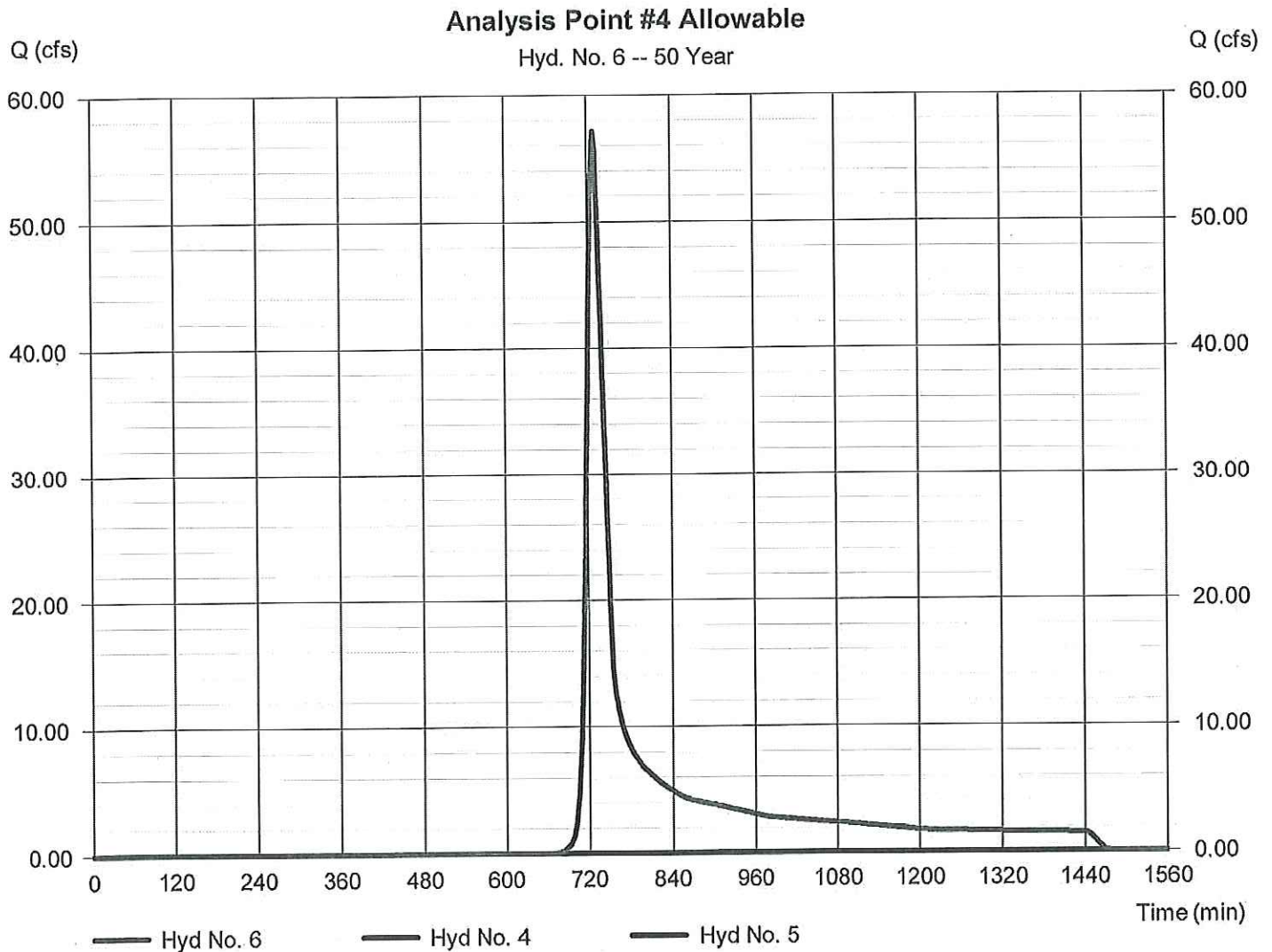
Monday, Apr 16, 2012

## Hyd. No. 6

### Analysis Point #4 Allowable

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 2 min  
Inflow hyds. = 4, 5

Peak discharge = 57.14 cfs  
Time to peak = 730 min  
Hyd. volume = 226,866 cuft  
Contrib. drain. area = 39.810 ac



Project: Voice of America Park

**Drainage Area Description:**

Post-Developed Area #1, Onsite tributary Lake #1 and analysis point #1

Job #: 07M056.006

Initials: GJK

Date: 4/4/2012

Drainage Area: 24.30 Acres

Soil Types: 25 % Type B  
75 % Type C

Land Use: Open Space 75 %  
Lake 10 %  
Impervious 15 %

**Composite Runoff Curve Number:**

| Ground Cover | Soil Type | CN  | Soil Type % | Land Use % |       |
|--------------|-----------|-----|-------------|------------|-------|
| Open Space   | B         | 61  | 25          | 75         | 11.44 |
| Lake         | B         | 100 | 25          | 10         | 2.50  |
| Impervious   | B         | 98  | 25          | 15         | 3.68  |
| Open Space   | C         | 74  | 75          | 75         | 41.63 |
| Lake         | C         | 100 | 75          | 10         | 7.50  |
| Impervious   | C         | 98  | 75          | 15         | 11.03 |

Composite CN = 77.8

**Time of Concentration:**

**Sheet Flow:**

Length = 100

Slope(ft/ft) = 0.0200

Manning's, n = 0.17

Tc  
0.19 hr

**Shallow Concentrated Flow:**

Length = 370

Slope(ft/ft) = 0.0150

Velocity (fps) = 2

0.05 hr

**Channel Flow:**

Length = 1070

Velocity (fps) = 3

0.10 hr

**Pipe Flow:**

Length =

Velocity (fps) =

hr

Tc = 0.34 hr  
20.5 min



Project: Voice of America Park

**Drainage Area Description:**

Post-Developed Area #2, Onsite tributary to Lake #2, then Lake #3 and analysis point #2

Job #: 07M056.006

Initials: GJK

Date: 4/4/2012

Drainage Area: 17.60 Acres

Soil Types: 100 % Type B  
0 % Type C

Land Use: Open Space 80 %  
Lake 8 %  
Impervious 12 %

**Composite Runoff Curve Number:**

| Ground Cover | Soil Type | CN  | Soil Type % | Land Use % |       |
|--------------|-----------|-----|-------------|------------|-------|
| Open Space   | B         | 61  | 100         | 80         | 48.80 |
| Lake         | B         | 100 | 100         | 8          | 8.00  |
| Impervious   | B         | 98  | 100         | 12         | 11.76 |
| Open Space   | C         | 74  | 0           | 80         | 0.00  |
| Lake         | C         | 100 | 0           | 8          | 0.00  |
| Impervious   | C         | 98  | 0           | 12         | 0.00  |

Composite CN = 68.6

**Time of Concentration:**

**Sheet Flow:**

Length = 100

Slope(ft/ft) = 0.0150

Manning's, n = 0.17

Tc

0.21 hr

**Shallow Concentrated Flow:**

Length = 620

Slope(ft/ft) = 0.0150

Velocity (fps) = 2

0.09 hr

**Channel Flow:**

Length =

Velocity (fps) =

0.00 hr

**Pipe Flow:**

Length =

Velocity (fps) =

hr

Tc = 0.30 hr  
18.0 min

Project: Voice of America Park

**Drainage Area Description:**

Post-Developed Area #3, Onsite tributary to Lake #3 and analysis point #2

Job #: 07M056.006

Initials: GJK

Date: 4/4/2012

Drainage Area: 63.50 Acres

Soil Types: 30 % Type B  
70 % Type C

Land Use: Open Space 49 %  
Lake 5 %  
Impervious 18 %  
Synthetic Turf Fields 28 % (9 Fields Total)

**Composite Runoff Curve Number:**

| Ground Cover          | Soil Type | CN  | Soil Type % | Land Use % |       |
|-----------------------|-----------|-----|-------------|------------|-------|
| Open Space            | B         | 61  | 30          | 49         | 8.97  |
| Lake                  | B         | 100 | 30          | 5          | 1.50  |
| Impervious            | B         | 98  | 30          | 18         | 5.29  |
| Synthetic Turf Fields | B         | 90  | 30          | 28         | 7.56  |
| Open Space            | C         | 74  | 70          | 49         | 25.38 |
| Lake                  | C         | 100 | 70          | 5          | 3.50  |
| Impervious            | C         | 98  | 70          | 18         | 12.35 |
| Synthetic Turf Fields | C         | 90  | 70          | 28         | 17.64 |

Composite CN = 82.2

**Time of Concentration:**

**Sheet Flow:**

Length = 100

Slope(ft/ft) = 0.0200

Manning's, n = 0.17

Tc

0.19 hr

**Shallow Concentrated Flow:**

Length = 300

Slope(ft/ft) = 0.0150

Velocity (fps) = 2

0.04 hr

**Channel Flow:**

Length =

Velocity (fps) =

0.00 hr

**Pipe Flow:**

Length = 930

Velocity (fps) = 5

0.05 hr

Tc = 0.28 hr  
17.1 min

Project: Voice of America Park

**Drainage Area Description:**

Post-Developed Area #4, Onsite tributary to Lake #4 and analysis point #3

Job #: 07M056.006

Initials: GJK

Date: 4/4/2012

Drainage Area: 22.25 Acres

Soil Types: 70 % Type B  
30 % Type C

Land Use: Open Space 60 %  
Lake 10 %  
Impervious 30 %

**Composite Runoff Curve Number:**

| Ground Cover | Soil Type | CN  | Soil Type % | Land Use % |       |
|--------------|-----------|-----|-------------|------------|-------|
| Open Space   | B         | 61  | 70          | 60         | 25.62 |
| Lake         | B         | 100 | 70          | 10         | 7.00  |
| Impervious   | B         | 98  | 70          | 30         | 20.58 |
| Open Space   | C         | 74  | 30          | 60         | 13.32 |
| Lake         | C         | 100 | 30          | 10         | 3.00  |
| Impervious   | C         | 98  | 30          | 30         | 8.82  |

Composite CN = 78.3

**Time of Concentration:**

**Sheet Flow:**

Length = 100

Slope(ft/ft) = 0.0150

Manning's, n = 0.17

Tc

0.21 hr

**Shallow Concentrated Flow:**

Length = 450

Slope(ft/ft) = 0.0150

Velocity (fps) = 2

0.06 hr

**Channel Flow:**

Length = 320

Velocity (fps) = 2.5

0.04 hr

**Pipe Flow:**

Length = 130

Velocity (fps) = 5

0.01 hr

Tc = 0.31 hr  
18.7 min

Project: Voice of America Park

**Drainage Area Description:**

Post-Developed Area #5, Onsite tributary to Lake #5 analysis point #3

Job #: 07M056.006

Initials: GJK

Date: 4/4/2012

Drainage Area: 67.30 Acres

Soil Types: 35 % Type B  
65 % Type C

Land Use: Open Space 82 %  
Lake 13 %  
Impervious 5 %

**Composite Runoff Curve Number:**

| Ground Cover | Soil Type | CN  | Soil Type % | Land Use % |       |
|--------------|-----------|-----|-------------|------------|-------|
| Open Space   | B         | 61  | 35          | 82         | 17.51 |
| Lake         | B         | 100 | 35          | 13         | 4.55  |
| Impervious   | B         | 98  | 35          | 5          | 1.72  |
| Open Space   | C         | 74  | 65          | 82         | 39.44 |
| Lake         | C         | 100 | 65          | 13         | 8.45  |
| Impervious   | C         | 98  | 65          | 5          | 3.19  |

Composite CN = 74.8

**Time of Concentration:**

**Sheet Flow:**

Length = 100

Slope(ft/ft) = 0.0150

Manning's, n = 0.17

Tc

0.21 hr

**Shallow Concentrated Flow:**

Length = 950

Slope(ft/ft) = 0.0120

Velocity (fps) = 1.8

0.15 hr

**Channel Flow:**

Length = 100

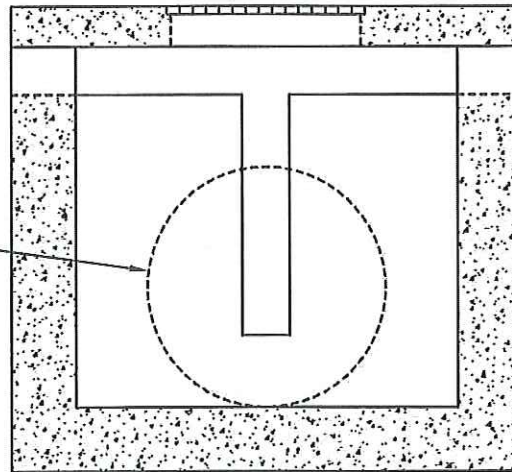
Velocity (fps) = 2.5

0.01 hr

Tc = 0.37 hr  
22.3 min



30" OUTLET PIPE



O.D.O.T CB 2-4

T/GR=887.92

ELEV=887.50

(4) 4'-0" WINDOWS

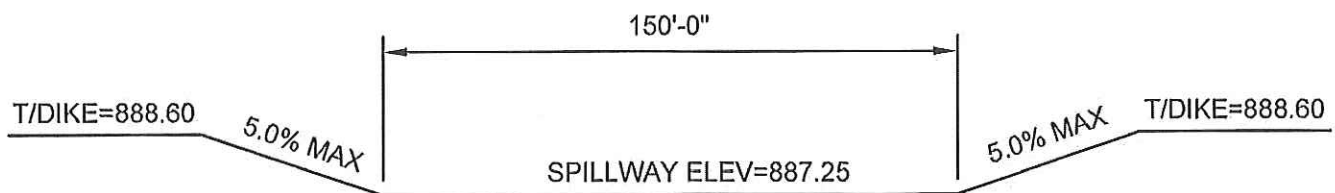
ELEV=887.00

(1) 6" WINDOW

ELEV=884.50

30" INV=883.75

**LAKE #1 OUTLET STRUCTURE**  
**SIDE VIEW DETAIL**  
**N.T.S.**



**LAKE #1 EMERGENCY SPILLWAY DETAIL**  
**N.T.S.**

Drawing:  
07M056-006 CD

Scale  
07M056.006

Drawn by:  
GJK

Checked By:

Issue Date:  
04-04-12

**VOICE OF AMERICA PARK  
ATHLETIC COMPLEX**

SECTION 12, TOWN 3, RANGE 2,  
WEST CHESTER TOWNSHIP,  
BUTLER COUNTY, OHIO

**FUTURE LAKE #1 OUTLET DETAILS**



6900 Tylersville Road, Suite A  
Mason, OH 45040 - 513.336.6600

# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Monday, Apr 16, 2012

## Pond No. 1 - Lake #1

### Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 884.50 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 884.50         | 00                  | 0                    | 0                    |
| 0.24       | 884.74         | 01                  | 0                    | 0                    |
| 0.25       | 884.75         | 81,066              | 271                  | 271                  |
| 0.50       | 885.00         | 82,336              | 20,423               | 20,694               |
| 1.50       | 886.00         | 87,471              | 84,882               | 105,577              |
| 2.50       | 887.00         | 92,703              | 90,065               | 195,642              |

### Culvert / Orifice Structures

|                 | [A]      | [B]  | [C]  | [PrfRsr] |
|-----------------|----------|------|------|----------|
| Rise (in)       | = 30.00  | 0.00 | 0.00 | 0.00     |
| Span (in)       | = 30.00  | 0.00 | 0.00 | 0.00     |
| No. Barrels     | = 1      | 0    | 0    | 0        |
| Invert El. (ft) | = 883.75 | 0.00 | 0.00 | 0.00     |
| Length (ft)     | = 47.00  | 0.00 | 0.00 | 0.00     |
| Slope (%)       | = 0.30   | 0.00 | 0.00 | n/a      |
| N-Value         | = .013   | .013 | .013 | n/a      |
| Orifice Coeff.  | = 0.60   | 0.60 | 0.60 | 0.60     |
| Multi-Stage     | = n/a    | No   | No   | No       |

### Weir Structures

|                | [A]                  | [B]    | [C]  | [D]  |
|----------------|----------------------|--------|------|------|
| Crest Len (ft) | = 0.50               | 15.50  | 0.00 | 0.00 |
| Crest El. (ft) | = 884.50             | 887.00 | 0.00 | 0.00 |
| Weir Coeff.    | = 3.00               | 3.00   | 3.33 | 3.33 |
| Weir Type      | = Rect               | Rect   | ---  | ---  |
| Multi-Stage    | = Yes                | Yes    | No   | No   |
| Exfil.(in/hr)  | = 0.000 (by Contour) |        |      |      |
| TW Elev. (ft)  | = 0.00               |        |      |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

### Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00     | 0            | 884.50       | 0.00      | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.000     |
| 0.02     | 0            | 884.52       | 2.53 oc   | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.006     |
| 0.05     | 0            | 884.55       | 2.53 oc   | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.016     |
| 0.07     | 0            | 884.57       | 2.53 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.029     |
| 0.10     | 0            | 884.60       | 2.53 oc   | ---       | ---       | ---        | 0.04     | 0.00     | ---      | ---      | ---       | ---      | 0.045     |
| 0.12     | 0            | 884.62       | 2.53 oc   | ---       | ---       | ---        | 0.06     | 0.00     | ---      | ---      | ---       | ---      | 0.062     |
| 0.14     | 0            | 884.64       | 2.53 oc   | ---       | ---       | ---        | 0.08     | 0.00     | ---      | ---      | ---       | ---      | 0.082     |
| 0.17     | 0            | 884.67       | 2.53 oc   | ---       | ---       | ---        | 0.10     | 0.00     | ---      | ---      | ---       | ---      | 0.103     |
| 0.19     | 0            | 884.69       | 2.53 oc   | ---       | ---       | ---        | 0.13     | 0.00     | ---      | ---      | ---       | ---      | 0.126     |
| 0.22     | 0            | 884.72       | 2.53 oc   | ---       | ---       | ---        | 0.15     | 0.00     | ---      | ---      | ---       | ---      | 0.150     |
| 0.24     | 0            | 884.74       | 2.53 oc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.176     |
| 0.24     | 27           | 884.74       | 2.53 uc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.177     |
| 0.24     | 54           | 884.74       | 2.53 oc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.178     |
| 0.24     | 82           | 884.74       | 2.53 oc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.180     |
| 0.24     | 109          | 884.74       | 2.53 oc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.181     |
| 0.24     | 136          | 884.74       | 2.53 oc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.182     |
| 0.25     | 163          | 884.75       | 2.53 oc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.183     |
| 0.25     | 190          | 884.75       | 2.53 oc   | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.184     |
| 0.25     | 217          | 884.75       | 2.53 oc   | ---       | ---       | ---        | 0.19     | 0.00     | ---      | ---      | ---       | ---      | 0.185     |
| 0.25     | 244          | 884.75       | 2.53 oc   | ---       | ---       | ---        | 0.19     | 0.00     | ---      | ---      | ---       | ---      | 0.186     |
| 0.25     | 271          | 884.75       | 2.53 oc   | ---       | ---       | ---        | 0.19     | 0.00     | ---      | ---      | ---       | ---      | 0.188     |
| 0.28     | 2,314        | 884.78       | 2.53 oc   | ---       | ---       | ---        | 0.22     | 0.00     | ---      | ---      | ---       | ---      | 0.216     |
| 0.30     | 4,356        | 884.80       | 2.53 oc   | ---       | ---       | ---        | 0.25     | 0.00     | ---      | ---      | ---       | ---      | 0.246     |
| 0.32     | 6,398        | 884.83       | 2.53 oc   | ---       | ---       | ---        | 0.28     | 0.00     | ---      | ---      | ---       | ---      | 0.278     |
| 0.35     | 8,441        | 884.85       | 2.53 oc   | ---       | ---       | ---        | 0.31     | 0.00     | ---      | ---      | ---       | ---      | 0.311     |
| 0.38     | 10,483       | 884.88       | 2.53 oc   | ---       | ---       | ---        | 0.34     | 0.00     | ---      | ---      | ---       | ---      | 0.345     |
| 0.40     | 12,525       | 884.90       | 2.53 oc   | ---       | ---       | ---        | 0.38     | 0.00     | ---      | ---      | ---       | ---      | 0.380     |
| 0.43     | 14,568       | 884.93       | 2.53 oc   | ---       | ---       | ---        | 0.42     | 0.00     | ---      | ---      | ---       | ---      | 0.416     |
| 0.45     | 16,610       | 884.95       | 2.53 oc   | ---       | ---       | ---        | 0.45     | 0.00     | ---      | ---      | ---       | ---      | 0.453     |
| 0.48     | 18,652       | 884.98       | 2.53 oc   | ---       | ---       | ---        | 0.49     | 0.00     | ---      | ---      | ---       | ---      | 0.491     |
| 0.50     | 20,694       | 885.00       | 2.53 oc   | ---       | ---       | ---        | 0.53     | 0.00     | ---      | ---      | ---       | ---      | 0.530     |
| 0.60     | 29,183       | 885.10       | 2.53 oc   | ---       | ---       | ---        | 0.70     | 0.00     | ---      | ---      | ---       | ---      | 0.697     |
| 0.70     | 37,671       | 885.20       | 2.53 oc   | ---       | ---       | ---        | 0.88     | 0.00     | ---      | ---      | ---       | ---      | 0.879     |
| 0.80     | 46,159       | 885.30       | 2.53 oc   | ---       | ---       | ---        | 1.07     | 0.00     | ---      | ---      | ---       | ---      | 1.073     |
| 0.90     | 54,647       | 885.40       | 2.53 oc   | ---       | ---       | ---        | 1.28     | 0.00     | ---      | ---      | ---       | ---      | 1.281     |
| 1.00     | 63,136       | 885.50       | 2.53 oc   | ---       | ---       | ---        | 1.50     | 0.00     | ---      | ---      | ---       | ---      | 1.500     |
| 1.10     | 71,624       | 885.60       | 2.53 oc   | ---       | ---       | ---        | 1.73     | 0.00     | ---      | ---      | ---       | ---      | 1.730     |

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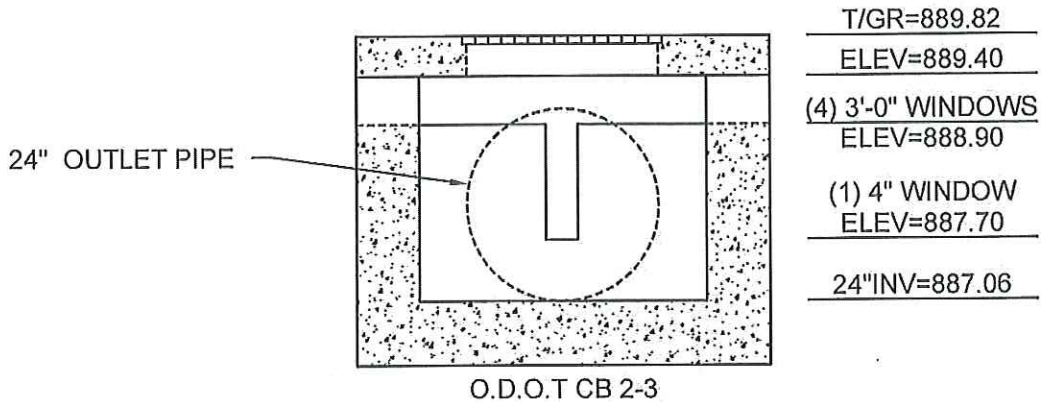
Lake #1

# Stage / Storage / Discharge Table

| Stage<br>ft | Storage<br>cuft | Elevation<br>ft | Clv A<br>cfs | Clv B<br>cfs | Clv C<br>cfs | PrfRsr<br>cfs | Wr A<br>cfs | Wr B<br>cfs | Wr C<br>cfs | Wr D<br>cfs | Exfil<br>cfs | User<br>cfs | Total<br>cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 1.20        | 80,112          | 885.70          | 2.53 oc      | ---          | ---          | ---           | 1.97        | 0.00        | ---         | ---         | ---          | ---         | 1.971        |
| 1.30        | 88,600          | 885.80          | 2.53 oc      | ---          | ---          | ---           | 2.22        | 0.00        | ---         | ---         | ---          | ---         | 2.223        |
| 1.40        | 97,088          | 885.90          | 2.53 oc      | ---          | ---          | ---           | 2.48        | 0.00        | ---         | ---         | ---          | ---         | 2.484        |
| 1.50        | 105,577         | 886.00          | 2.82 oc      | ---          | ---          | ---           | 2.75 s      | 0.00        | ---         | ---         | ---          | ---         | 2.751        |
| 1.60        | 114,583         | 886.10          | 3.12 oc      | ---          | ---          | ---           | 3.02 s      | 0.00        | ---         | ---         | ---          | ---         | 3.019        |
| 1.70        | 123,590         | 886.20          | 3.32 oc      | ---          | ---          | ---           | 3.30 s      | 0.00        | ---         | ---         | ---          | ---         | 3.297        |
| 1.80        | 132,596         | 886.30          | 3.64 oc      | ---          | ---          | ---           | 3.57 s      | 0.00        | ---         | ---         | ---          | ---         | 3.574        |
| 1.90        | 141,603         | 886.40          | 3.86 oc      | ---          | ---          | ---           | 3.86 s      | 0.00        | ---         | ---         | ---          | ---         | 3.860        |
| 2.00        | 150,609         | 886.50          | 4.19 oc      | ---          | ---          | ---           | 4.15 s      | 0.00        | ---         | ---         | ---          | ---         | 4.153        |
| 2.10        | 159,616         | 886.60          | 4.53 oc      | ---          | ---          | ---           | 4.45 s      | 0.00        | ---         | ---         | ---          | ---         | 4.446        |
| 2.20        | 168,622         | 886.70          | 4.75 oc      | ---          | ---          | ---           | 4.75 s      | 0.00        | ---         | ---         | ---          | ---         | 4.753        |
| 2.30        | 177,629         | 886.80          | 5.09 oc      | ---          | ---          | ---           | 5.06 s      | 0.00        | ---         | ---         | ---          | ---         | 5.058        |
| 2.40        | 186,635         | 886.90          | 5.44 oc      | ---          | ---          | ---           | 5.37 s      | 0.00        | ---         | ---         | ---          | ---         | 5.366        |
| 2.50        | 195,642         | 887.00          | 5.78 oc      | ---          | ---          | ---           | 5.68 s      | 0.00        | ---         | ---         | ---          | ---         | 5.680        |

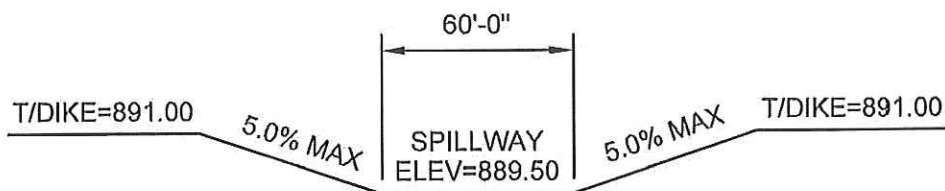
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## **LAKE #2 OUTLET STRUCTURE SIDE VIEW DETAIL**

**N.T.S.**



## **LAKE #2 EMERGENCY SPILLWAY DETAIL**

**N.T.S.**

Drawing:  
07M056-006 CD  
Scale  
07M056.006  
Drawn by:  
GJK  
Checked By:  
Issue Date:  
04-04-12

**VOICE OF AMERICA PARK  
ATHLETIC COMPLEX**  
SECTION 12, TOWN 3, RANGE 2,  
WEST CHESTER TOWNSHIP,  
BUTLER COUNTY, OHIO  
**LAKE #2 OUTLET DETAILS**

**bayer  
becker**  
6900 Tylersville Road, Suite A  
Mason, OH 45040 - 513.336.6600



# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Monday, Apr 16, 2012

Pond No. 2 - Lake #2

## Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 887.70 ft

## Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 887.70         | 00                  | 0                    | 0                    |
| 0.09       | 887.79         | 01                  | 0                    | 0                    |
| 0.10       | 887.80         | 55,863              | 187                  | 187                  |
| 0.30       | 888.00         | 80,959              | 13,604               | 13,791               |
| 1.30       | 889.00         | 110,891             | 95,524               | 109,315              |
| 2.30       | 890.00         | 133,307             | 121,915              | 231,230              |

## Culvert / Orifice Structures

|                 | [A]      | [B]  | [C]  | [PrfRsr] |
|-----------------|----------|------|------|----------|
| Rise (in)       | = 24.00  | 0.00 | 0.00 | 0.00     |
| Span (in)       | = 24.00  | 0.00 | 0.00 | 0.00     |
| No. Barrels     | = 1      | 0    | 0    | 0        |
| Invert El. (ft) | = 887.06 | 0.00 | 0.00 | 0.00     |
| Length (ft)     | = 178.00 | 0.00 | 0.00 | 0.00     |
| Slope (%)       | = 0.30   | 0.00 | 0.00 | n/a      |
| N-Value         | = .013   | .013 | .013 | n/a      |
| Orifice Coeff.  | = 0.60   | 0.60 | 0.60 | 0.60     |
| Multi-Stage     | = n/a    | No   | No   | No       |

## Weir Structures

|                | [A]                   | [B]    | [C]  | [D]  |
|----------------|-----------------------|--------|------|------|
| Crest Len (ft) | = 0.33                | 11.67  | 0.00 | 0.00 |
| Crest El. (ft) | = 887.70              | 888.90 | 0.00 | 0.00 |
| Weir Coeff.    | = 3.00                | 3.00   | 3.33 | 3.33 |
| Weir Type      | = Rect                | Rect   | ---  | ---  |
| Multi-Stage    | = Yes                 | Yes    | No   | No   |
| Exfil.(in/hr)  | = 0.000 (by Wet area) |        |      |      |
| TW Elev. (ft)  | = 0.00                |        |      |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

## Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00     | 0            | 887.70       | 0.00      | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.000     |
| 0.01     | 0            | 887.71       | 2.34 oc   | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.001     |
| 0.02     | 0            | 887.72       | 2.34 oc   | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.002     |
| 0.03     | 0            | 887.73       | 2.34 oc   | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.004     |
| 0.04     | 0            | 887.74       | 2.34 oc   | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.007     |
| 0.04     | 0            | 887.74       | 2.34 oc   | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.009     |
| 0.05     | 0            | 887.75       | 2.34 oc   | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.012     |
| 0.06     | 0            | 887.76       | 2.34 oc   | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.016     |
| 0.07     | 0            | 887.77       | 2.34 oc   | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.019     |
| 0.08     | 0            | 887.78       | 2.34 oc   | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.023     |
| 0.09     | 0            | 887.79       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.027     |
| 0.09     | 19           | 887.79       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.027     |
| 0.09     | 37           | 887.79       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.028     |
| 0.09     | 56           | 887.79       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.028     |
| 0.09     | 75           | 887.79       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.028     |
| 0.09     | 94           | 887.79       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.029     |
| 0.10     | 112          | 887.80       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.029     |
| 0.10     | 131          | 887.80       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.030     |
| 0.10     | 150          | 887.80       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.030     |
| 0.10     | 168          | 887.80       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.031     |
| 0.10     | 187          | 887.80       | 2.34 oc   | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.031     |
| 0.12     | 1,548        | 887.82       | 2.34 oc   | ---       | ---       | ---        | 0.04     | 0.00     | ---      | ---      | ---       | ---      | 0.041     |
| 0.14     | 2,908        | 887.84       | 2.34 oc   | ---       | ---       | ---        | 0.05     | 0.00     | ---      | ---      | ---       | ---      | 0.052     |
| 0.16     | 4,268        | 887.86       | 2.34 oc   | ---       | ---       | ---        | 0.06     | 0.00     | ---      | ---      | ---       | ---      | 0.063     |
| 0.18     | 5,629        | 887.88       | 2.34 oc   | ---       | ---       | ---        | 0.08     | 0.00     | ---      | ---      | ---       | ---      | 0.076     |
| 0.20     | 6,989        | 887.90       | 2.34 oc   | ---       | ---       | ---        | 0.09     | 0.00     | ---      | ---      | ---       | ---      | 0.089     |
| 0.22     | 8,350        | 887.92       | 2.34 oc   | ---       | ---       | ---        | 0.10     | 0.00     | ---      | ---      | ---       | ---      | 0.102     |
| 0.24     | 9,710        | 887.94       | 2.34 oc   | ---       | ---       | ---        | 0.12     | 0.00     | ---      | ---      | ---       | ---      | 0.116     |
| 0.26     | 11,071       | 887.96       | 2.34 oc   | ---       | ---       | ---        | 0.13     | 0.00     | ---      | ---      | ---       | ---      | 0.131     |
| 0.28     | 12,431       | 887.98       | 2.34 oc   | ---       | ---       | ---        | 0.15     | 0.00     | ---      | ---      | ---       | ---      | 0.147     |
| 0.30     | 13,791       | 888.00       | 2.34 oc   | ---       | ---       | ---        | 0.16     | 0.00     | ---      | ---      | ---       | ---      | 0.163     |
| 0.40     | 23,344       | 888.10       | 2.34 oc   | ---       | ---       | ---        | 0.25     | 0.00     | ---      | ---      | ---       | ---      | 0.250     |
| 0.50     | 32,896       | 888.20       | 2.34 oc   | ---       | ---       | ---        | 0.35     | 0.00     | ---      | ---      | ---       | ---      | 0.350     |
| 0.60     | 42,449       | 888.30       | 2.34 oc   | ---       | ---       | ---        | 0.46     | 0.00     | ---      | ---      | ---       | ---      | 0.460     |
| 0.70     | 52,001       | 888.40       | 2.34 oc   | ---       | ---       | ---        | 0.58     | 0.00     | ---      | ---      | ---       | ---      | 0.580     |
| 0.80     | 61,553       | 888.50       | 2.34 oc   | ---       | ---       | ---        | 0.71     | 0.00     | ---      | ---      | ---       | ---      | 0.708     |
| 0.90     | 71,106       | 888.60       | 2.34 oc   | ---       | ---       | ---        | 0.85     | 0.00     | ---      | ---      | ---       | ---      | 0.845     |

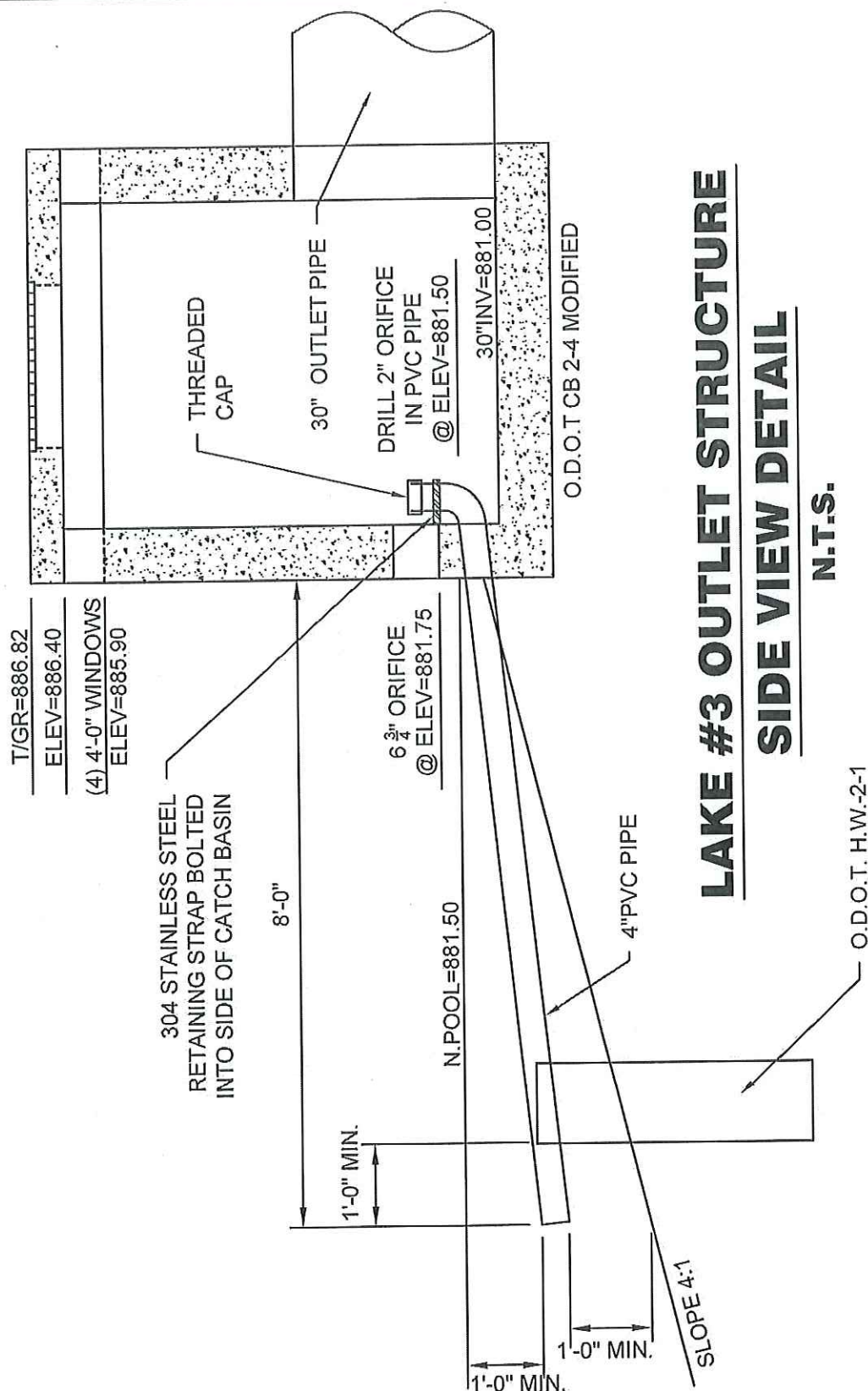
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Lake #2

Stage / Storage / Discharge Table

| Stage<br>ft | Storage<br>cuft | Elevation<br>ft | Clv A<br>cfs | Clv B<br>cfs | Clv C<br>cfs | PrfRsr<br>cfs | Wr A<br>cfs | Wr B<br>cfs | Wr C<br>cfs | Wr D<br>cfs | Exfil<br>cfs | User<br>cfs | Total<br>cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 1.00        | 80,658          | 888.70          | 2.34 oc      | ---          | ---          | ---           | 0.99        | 0.00        | ---         | ---         | ---          | ---         | 0.990        |
| 1.10        | 90,211          | 888.80          | 2.34 oc      | ---          | ---          | ---           | 1.14        | 0.00        | ---         | ---         | ---          | ---         | 1.142        |
| 1.20        | 99,763          | 888.90          | 2.34 oc      | ---          | ---          | ---           | 1.30        | 0.00        | ---         | ---         | ---          | ---         | 1.301        |
| 1.30        | 109,315         | 889.00          | 2.63 oc      | ---          | ---          | ---           | 1.46 s      | 1.11        | ---         | ---         | ---          | ---         | 2.571        |
| 1.40        | 121,507         | 889.10          | 4.79 oc      | ---          | ---          | ---           | 1.56 s      | 3.13        | ---         | ---         | ---          | ---         | 4.690        |
| 1.50        | 133,698         | 889.20          | 7.33 oc      | ---          | ---          | ---           | 1.57 s      | 5.75        | ---         | ---         | ---          | ---         | 7.320        |
| 1.60        | 145,890         | 889.30          | 9.91 oc      | ---          | ---          | ---           | 1.26 s      | 8.65 s      | ---         | ---         | ---          | ---         | 9.910        |
| 1.70        | 158,081         | 889.40          | 10.79 oc     | ---          | ---          | ---           | 1.11 s      | 9.68 s      | ---         | ---         | ---          | ---         | 10.79        |
| 1.80        | 170,273         | 889.50          | 11.91 oc     | ---          | ---          | ---           | 1.06 s      | 10.85 s     | ---         | ---         | ---          | ---         | 11.91        |
| 1.90        | 182,464         | 889.60          | 12.83 oc     | ---          | ---          | ---           | 1.03 s      | 11.81 s     | ---         | ---         | ---          | ---         | 12.83        |
| 2.00        | 194,656         | 889.70          | 13.64 oc     | ---          | ---          | ---           | 1.00 s      | 12.63 s     | ---         | ---         | ---          | ---         | 13.63        |
| 2.10        | 206,847         | 889.80          | 14.36 oc     | ---          | ---          | ---           | 0.98 s      | 13.38 s     | ---         | ---         | ---          | ---         | 14.35        |
| 2.20        | 219,039         | 889.90          | 15.02 oc     | ---          | ---          | ---           | 0.96 s      | 14.05 s     | ---         | ---         | ---          | ---         | 15.01        |
| 2.30        | 231,230         | 890.00          | 15.63 oc     | ---          | ---          | ---           | 0.95 s      | 14.68 s     | ---         | ---         | ---          | ---         | 15.63        |

...End



## LAKE #3 OUTLET STRUCTURE SIDE VIEW DETAIL

N.T.S.

Drawing:  
07M056-006 CD  
Scale  
07M056.006  
Drawn by:  
GJK  
Checked By:  
Issue Date:  
05-14-12

### VOICE OF AMERICA PARK ATHLETIC COMPLEX

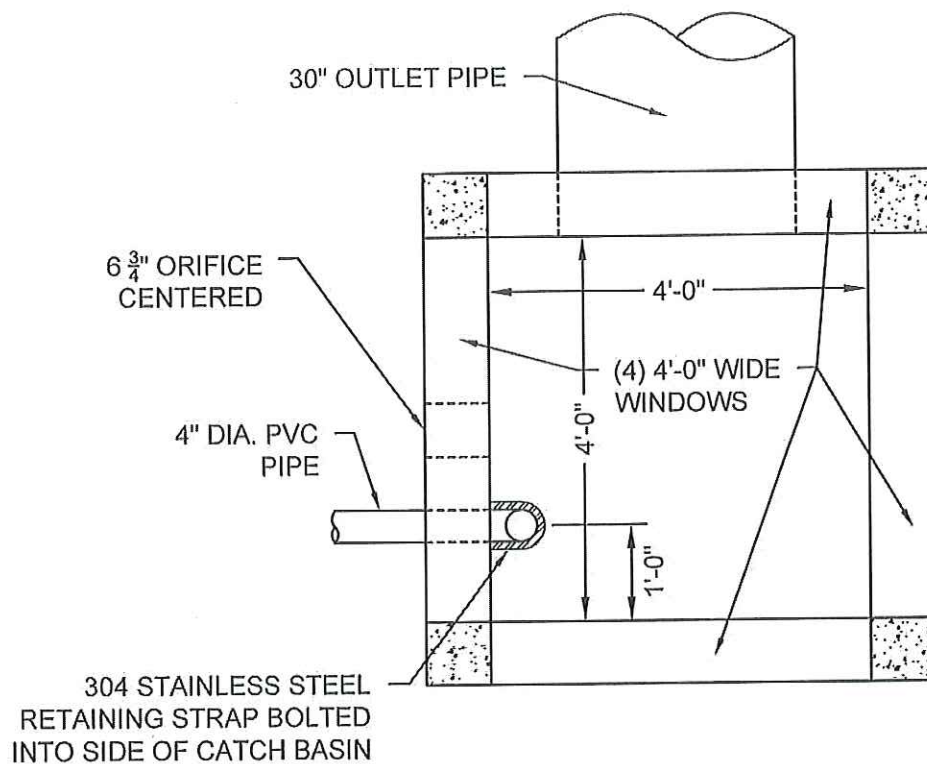
SECTION 12, TOWN 3, RANGE 2,  
WEST CHESTER TOWNSHIP,  
BUTLER COUNTY, OHIO

LAKE #3 OUTLET DETAILS (1 of 2)

**bayer  
becker**

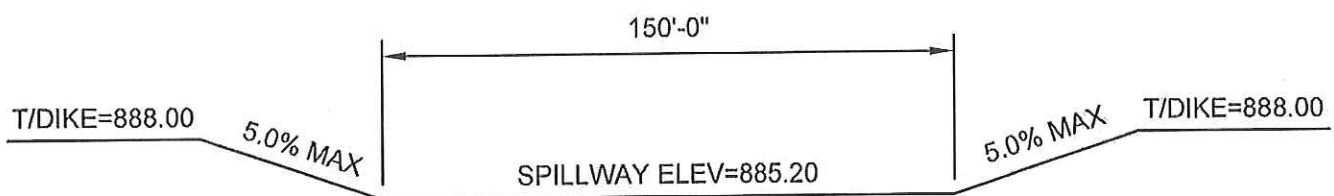
6900 Tylersville Road, Suite A  
Mason, OH 45040 - 513.336.6600





## **LAKE #3 OUTLET STRUCTURE TOP VIEW DETAIL**

**N.T.S.**



## **LAKE #3 EMERGENCY SPILLWAY DETAIL**

**N.T.S.**

Drawing:  
07M056-006 CD

Scale  
07M056.006

Drawn by:  
GJK

Checked By:

Issue Date:  
05-14-12

### **VOICE OF AMERICA PARK ATHLETIC COMPLEX**

SECTION 12, TOWN 3, RANGE 2,  
WEST CHESTER TOWNSHIP,  
BUTLER COUNTY, OHIO

**LAKE #3 OUTLET DETAILS (2 of 2)**



6900 Tylersville Road, Suite A  
Mason, OH 45040 - 513.336.6600



# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, May 15, 2012

Pond No. 3 - Lake #3

## Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 881.50 ft

## Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 881.50         | 00                  | 0                    | 0                    |
| 0.24       | 881.74         | 01                  | 0                    | 0                    |
| 0.25       | 881.75         | 150,658             | 504                  | 504                  |
| 0.50       | 882.00         | 154,399             | 38,127               | 38,631               |
| 1.50       | 883.00         | 164,258             | 159,287              | 197,919              |
| 2.50       | 884.00         | 174,071             | 169,124              | 367,042              |
| 3.50       | 885.00         | 183,937             | 178,963              | 546,006              |
| 4.50       | 886.00         | 207,023             | 195,347              | 741,353              |
| 4.80       | 886.30         | 210,198             | 62,576               | 803,929              |

## Culvert / Orifice Structures

|                 | [A]      | [B]    | [C]    | [PrfRsr] |
|-----------------|----------|--------|--------|----------|
| Rise (in)       | = 30.00  | 2.00   | 6.75   | 0.00     |
| Span (in)       | = 30.00  | 2.00   | 6.75   | 0.00     |
| No. Barrels     | = 1      | 1      | 1      | 0        |
| Invert El. (ft) | = 881.00 | 881.50 | 881.75 | 0.00     |
| Length (ft)     | = 190.00 | 0.00   | 0.00   | 0.00     |
| Slope (%)       | = 0.30   | 0.00   | 0.00   | n/a      |
| N-Value         | = .013   | .013   | .013   | n/a      |
| Orifice Coeff.  | = 0.60   | 0.60   | 0.60   | 0.60     |
| Multi-Stage     | = n/a    | Yes    | Yes    | No       |

## Weir Structures

|                | [A]                   | [B]  | [C]  | [D]  |
|----------------|-----------------------|------|------|------|
| Crest Len (ft) | = 16.00               | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 885.90              | 0.00 | 0.00 | 0.00 |
| Weir Coeff.    | = 3.00                | 3.33 | 3.33 | 3.33 |
| Weir Type      | = Rect                | ---  | ---  | ---  |
| Multi-Stage    | = Yes                 | No   | No   | No   |
| Exfil.(in/hr)  | = 0.000 (by Wet area) |      |      |      |
| TW Elev. (ft)  | = 0.00                |      |      |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

## Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00     | 0            | 881.50       | 0.00      | 0.00      | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.000     |
| 0.02     | 0            | 881.52       | 1.76 ic   | 0.00 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.001     |
| 0.05     | 0            | 881.55       | 1.76 ic   | 0.00 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.004     |
| 0.07     | 0            | 881.57       | 1.76 ic   | 0.01 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.008     |
| 0.10     | 0            | 881.60       | 1.76 ic   | 0.01 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.014     |
| 0.12     | 0            | 881.62       | 1.76 ic   | 0.02 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.020     |
| 0.14     | 0            | 881.64       | 1.76 ic   | 0.03 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.026     |
| 0.17     | 0            | 881.67       | 1.76 ic   | 0.03 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.031     |
| 0.19     | 0            | 881.69       | 1.76 ic   | 0.03 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.035     |
| 0.22     | 0            | 881.72       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.038     |
| 0.24     | 0            | 881.74       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.24     | 50           | 881.74       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.24     | 101          | 881.74       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.24     | 151          | 881.74       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.24     | 202          | 881.74       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.24     | 252          | 881.74       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.25     | 302          | 881.75       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.25     | 353          | 881.75       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.042     |
| 0.25     | 403          | 881.75       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.043     |
| 0.25     | 454          | 881.75       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.043     |
| 0.25     | 504          | 881.75       | 1.76 ic   | 0.04 ic   | 0.00      | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.043     |
| 0.28     | 4,317        | 881.78       | 1.76 ic   | 0.05 ic   | 0.00 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.048     |
| 0.30     | 8,129        | 881.80       | 1.76 ic   | 0.05 ic   | 0.01 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.057     |
| 0.32     | 11,942       | 881.83       | 1.76 ic   | 0.05 ic   | 0.02 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.070     |
| 0.35     | 15,755       | 881.85       | 1.76 ic   | 0.05 ic   | 0.03 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.087     |
| 0.38     | 19,568       | 881.88       | 1.76 ic   | 0.06 ic   | 0.05 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.107     |
| 0.40     | 23,380       | 881.90       | 1.76 ic   | 0.06 ic   | 0.07 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.132     |
| 0.43     | 27,193       | 881.93       | 1.76 ic   | 0.06 ic   | 0.10 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.157     |
| 0.45     | 31,006       | 881.95       | 1.76 ic   | 0.06 ic   | 0.12 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.187     |
| 0.48     | 34,819       | 881.98       | 1.76 ic   | 0.07 ic   | 0.15 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.219     |
| 0.50     | 38,631       | 882.00       | 1.76 ic   | 0.07 ic   | 0.18 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.250     |
| 0.60     | 54,560       | 882.10       | 1.76 ic   | 0.08 ic   | 0.33 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.404     |
| 0.70     | 70,489       | 882.20       | 1.76 ic   | 0.08 ic   | 0.49 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.569     |
| 0.80     | 86,418       | 882.30       | 1.76 ic   | 0.09 ic   | 0.62 ic   | ---        | 0.00     | ---      | ---      | ---      | ---       | ---      | 0.713     |

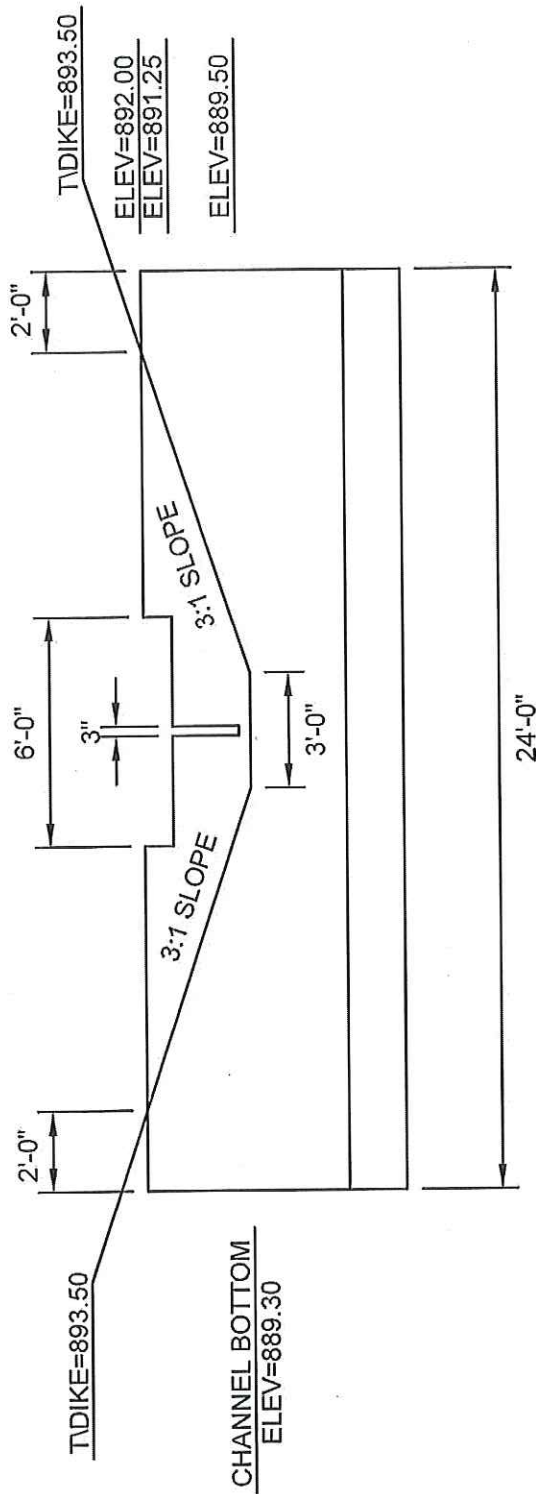
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Lake #3

## Stage / Storage / Discharge Table

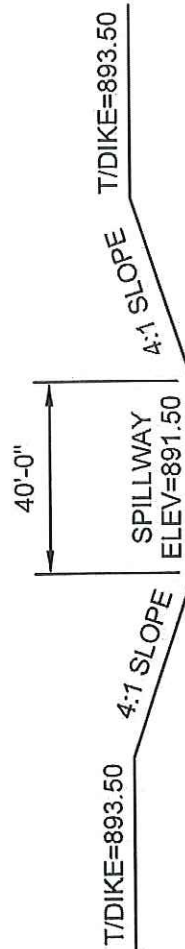
| Stage<br>ft | Storage<br>cuft | Elevation<br>ft | Clv A<br>cfs | Clv B<br>cfs | Clv C<br>cfs | PrfRsr<br>cfs | Wr A<br>cfs | Wr B<br>cfs | Wr C<br>cfs | Wr D<br>cfs | Exfil<br>cfs | User<br>cfs | Total<br>cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 0.90        | 102,346         | 882.40          | 1.76 ic      | 0.09 ic      | 0.73 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 0.821        |
| 1.00        | 118,275         | 882.50          | 1.76 ic      | 0.10 ic      | 0.82 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 0.920        |
| 1.10        | 134,204         | 882.60          | 1.76 ic      | 0.11 ic      | 0.90 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.008        |
| 1.20        | 150,132         | 882.70          | 1.76 ic      | 0.11 ic      | 0.98 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.089        |
| 1.30        | 166,061         | 882.80          | 1.76 ic      | 0.12 ic      | 1.05 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.165        |
| 1.40        | 181,990         | 882.90          | 1.76 ic      | 0.12 ic      | 1.11 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.235        |
| 1.50        | 197,919         | 883.00          | 1.76 ic      | 0.13 ic      | 1.18 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.303        |
| 1.60        | 214,831         | 883.10          | 1.76 ic      | 0.13 ic      | 1.24 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.366        |
| 1.70        | 231,743         | 883.20          | 1.76 ic      | 0.13 ic      | 1.29 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.427        |
| 1.80        | 248,656         | 883.30          | 1.76 ic      | 0.14 ic      | 1.35 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.485        |
| 1.90        | 265,568         | 883.40          | 1.76 ic      | 0.14 ic      | 1.40 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.541        |
| 2.00        | 282,480         | 883.50          | 1.76 ic      | 0.15 ic      | 1.45 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.595        |
| 2.10        | 299,393         | 883.60          | 1.76 ic      | 0.15 ic      | 1.50 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.648        |
| 2.20        | 316,305         | 883.70          | 1.76 ic      | 0.15 ic      | 1.55 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.698        |
| 2.30        | 333,218         | 883.80          | 1.76 ic      | 0.16 ic      | 1.59 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.747        |
| 2.40        | 350,130         | 883.90          | 1.86 ic      | 0.16 ic      | 1.64 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.795        |
| 2.50        | 367,042         | 884.00          | 1.86 ic      | 0.16 ic      | 1.68 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.842        |
| 2.60        | 384,939         | 884.10          | 1.89 ic      | 0.17 ic      | 1.72 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.887        |
| 2.70        | 402,835         | 884.20          | 1.97 ic      | 0.17 ic      | 1.76 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.932        |
| 2.80        | 420,731         | 884.30          | 1.98 ic      | 0.17 ic      | 1.80 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 1.975        |
| 2.90        | 438,628         | 884.40          | 2.09 ic      | 0.18 ic      | 1.84 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.018        |
| 3.00        | 456,524         | 884.50          | 2.09 ic      | 0.18 ic      | 1.88 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.059        |
| 3.10        | 474,420         | 884.60          | 2.10 ic      | 0.18 ic      | 1.92 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.100        |
| 3.20        | 492,317         | 884.70          | 2.21 ic      | 0.19 ic      | 1.95 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.140        |
| 3.30        | 510,213         | 884.80          | 2.21 ic      | 0.19 ic      | 1.99 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.179        |
| 3.40        | 528,110         | 884.90          | 2.22 ic      | 0.19 ic      | 2.03 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.218        |
| 3.50        | 546,006         | 885.00          | 2.33 ic      | 0.19 ic      | 2.06 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.256        |
| 3.60        | 565,541         | 885.10          | 2.33 ic      | 0.20 ic      | 2.10 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.293        |
| 3.70        | 585,075         | 885.20          | 2.33 ic      | 0.20 ic      | 2.13 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.329        |
| 3.80        | 604,610         | 885.30          | 2.37 ic      | 0.20 ic      | 2.16 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.365        |
| 3.90        | 624,145         | 885.40          | 2.46 ic      | 0.20 ic      | 2.20 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.401        |
| 4.00        | 643,679         | 885.50          | 2.46 ic      | 0.21 ic      | 2.23 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.436        |
| 4.10        | 663,214         | 885.60          | 2.47 ic      | 0.21 ic      | 2.26 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.470        |
| 4.20        | 682,749         | 885.70          | 2.59 ic      | 0.21 ic      | 2.29 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.504        |
| 4.30        | 702,283         | 885.80          | 2.59 ic      | 0.21 ic      | 2.32 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.537        |
| 4.40        | 721,818         | 885.90          | 2.59 ic      | 0.22 ic      | 2.35 ic      | ---           | 0.00        | ---         | ---         | ---         | ---          | ---         | 2.571        |
| 4.50        | 741,353         | 886.00          | 4.24 oc      | 0.22 ic      | 2.38 ic      | ---           | 1.52        | ---         | ---         | ---         | ---          | ---         | 4.116        |
| 4.53        | 747,610         | 886.03          | 4.91 oc      | 0.21 ic      | 2.39 ic      | ---           | 2.25        | ---         | ---         | ---         | ---          | ---         | 4.856        |
| 4.56        | 753,868         | 886.06          | 5.79 oc      | 0.21 ic      | 2.40 ic      | ---           | 3.07        | ---         | ---         | ---         | ---          | ---         | 5.688        |
| 4.59        | 760,125         | 886.09          | 6.72 oc      | 0.21 ic      | 2.40 ic      | ---           | 3.98        | ---         | ---         | ---         | ---          | ---         | 6.585        |
| 4.62        | 766,383         | 886.12          | 7.68 oc      | 0.21 ic      | 2.38 ic      | ---           | 4.96        | ---         | ---         | ---         | ---          | ---         | 7.542        |
| 4.65        | 772,641         | 886.15          | 8.65 oc      | 0.21 ic      | 2.36 ic      | ---           | 6.00        | ---         | ---         | ---         | ---          | ---         | 8.566        |
| 4.68        | 778,898         | 886.18          | 9.82 oc      | 0.20 ic      | 2.33 ic      | ---           | 7.12        | ---         | ---         | ---         | ---          | ---         | 9.652        |
| 4.71        | 785,156         | 886.21          | 10.95 oc     | 0.20 ic      | 2.30 ic      | ---           | 8.29        | ---         | ---         | ---         | ---          | ---         | 10.80        |
| 4.74        | 791,414         | 886.24          | 12.04 oc     | 0.20 ic      | 2.28 ic      | ---           | 9.52        | ---         | ---         | ---         | ---          | ---         | 12.00        |
| 4.77        | 797,671         | 886.27          | 13.37 oc     | 0.20 ic      | 2.24 ic      | ---           | 10.82       | ---         | ---         | ---         | ---          | ---         | 13.25        |
| 4.80        | 803,929         | 886.30          | 14.65 oc     | 0.19 ic      | 2.20 ic      | ---           | 12.14       | ---         | ---         | ---         | ---          | ---         | 14.53        |

...End



## LAKE #4 OUTLET STRUCTURE DETAIL

N.T.S.



## LAKE #4 EMERGENCY SPILLWAY DETAIL

N.T.S.

Drawing:  
07M056-006 CD  
Scale  
07M056.006  
Drawn by:  
GJK  
Checked By:  
Issue Date:  
04-04-12

## VOICE OF AMERICA PARK ATHLETIC COMPLEX

SECTION 12, TOWN 3, RANGE 2,  
WEST CHESTER TOWNSHIP,  
BUTLER COUNTY, OHIO

LAKE #4 OUTLET DETAILS



6900 Tylersville Road, Suite A  
Mason, OH 45040 - 513.336.6600



# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Monday, Apr 16, 2012

## Pond No. 4 - Lake #4

### Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 889.50 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 889.50         | 00                  | 0                    | 0                    |
| 0.09       | 889.59         | 01                  | 0                    | 0                    |
| 0.10       | 889.60         | 101,215             | 337                  | 337                  |
| 0.50       | 890.00         | 103,743             | 40,989               | 41,326               |
| 1.50       | 891.00         | 110,129             | 106,909              | 148,235              |
| 2.50       | 892.00         | 116,611             | 113,343              | 261,578              |
| 3.50       | 893.00         | 123,187             | 119,872              | 381,450              |
| 4.00       | 893.50         | 126,512             | 62,417               | 443,867              |

### Culvert / Orifice Structures

|                 | [A]    | [B]  | [C]  | [PrfRsr] |
|-----------------|--------|------|------|----------|
| Rise (in)       | = 0.00 | 0.00 | 0.00 | 0.00     |
| Span (in)       | = 0.00 | 0.00 | 0.00 | 0.00     |
| No. Barrels     | = 0    | 0    | 0    | 0        |
| Invert El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00     |
| Length (ft)     | = 0.00 | 0.00 | 0.00 | 0.00     |
| Slope (%)       | = 0.00 | 0.00 | 0.00 | n/a      |
| N-Value         | = .013 | .013 | .013 | n/a      |
| Orifice Coeff.  | = 0.60 | 0.60 | 0.60 | 0.60     |
| Multi-Stage     | = n/a  | No   | No   | No       |

### Weir Structures

|                | [A]                   | [B]    | [C]  | [D]  |
|----------------|-----------------------|--------|------|------|
| Crest Len (ft) | = 0.25                | 5.75   | 0.00 | 0.00 |
| Crest El. (ft) | = 889.50              | 891.25 | 0.00 | 0.00 |
| Weir Coeff.    | = 3.00                | 3.00   | 3.33 | 3.33 |
| Weir Type      | = Rect                | Rect   | ---  | ---  |
| Multi-Stage    | = No                  | No     | No   | No   |
| Exfil.(in/hr)  | = 0.000 (by Wet area) |        |      |      |
| TW Elev. (ft)  | = 0.00                |        |      |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

### Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00     | 0            | 889.50       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.000     |
| 0.01     | 0            | 889.51       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.001     |
| 0.02     | 0            | 889.52       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.002     |
| 0.03     | 0            | 889.53       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.003     |
| 0.04     | 0            | 889.54       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.005     |
| 0.05     | 0            | 889.55       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.007     |
| 0.05     | 0            | 889.55       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.009     |
| 0.06     | 0            | 889.56       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.012     |
| 0.07     | 0            | 889.57       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.015     |
| 0.08     | 0            | 889.58       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.017     |
| 0.09     | 0            | 889.59       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.020     |
| 0.09     | 34           | 889.59       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.021     |
| 0.09     | 67           | 889.59       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.021     |
| 0.09     | 101          | 889.59       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.021     |
| 0.09     | 135          | 889.59       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.022     |
| 0.10     | 168          | 889.59       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.022     |
| 0.10     | 202          | 889.60       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.022     |
| 0.10     | 236          | 889.60       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.023     |
| 0.10     | 269          | 889.60       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.023     |
| 0.10     | 303          | 889.60       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.023     |
| 0.10     | 337          | 889.60       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.024     |
| 0.14     | 4,436        | 889.64       | ---       | ---       | ---       | ---        | 0.04     | 0.00     | ---      | ---      | ---       | ---      | 0.039     |
| 0.18     | 8,535        | 889.68       | ---       | ---       | ---       | ---        | 0.06     | 0.00     | ---      | ---      | ---       | ---      | 0.057     |
| 0.22     | 12,633       | 889.72       | ---       | ---       | ---       | ---        | 0.08     | 0.00     | ---      | ---      | ---       | ---      | 0.077     |
| 0.26     | 16,732       | 889.76       | ---       | ---       | ---       | ---        | 0.10     | 0.00     | ---      | ---      | ---       | ---      | 0.099     |
| 0.30     | 20,831       | 889.80       | ---       | ---       | ---       | ---        | 0.12     | 0.00     | ---      | ---      | ---       | ---      | 0.123     |
| 0.34     | 24,930       | 889.84       | ---       | ---       | ---       | ---        | 0.15     | 0.00     | ---      | ---      | ---       | ---      | 0.149     |
| 0.38     | 29,029       | 889.88       | ---       | ---       | ---       | ---        | 0.18     | 0.00     | ---      | ---      | ---       | ---      | 0.176     |
| 0.42     | 33,128       | 889.92       | ---       | ---       | ---       | ---        | 0.20     | 0.00     | ---      | ---      | ---       | ---      | 0.204     |
| 0.46     | 37,227       | 889.96       | ---       | ---       | ---       | ---        | 0.23     | 0.00     | ---      | ---      | ---       | ---      | 0.234     |
| 0.50     | 41,326       | 890.00       | ---       | ---       | ---       | ---        | 0.27     | 0.00     | ---      | ---      | ---       | ---      | 0.265     |
| 0.60     | 52,017       | 890.10       | ---       | ---       | ---       | ---        | 0.35     | 0.00     | ---      | ---      | ---       | ---      | 0.349     |
| 0.70     | 62,708       | 890.20       | ---       | ---       | ---       | ---        | 0.44     | 0.00     | ---      | ---      | ---       | ---      | 0.439     |
| 0.80     | 73,398       | 890.30       | ---       | ---       | ---       | ---        | 0.54     | 0.00     | ---      | ---      | ---       | ---      | 0.537     |
| 0.90     | 84,089       | 890.40       | ---       | ---       | ---       | ---        | 0.64     | 0.00     | ---      | ---      | ---       | ---      | 0.640     |

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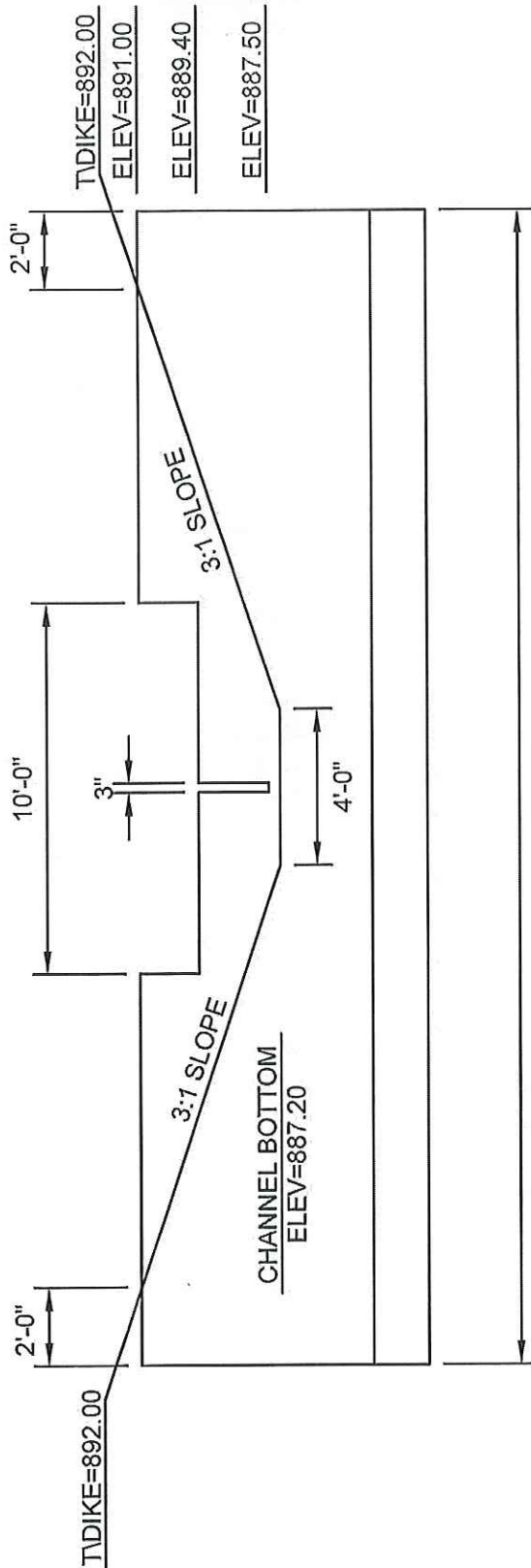


Lake #4

Stage / Storage / Discharge Table

| Stage<br>ft | Storage<br>cuft | Elevation<br>ft | Clv A<br>cfs | Clv B<br>cfs | Clv C<br>cfs | PrfRsr<br>cfs | Wr A<br>cfs | Wr B<br>cfs | Wr C<br>cfs | Wr D<br>cfs | Exfil<br>cfs | User<br>cfs | Total<br>cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 1.00        | 94,780          | 890.50          | ---          | ---          | ---          | ---           | 0.75        | 0.00        | ---         | ---         | ---          | ---         | 0.750        |
| 1.10        | 105,471         | 890.60          | ---          | ---          | ---          | ---           | 0.87        | 0.00        | ---         | ---         | ---          | ---         | 0.865        |
| 1.20        | 116,162         | 890.70          | ---          | ---          | ---          | ---           | 0.99        | 0.00        | ---         | ---         | ---          | ---         | 0.986        |
| 1.30        | 126,853         | 890.80          | ---          | ---          | ---          | ---           | 1.11        | 0.00        | ---         | ---         | ---          | ---         | 1.111        |
| 1.40        | 137,544         | 890.90          | ---          | ---          | ---          | ---           | 1.24        | 0.00        | ---         | ---         | ---          | ---         | 1.242        |
| 1.50        | 148,235         | 891.00          | ---          | ---          | ---          | ---           | 1.38        | 0.00        | ---         | ---         | ---          | ---         | 1.378        |
| 1.60        | 159,569         | 891.10          | ---          | ---          | ---          | ---           | 1.52        | 0.00        | ---         | ---         | ---          | ---         | 1.518        |
| 1.70        | 170,904         | 891.20          | ---          | ---          | ---          | ---           | 1.66        | 0.00        | ---         | ---         | ---          | ---         | 1.662        |
| 1.80        | 182,238         | 891.30          | ---          | ---          | ---          | ---           | 1.81        | 0.19        | ---         | ---         | ---          | ---         | 2.004        |
| 1.90        | 193,572         | 891.40          | ---          | ---          | ---          | ---           | 1.96        | 1.00        | ---         | ---         | ---          | ---         | 2.965        |
| 2.00        | 204,907         | 891.50          | ---          | ---          | ---          | ---           | 2.12        | 2.15        | ---         | ---         | ---          | ---         | 4.276        |
| 2.10        | 216,241         | 891.60          | ---          | ---          | ---          | ---           | 2.28        | 3.57        | ---         | ---         | ---          | ---         | 5.852        |
| 2.20        | 227,575         | 891.70          | ---          | ---          | ---          | ---           | 2.45        | 5.20        | ---         | ---         | ---          | ---         | 7.651        |
| 2.30        | 238,910         | 891.80          | ---          | ---          | ---          | ---           | 2.62        | 7.03        | ---         | ---         | ---          | ---         | 9.648        |
| 2.40        | 250,244         | 891.90          | ---          | ---          | ---          | ---           | 2.79        | 9.04        | ---         | ---         | ---          | ---         | 11.82        |
| 2.50        | 261,578         | 892.00          | ---          | ---          | ---          | ---           | 2.96        | 11.20       | ---         | ---         | ---          | ---         | 14.17        |
| 2.60        | 273,566         | 892.10          | ---          | ---          | ---          | ---           | 3.14        | 13.52       | ---         | ---         | ---          | ---         | 16.66        |
| 2.70        | 285,553         | 892.20          | ---          | ---          | ---          | ---           | 3.33        | 15.97       | ---         | ---         | ---          | ---         | 19.30        |
| 2.80        | 297,540         | 892.30          | ---          | ---          | ---          | ---           | 3.51        | 18.56       | ---         | ---         | ---          | ---         | 22.07        |
| 2.90        | 309,527         | 892.40          | ---          | ---          | ---          | ---           | 3.70        | 21.27       | ---         | ---         | ---          | ---         | 24.97        |
| 3.00        | 321,514         | 892.50          | ---          | ---          | ---          | ---           | 3.90        | 24.10       | ---         | ---         | ---          | ---         | 28.00        |
| 3.10        | 333,501         | 892.60          | ---          | ---          | ---          | ---           | 4.09        | 27.05       | ---         | ---         | ---          | ---         | 31.15        |
| 3.20        | 345,489         | 892.70          | ---          | ---          | ---          | ---           | 4.29        | 30.11       | ---         | ---         | ---          | ---         | 34.41        |
| 3.30        | 357,476         | 892.80          | ---          | ---          | ---          | ---           | 4.50        | 33.28       | ---         | ---         | ---          | ---         | 37.78        |
| 3.40        | 369,463         | 892.90          | ---          | ---          | ---          | ---           | 4.70        | 36.55       | ---         | ---         | ---          | ---         | 41.25        |
| 3.50        | 381,450         | 893.00          | ---          | ---          | ---          | ---           | 4.91        | 39.93       | ---         | ---         | ---          | ---         | 44.85        |
| 3.55        | 387,692         | 893.05          | ---          | ---          | ---          | ---           | 5.02        | 41.66       | ---         | ---         | ---          | ---         | 46.67        |
| 3.60        | 393,934         | 893.10          | ---          | ---          | ---          | ---           | 5.12        | 43.40       | ---         | ---         | ---          | ---         | 48.53        |
| 3.65        | 400,175         | 893.15          | ---          | ---          | ---          | ---           | 5.23        | 45.18       | ---         | ---         | ---          | ---         | 50.41        |
| 3.70        | 406,417         | 893.20          | ---          | ---          | ---          | ---           | 5.34        | 46.97       | ---         | ---         | ---          | ---         | 52.31        |
| 3.75        | 412,659         | 893.25          | ---          | ---          | ---          | ---           | 5.45        | 48.79       | ---         | ---         | ---          | ---         | 54.23        |
| 3.80        | 418,900         | 893.30          | ---          | ---          | ---          | ---           | 5.56        | 50.63       | ---         | ---         | ---          | ---         | 56.18        |
| 3.85        | 425,142         | 893.35          | ---          | ---          | ---          | ---           | 5.67        | 52.49       | ---         | ---         | ---          | ---         | 58.16        |
| 3.90        | 431,384         | 893.40          | ---          | ---          | ---          | ---           | 5.78        | 54.38       | ---         | ---         | ---          | ---         | 60.15        |
| 3.95        | 437,625         | 893.45          | ---          | ---          | ---          | ---           | 5.89        | 56.28       | ---         | ---         | ---          | ---         | 62.17        |
| 4.00        | 443,867         | 893.50          | ---          | ---          | ---          | ---           | 6.00        | 58.22       | ---         | ---         | ---          | ---         | 64.22        |

...End



## LAKE #5 OUTLET STRUCTURE DETAIL

N.T.S.



## LAKE #5 EMERGENCY SPILLWAY DETAIL

N.T.S.

Drawing: 07M056-006 CD  
 Scale: 07M056.006  
 Drawn by: GJK  
 Checked By:  
 Issue Date: 04-04-12

## VOICE OF AMERICA PARK ATHLETIC COMPLEX

SECTION 12, TOWN 3, RANGE 2,  
 WEST CHESTER TOWNSHIP,  
 BUTLER COUNTY, OHIO

## LAKE #5 OUTLET DETAILS



6900 Tylersville Road, Suite A  
 Mason, OH 45040 - 513.336.6600

# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Monday, Apr 16, 2012

## Pond No. 5 - Lake #5

### Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 887.50 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 887.50         | 00                  | 0                    | 0                    |
| 0.07       | 887.57         | 01                  | 0                    | 0                    |
| 0.08       | 887.58         | 322,667             | 1,078                | 1,078                |
| 0.50       | 888.00         | 326,812             | 136,370              | 137,449              |
| 1.50       | 889.00         | 338,236             | 332,474              | 469,923              |
| 2.50       | 890.00         | 351,020             | 344,574              | 814,497              |
| 3.50       | 891.00         | 356,916             | 353,929              | 1,168,426            |
| 4.50       | 892.00         | 367,142             | 361,980              | 1,530,406            |

### Culvert / Orifice Structures

|                 | [A]    | [B]  | [C]  | [PrfRsr] |
|-----------------|--------|------|------|----------|
| Rise (in)       | = 0.00 | 0.00 | 0.00 | 0.00     |
| Span (in)       | = 0.00 | 0.00 | 0.00 | 0.00     |
| No. Barrels     | = 0    | 0    | 0    | 0        |
| Invert El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00     |
| Length (ft)     | = 0.00 | 0.00 | 0.00 | 0.00     |
| Slope (%)       | = 0.00 | 0.00 | 0.00 | n/a      |
| N-Value         | = .013 | .013 | .013 | n/a      |
| Orifice Coeff.  | = 0.60 | 0.60 | 0.60 | 0.60     |
| Multi-Stage     | = n/a  | No   | No   | No       |

### Weir Structures

|                | [A]                   | [B]    | [C]  | [D]  |
|----------------|-----------------------|--------|------|------|
| Crest Len (ft) | = 0.25                | 9.67   | 0.00 | 0.00 |
| Crest El. (ft) | = 887.50              | 889.40 | 0.00 | 0.00 |
| Weir Coeff.    | = 3.00                | 3.00   | 3.33 | 3.33 |
| Weir Type      | = Rect                | Rect   | ---  | ---  |
| Multi-Stage    | = No                  | No     | No   | No   |
| Exfil.(in/hr)  | = 0.000 (by Wet area) |        |      |      |
| TW Elev. (ft)  | = 0.00                |        |      |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

### Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00     | 0            | 887.50       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.000     |
| 0.01     | 0            | 887.51       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.000     |
| 0.01     | 0            | 887.51       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.001     |
| 0.02     | 0            | 887.52       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.002     |
| 0.03     | 0            | 887.53       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.004     |
| 0.04     | 0            | 887.54       | ---       | ---       | ---       | ---        | 0.00     | 0.00     | ---      | ---      | ---       | ---      | 0.005     |
| 0.04     | 0            | 887.54       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.006     |
| 0.05     | 0            | 887.55       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.008     |
| 0.06     | 0            | 887.56       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.010     |
| 0.06     | 0            | 887.56       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.012     |
| 0.07     | 0            | 887.57       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.014     |
| 0.07     | 108          | 887.57       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.014     |
| 0.07     | 216          | 887.57       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.014     |
| 0.07     | 324          | 887.57       | ---       | ---       | ---       | ---        | 0.01     | 0.00     | ---      | ---      | ---       | ---      | 0.015     |
| 0.07     | 431          | 887.57       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.015     |
| 0.08     | 539          | 887.57       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.015     |
| 0.08     | 647          | 887.58       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.016     |
| 0.08     | 755          | 887.58       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.016     |
| 0.08     | 863          | 887.58       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.016     |
| 0.08     | 971          | 887.58       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.017     |
| 0.08     | 1,078        | 887.58       | ---       | ---       | ---       | ---        | 0.02     | 0.00     | ---      | ---      | ---       | ---      | 0.017     |
| 0.12     | 14,715       | 887.62       | ---       | ---       | ---       | ---        | 0.03     | 0.00     | ---      | ---      | ---       | ---      | 0.032     |
| 0.16     | 28,353       | 887.66       | ---       | ---       | ---       | ---        | 0.05     | 0.00     | ---      | ---      | ---       | ---      | 0.050     |
| 0.21     | 41,990       | 887.71       | ---       | ---       | ---       | ---        | 0.07     | 0.00     | ---      | ---      | ---       | ---      | 0.070     |
| 0.25     | 55,627       | 887.75       | ---       | ---       | ---       | ---        | 0.09     | 0.00     | ---      | ---      | ---       | ---      | 0.093     |
| 0.29     | 69,264       | 887.79       | ---       | ---       | ---       | ---        | 0.12     | 0.00     | ---      | ---      | ---       | ---      | 0.117     |
| 0.33     | 82,901       | 887.83       | ---       | ---       | ---       | ---        | 0.14     | 0.00     | ---      | ---      | ---       | ---      | 0.143     |
| 0.37     | 96,538       | 887.87       | ---       | ---       | ---       | ---        | 0.17     | 0.00     | ---      | ---      | ---       | ---      | 0.172     |
| 0.42     | 110,175      | 887.92       | ---       | ---       | ---       | ---        | 0.20     | 0.00     | ---      | ---      | ---       | ---      | 0.201     |
| 0.46     | 123,812      | 887.96       | ---       | ---       | ---       | ---        | 0.23     | 0.00     | ---      | ---      | ---       | ---      | 0.232     |
| 0.50     | 137,449      | 888.00       | ---       | ---       | ---       | ---        | 0.27     | 0.00     | ---      | ---      | ---       | ---      | 0.265     |
| 0.60     | 170,696      | 888.10       | ---       | ---       | ---       | ---        | 0.35     | 0.00     | ---      | ---      | ---       | ---      | 0.349     |
| 0.70     | 203,944      | 888.20       | ---       | ---       | ---       | ---        | 0.44     | 0.00     | ---      | ---      | ---       | ---      | 0.439     |
| 0.80     | 237,191      | 888.30       | ---       | ---       | ---       | ---        | 0.54     | 0.00     | ---      | ---      | ---       | ---      | 0.537     |
| 0.90     | 270,439      | 888.40       | ---       | ---       | ---       | ---        | 0.64     | 0.00     | ---      | ---      | ---       | ---      | 0.640     |

Continues on next page...



Lake #5

## Stage / Storage / Discharge Table

| Stage<br>ft | Storage<br>cuft | Elevation<br>ft | Clv A<br>cfs | Clv B<br>cfs | Clv C<br>cfs | PrfRsr<br>cfs | Wr A<br>cfs | Wr B<br>cfs | Wr C<br>cfs | Wr D<br>cfs | Exfil<br>cfs | User<br>cfs | Total<br>cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 1.00        | 303,686         | 888.50          | ---          | ---          | ---          | ---           | 0.75        | 0.00        | ---         | ---         | ---          | ---         | 0.750        |
| 1.10        | 336,934         | 888.60          | ---          | ---          | ---          | ---           | 0.87        | 0.00        | ---         | ---         | ---          | ---         | 0.865        |
| 1.20        | 370,181         | 888.70          | ---          | ---          | ---          | ---           | 0.99        | 0.00        | ---         | ---         | ---          | ---         | 0.986        |
| 1.30        | 403,428         | 888.80          | ---          | ---          | ---          | ---           | 1.11        | 0.00        | ---         | ---         | ---          | ---         | 1.111        |
| 1.40        | 436,676         | 888.90          | ---          | ---          | ---          | ---           | 1.24        | 0.00        | ---         | ---         | ---          | ---         | 1.242        |
| 1.50        | 469,923         | 889.00          | ---          | ---          | ---          | ---           | 1.38        | 0.00        | ---         | ---         | ---          | ---         | 1.378        |
| 1.60        | 504,381         | 889.10          | ---          | ---          | ---          | ---           | 1.52        | 0.00        | ---         | ---         | ---          | ---         | 1.518        |
| 1.70        | 538,838         | 889.20          | ---          | ---          | ---          | ---           | 1.66        | 0.00        | ---         | ---         | ---          | ---         | 1.662        |
| 1.80        | 573,295         | 889.30          | ---          | ---          | ---          | ---           | 1.81        | 0.00        | ---         | ---         | ---          | ---         | 1.811        |
| 1.90        | 607,753         | 889.40          | ---          | ---          | ---          | ---           | 1.96        | 0.00        | ---         | ---         | ---          | ---         | 1.964        |
| 2.00        | 642,210         | 889.50          | ---          | ---          | ---          | ---           | 2.12        | 0.92        | ---         | ---         | ---          | ---         | 3.036        |
| 2.10        | 676,668         | 889.60          | ---          | ---          | ---          | ---           | 2.28        | 2.59        | ---         | ---         | ---          | ---         | 4.874        |
| 2.20        | 711,125         | 889.70          | ---          | ---          | ---          | ---           | 2.45        | 4.76        | ---         | ---         | ---          | ---         | 7.209        |
| 2.30        | 745,582         | 889.80          | ---          | ---          | ---          | ---           | 2.62        | 7.33        | ---         | ---         | ---          | ---         | 9.949        |
| 2.40        | 780,040         | 889.90          | ---          | ---          | ---          | ---           | 2.79        | 10.25       | ---         | ---         | ---          | ---         | 13.04        |
| 2.50        | 814,497         | 890.00          | ---          | ---          | ---          | ---           | 2.96        | 13.48       | ---         | ---         | ---          | ---         | 16.45        |
| 2.60        | 849,890         | 890.10          | ---          | ---          | ---          | ---           | 3.14        | 16.99       | ---         | ---         | ---          | ---         | 20.13        |
| 2.70        | 885,283         | 890.20          | ---          | ---          | ---          | ---           | 3.33        | 20.76       | ---         | ---         | ---          | ---         | 24.08        |
| 2.80        | 920,676         | 890.30          | ---          | ---          | ---          | ---           | 3.51        | 24.77       | ---         | ---         | ---          | ---         | 28.28        |
| 2.90        | 956,069         | 890.40          | ---          | ---          | ---          | ---           | 3.70        | 29.00       | ---         | ---         | ---          | ---         | 32.71        |
| 3.00        | 991,462         | 890.50          | ---          | ---          | ---          | ---           | 3.90        | 33.46       | ---         | ---         | ---          | ---         | 37.36        |
| 3.10        | 1,026,854       | 890.60          | ---          | ---          | ---          | ---           | 4.09        | 38.13       | ---         | ---         | ---          | ---         | 42.22        |
| 3.20        | 1,062,247       | 890.70          | ---          | ---          | ---          | ---           | 4.29        | 42.99       | ---         | ---         | ---          | ---         | 47.28        |
| 3.30        | 1,097,640       | 890.80          | ---          | ---          | ---          | ---           | 4.50        | 48.04       | ---         | ---         | ---          | ---         | 52.54        |
| 3.40        | 1,133,033       | 890.90          | ---          | ---          | ---          | ---           | 4.70        | 53.28       | ---         | ---         | ---          | ---         | 57.98        |
| 3.50        | 1,168,426       | 891.00          | ---          | ---          | ---          | ---           | 4.91        | 58.71       | ---         | ---         | ---          | ---         | 63.62        |
| 3.60        | 1,204,824       | 891.10          | ---          | ---          | ---          | ---           | 5.12        | 64.30       | ---         | ---         | ---          | ---         | 69.42        |
| 3.70        | 1,240,822       | 891.20          | ---          | ---          | ---          | ---           | 5.34        | 70.05       | ---         | ---         | ---          | ---         | 75.39        |
| 3.80        | 1,277,020       | 891.30          | ---          | ---          | ---          | ---           | 5.56        | 75.97       | ---         | ---         | ---          | ---         | 81.53        |
| 3.90        | 1,313,218       | 891.40          | ---          | ---          | ---          | ---           | 5.78        | 82.05       | ---         | ---         | ---          | ---         | 87.82        |
| 4.00        | 1,349,416       | 891.50          | ---          | ---          | ---          | ---           | 6.00        | 88.27       | ---         | ---         | ---          | ---         | 94.27        |
| 4.10        | 1,385,614       | 891.60          | ---          | ---          | ---          | ---           | 6.23        | 94.65       | ---         | ---         | ---          | ---         | 100.88       |
| 4.20        | 1,421,813       | 891.70          | ---          | ---          | ---          | ---           | 6.46        | 101.18      | ---         | ---         | ---          | ---         | 107.63       |
| 4.30        | 1,458,011       | 891.80          | ---          | ---          | ---          | ---           | 6.69        | 107.85      | ---         | ---         | ---          | ---         | 114.53       |
| 4.40        | 1,494,209       | 891.90          | ---          | ---          | ---          | ---           | 6.92        | 114.66      | ---         | ---         | ---          | ---         | 121.58       |
| 4.50        | 1,530,406       | 892.00          | ---          | ---          | ---          | ---           | 7.16        | 121.62      | ---         | ---         | ---          | ---         | 128.78       |

...End





## Water Quality Volume

Project: Voice of America Park Designed By: GJK Date: 4/16/12  
Job No.: 07M056.006 Checked By: \_\_\_\_\_ Date: \_\_\_\_\_  
Basin ID: WQ Basin (Lake #1) Revised By: \_\_\_\_\_ Date: \_\_\_\_\_

### Required Water Quality Volume

$$WQ_v = P C A / 12$$

Site Drainage Area (A) = 24.30 acres (To Basin)  $WQ_v =$  0.304 acre-ft.  
Rainfall Depth (P) = 0.75 in. Sediment Storage Allowance = -25 %  
Sediment Storage Allowance = -0.08 Ac-ft  
Runoff Coefficient (C) = 0.2  
**Total  $WQ_v =$  0.228 Ac-ft  
= 9,924 cu.ft.**

### Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 24 hours

**$Q_{wqv} =$  0.115 cfs**

Provided Retention Time (PT) 44.21 hours

### Water Quality Outlet Orifice

#### Contour Areas

|              | Elevation<br>ft | Area<br>ft <sup>2</sup> | Volume<br>ft <sup>3</sup> | Cum. Vol.<br>ft <sup>3</sup> | Elevation<br>at V | Storage<br>at Elev |
|--------------|-----------------|-------------------------|---------------------------|------------------------------|-------------------|--------------------|
| Basin Inv. = | 884.50          | 79,803                  | 0.00                      | 0.00                         |                   |                    |
| Contour 1 =  | 885.00          | 88,336                  | 42034.75                  | 42034.75                     | 884.62            | 9923.51            |
| Contour 2 =  | 886.00          | 87,471                  | 87903.50                  | 129938.25                    |                   |                    |
| Contour 3 =  | 887.00          | 92,703                  | 90087.00                  | 220025.25                    |                   |                    |

$$Q = C L H^{3/2}$$

$C_d =$  3.00  
 $L =$  6.00 in  
 $H =$  1.44 in  
 $Q =$  0.062 cfs



## Water Quality Volume

Project: Voice of America Park      Designed By: GJK      Date: 4/16/12  
 Job No.: 07M056.006      Checked By: \_\_\_\_\_      Date: \_\_\_\_\_  
 Basin ID: WQ Basin (Lake #2)      Revised By: \_\_\_\_\_      Date: \_\_\_\_\_

### Required Water Quality Volume

$$WQ_v = P C A / 12$$

Site Drainage Area (A) = 16.70 acres      (To Basin)       $WQ_v =$  0.209 acre-ft.  
 Rainfall Depth (P) = 0.75 in.      Sediment Storage Allowance = -25 %  
                                                                                                                          Sediment Storage Allowance = -0.05 Ac-ft  
 Runoff Coefficient (C) = 0.2      **Total  $WQ_v =$  0.157 Ac-ft**  
                                                                                                                          **= 6,820 cu.ft.**

### Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 24 hours

$$Q_{wqv} = \underline{0.079 \text{ cfs}}$$

Provided Retention Time (PT) 79.88 hours

### Water Quality Outlet Orifice

#### Contour Areas

|              | Elevation<br>ft | Area<br>ft <sup>2</sup> | Volume<br>ft <sup>3</sup> | Cum. Vol.<br>ft <sup>3</sup> | Elevation<br>at V | Storage<br>at Elev |
|--------------|-----------------|-------------------------|---------------------------|------------------------------|-------------------|--------------------|
| Basin Inv. = | 887.70          | 54,989                  | 0.00                      | 0.00                         |                   |                    |
| Contour 1 =  | 888.00          | 80,959                  | 20392.20                  | 20392.20                     | 887.80            | 6819.86            |
| Contour 2 =  | 889.00          | 110,891                 | 95925.00                  | 116317.20                    |                   |                    |

$$Q = C L H^{3/2}$$

$C_d =$  3.00  
 $L =$  3.00 in  
 $H =$  1.20 in  
 $Q =$  0.024 cfs



## Water Quality Volume

Project: Voice of America Park      Designed By: GJK      Date: 4/4/12  
Job No.: 07M056.006      Checked By:      Date:        
Basin ID: WQ Basin (Lake #3)      Revised By: GJK      Date: 4/14/12

### Required Water Quality Volume

$$WQ_v = P C A/12$$

Site Drainage Area (A) = 63.60 acres (To Basin)       $WQ_v = 0.795$  acre-ft.  
Rainfall Depth (P) = 0.75 in.      Sediment Storage Allowance = -25 %  
Runoff Coefficient (C) = 0.2      Sediment Storage Allowance = -0.20 Ac-ft  

$\text{Total } WQ_v = 0.596 \text{ Ac-ft}$   
 $= 25,973 \text{ cu.ft.}$

### Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 24 hours

$Q_{wqv} = 0.301 \text{ cfs}$

Provided Retention Time (PT) 1371.37 hours

### Water Quality Outlet Orifice

#### Contour Areas

|              | Elevation<br>ft | Area<br>ft <sup>2</sup> | Volume<br>ft <sup>3</sup> | Cum. Vol.<br>ft <sup>3</sup> | Elevation<br>at V | Storage<br>at Elev |
|--------------|-----------------|-------------------------|---------------------------|------------------------------|-------------------|--------------------|
| Basin Inv. = | 881.50          | 148,454                 | 0.00                      | 0.00                         |                   |                    |
| Contour 1 =  | 882.00          | 154,399                 | 75713.25                  | 75713.25                     | 881.67            | 25972.65           |
| Contour 2 =  | 883.00          | 164,258                 | 159328.50                 | 235041.75                    |                   |                    |
| Contour 3 =  | 884.00          | 147,071                 | 155664.50                 | 390706.25                    |                   |                    |
| Contour 4 =  | 885.00          | 183,937                 | 165504.00                 | 556210.25                    |                   |                    |
| Contour 5 =  | 886.00          | 207,023                 | 195480.00                 | 751690.25                    |                   |                    |

$$Q = N C_d A_o (2 g \Delta h)^{1/2}$$

$C_d = 0.61$

$A_o = 0.02 \pi D^2/4$  for circular orifices;  $= h * w$  for rectangular orifices

$g = 32.20 \text{ ft/sec}^2$

$Q = 0.005 \text{ cfs}$

Orifice h = 2.000 inch      Orifice w = 0.00 inch (= 0 for circular orifice)  
Number of orifices = N = 1

$\Delta h_{avg} = (\text{Elev at V} - \text{Basin Inv})/2 - 1/2 h = 0.00 \text{ ft}$



## Water Quality Volume

Project: Voice of America Park  
Job No.: 07M056.006  
Basin ID: WQ Basin (Lake #4)

Designed By: GJK  
Checked By:  
Revised By:

Date: 4/16/12  
Date:  
Date:

### Required Water Quality Volume

$$WQ_v = P C A / 12$$

Site Drainage Area (A) = 22.00 acres (To Basin)  $WQ_v = 0.275$  acre-ft.

Rainfall Depth (P) = 0.75 in. Sediment Storage Allowance = -25 %  
Sediment Storage Allowance = -0.07 Ac-ft

Runoff Coefficient (C) = 0.2

|                |              |
|----------------|--------------|
| Total $WQ_v$ = | 0.206 Ac-ft  |
| =              | 8,984 cu.ft. |

### Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 24 hours

|             |           |
|-------------|-----------|
| $Q_{wqv} =$ | 0.104 cfs |
|-------------|-----------|

Provided Retention Time (PT) 138.32 hours

### Water Quality Outlet Orifice

#### Contour Areas

|              | Elevation<br>ft | Area<br>ft <sup>2</sup> | Volume<br>ft <sup>3</sup> | Cum. Vol.<br>ft <sup>3</sup> | Elevation<br>at V | Storage<br>at Elev |
|--------------|-----------------|-------------------------|---------------------------|------------------------------|-------------------|--------------------|
| Basin Inv. = | 889.50          | 100,586                 | 0.00                      | 0.00                         |                   |                    |
| Contour 1 =  | 890.00          | 103,743                 | 51082.25                  | 51082.25                     | 889.59            | 8984.25            |
| Contour 2 =  | 891.00          | 110,129                 | 106936.00                 | 158018.25                    |                   |                    |
| Contour 3 =  | 892.00          | 116,611                 | 113370.00                 | 271388.25                    |                   |                    |
| Contour 4 =  | 893.00          | 123,187                 | 119899.00                 | 391287.25                    |                   |                    |

$$Q = C L H^{3/2}$$

$C_d = 3.00$   
 $L = 3.00$  in  
 $H = 1.00$  in  
 $Q = 0.018$  cfs





## Water Quality Volume

Project: Voice of America Park  
 Job No.: 07M056.006  
 Basin ID: WQ Basin (Lake #5)

Designed By: GJK  
 Checked By:  
 Revised By:

Date: 4/16/12  
 Date:  
 Date:

### Required Water Quality Volume

$$WQ_v = P C A / 12$$

Site Drainage Area (A) = 67.30 acres (To Basin)  $WQ_v = 0.841$  acre-ft.  
 Rainfall Depth (P) = 0.75 in. Sediment Storage Allowance = -25 %  
 Sediment Storage Allowance = -0.21 Ac-ft  
 Runoff Coefficient (C) = 0.2

|                                               |
|-----------------------------------------------|
| Total $WQ_v = 0.631$ Ac-ft<br>= 27,484 cu.ft. |
|-----------------------------------------------|

### Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 24 hours

|                       |
|-----------------------|
| $Q_{wqv} = 0.318$ cfs |
|-----------------------|

Provided Retention Time (PT) 317.35 hours

### Water Quality Outlet Orifice

#### Contour Areas

|              | Elevation<br>ft | Area<br>ft <sup>2</sup> | Volume<br>ft <sup>3</sup> | Cum. Vol.<br>ft <sup>3</sup> | Elevation<br>at V | Storage<br>at Elev |
|--------------|-----------------|-------------------------|---------------------------|------------------------------|-------------------|--------------------|
| Basin Inv. = | 887.50          | 321,879                 | 0.00                      | 0.00                         |                   |                    |
| Contour 1 =  | 888.00          | 326,812                 | 162172.75                 | 162172.75                    | 887.58            | 27483.64           |
| Contour 2 =  | 889.00          | 338,236                 | 332524.00                 | 494696.75                    |                   |                    |
| Contour 3 =  | 890.00          | 351,020                 | 344628.00                 | 839324.75                    |                   |                    |
| Contour 4 =  | 891.00          | 356,916                 | 353968.00                 | 1193292.75                   |                   |                    |

$$Q = C L H^{3/2}$$

$C_d = 3.00$   
 $L = 4.00$  in  
 $H = 1.00$  in  
 $Q = 0.024$  cfs